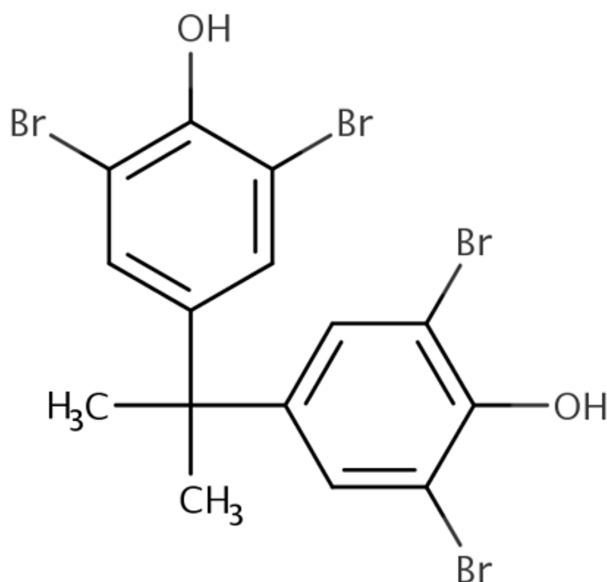

**Draft Data Quality Evaluation and Data Extraction Information for
Environmental Fate and Transport for
4,4-(1-Methylethylidene)bis[2,6-dibromophenol] (TBBPA)**

Systematic Review Support Document for the Draft Risk Evaluation

CASRN: 79-94-7



May 2026

This supplemental file contains information regarding the data extraction and evaluation results for data sources that were considered for the *Draft Risk Evaluation for 4,4'-(1-Methylethylidene)bis[2, 6-dibromophenol] (TBBPA)* and that underwent systematic review. EPA used the TSCA systematic review process described in the *Draft Systematic Review Protocol Supporting TSCA Risk Evaluations for Chemical Substances* (also referred to as the '2021 Draft Systematic Review Protocol'). The systematic review steps are further described in the *Draft Systematic Review Protocol for 4,4'-(1-Methylethylidene)bis[2, 6-dibromophenol] (TBBPA)*. EPA conducted data extractions and data quality evaluations based on author-reported descriptions and results; additional analyses (*e.g.*, statistical analyses) potentially conducted by EPA are not contained in this supplemental file. Additionally, the overall quality determination (OQD) for each reference represents the data as a whole for each study, and not for individual metric domains within a study.

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1927673	He, M. J., Luo, X. J., Yu, L. H., Liu, J., Zhang, X. L., Chen, S. J., Chen, D., Mai, B. X. (2010). Tetrabromobisphenol-A and hexabromocyclododecane in birds from an e-waste region in South China: Influence of diet on diastereoisomer- and enantiomer-specific distribution and trophodynamics. Environmental Science & Technology 44(15):5748-5754.	366
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11312629	Gong, H., Hu, J., Rui, X., Luo, J., Zhu, N. (2023). Unveiling the occurrence, distribution, removal, and environmental impacts of 65 emerging contaminants in neglected fresh leachate from municipal solid waste incineration plants. Journal of Hazardous Materials 460:132355.	391
5622511	Han, W., Luo, L., Zhang, S. (2013). Adsorption of tetrabromobisphenol A on soils: Contribution of soil components and influence of soil properties. Colloids and Surfaces A: Physicochemical and Engineering Aspects 428:60-64.	394
5348243	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.	396
10114302	Lan, J., Shen, Z., Gao, W., Liu, A. (2019). Occurrence of bisphenol-A and its brominated derivatives in tributary and estuary of Xiaoqing River adjacent to Bohai Sea, China. Marine Pollution Bulletin 149:1.	400

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5636571	Sun, Z., Yu, Y., Mao, L., Feng, Z., Yu, H. (2008). Sorption behavior of tetrabromobisphenol A in two soils with different characteristics. <i>Journal of Hazardous Materials</i> 160(2-3):456-461.	414
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10114428	Wang, X., Li, C., Yuan, X., Yang, S. (2020). Contamination Level, Distribution Characteristics, and Ecotoxicity of Tetrabromobisphenol A in Water and Sediment from Weihe River Basin, China. <i>International Journal of Environmental Research and Public Health</i> 17(11):3750.	420
10117951	Xie, J., Zhao, N., Zhang, Y., Hu, H., Zhao, M., Jin, H. (2022). Occurrence and partitioning of bisphenol analogues, triclocarban, and triclosan in seawater and sediment from East China Sea. <i>Chemosphere</i> 287(Pt 2):132218.	422
4181948	Yang, S., Wang, S., Zheng, B., Wu, F., Fu, Q. (2015). Sorption-desorption characteristics of tetrabromobisphenol A on humin and sediment of Lake Chaohu, China. <i>Environmental and Engineering Geoscience</i> 21(2):91-99.	425
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5519140	Cheng, H., Hua, Z. (2018). Distribution, release and removal behaviors of tetrabromobisphenol A in water-sediment systems under prolonged hydrodynamic disturbances. <i>Science of the Total Environment</i> 636:402-410.	452
5519135	Cheng, H., Hua, Z., Wang, L., Wang, Y., Xie, Z., Zhu, T. (2019). Relative effects of wind-induced disturbances and vegetation on tetrabromobisphenol A cycling in shallow lakes: Direct and indirect effects. <i>Environmental Pollution</i> 252(Pt A):794-803.	454
11312629	Gong, H., Hu, J., Rui, X., Luo, J., Zhu, N. (2023). Unveiling the occurrence, distribution, removal, and environmental impacts of 65 emerging contaminants in neglected fresh leachate from municipal solid waste incineration plants. <i>Journal of Hazardous Materials</i> 460:132355.	456
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5348243	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.	462
5496627	Islam, M. S., Zhou, H., Zytner, R. G. (2014). Comparison of behaviour and fate of tetrabromobisphenol A (TBBPA) in membrane bioreactors and conventional activated sludge process. <i>Journal of Water Reuse and Desalination</i> 4(3):164-173.	466

TBBPA

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5622549	Kim, U., Oh, E. (2018). Mass-flow-based removal and transformation potentials for TBBPA, HBCDs and PBDEs during wastewater treatment processes. <i>Journal of Hazardous Materials</i> 355:82-88.	470
1927658	Li, Y., Zhou, Q., Wang, Y., Xie, X. (2011). Fate of tetrabromobisphenol A and hexabromocyclododecane brominated flame retardants in soil and uptake by plants. <i>Chemosphere</i> 82(2):204-209.	472
3359132	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. <i>Environmental Science and Pollution Research</i> 23(16):16406-16416.	474
4182593	Luo, X. J., Zhang, X. L., Chen, S. J., Mai, B. X. (2010). Free and bound polybrominated diphenyl ethers and tetrabromobisphenol A in freshwater sediments. <i>Marine Pollution Bulletin</i> 60(5):718-724.	478
5622779	Mcphedran, K., Seth, R., Song, M., in, Chu, S., Letcher, R. J. (2013). Fate and mass balances of triclosan (TCS), tetrabromobisphenol A (TBBPA) and tribromobisphenol A (tri-BBPA) during the municipal wastewater treatment process. <i>Water Quality Research Journal of Canada</i> 48(3):255-265.	480
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6300802	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.	484
2539552	Ortuño, N., Moltó, J., Conesa, J. A., Font, R. (2014). Formation of brominated pollutants during the pyrolysis and combustion of tetrabromobisphenol A at different temperatures. <i>Environmental Pollution</i> 191:31-37.	486
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2942977	Takata, M., Watanabe, N., Yamamoto, S. (2015). Destruction of organic Cl and Br compounds through incineration enhanced by alkali and alumina addition. <i>Journal of Material Cycles and Waste Management</i> 17(2):282-289.	490
5547574	U.S. EPA, (1985). Chemical property and environmental behavior estimates for tetrabromobisphenol a - (TBBPA).	492
6305896	U.S. EPA, (2019). Proposed designation of 4,4'-(1-methylethylidene)bis [2,6-dibromophenol] (CASRN 79-94-7) as a high-priority substance for risk evaluation.	494
5546497	Velsicol Chem Corp, (1979). Photolysis of firemaster BP-4A.	496
1417731	Verslycke, T. A., Vethaak, A. D., Arijs, K., Janssen, C. R. (2005). Flame retardants, surfactants and organotins in sediment and mysid shrimp of the Scheldt estuary (The Netherlands). <i>Environmental Pollution</i> 136(1):19-31.	498
10113630	Wang, S., Wu, X., Guo, R., Wang, Q., Guo, H., Corvini, P. F. X., Sun, F., Ji, R. (2021). Long-term field study on fate, transformation, and vertical transport of tetrabromobisphenol A in soil-plant systems. <i>Environmental Science & Technology</i> 55(8):4607-4615.	500
1447752	Yang, S., Wang, S., Liu, H., Yan, Z. (2012). Tetrabromobisphenol A: tissue distribution in fish, and seasonal variation in water and sediment of Lake Chaohu, China. <i>Environmental Science and Pollution Research</i> 19(9):4090-4096.	503
1789485	Zhou, X., Guo, J., Lin, K., Huang, K., Deng, J. (2013). Leaching characteristics of heavy metals and brominated flame retardants from waste printed circuit boards. <i>Journal of Hazardous Materials</i> 246-247:96-102.	505
Other Properties		
List of Abbreviations and Acronyms for Data Quality Evaluation and Extraction Tables		507

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).
OECD Harmonized Template:	Photolysis in Air
HERO ID:	5238261

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	none; experimental; other: Non-guideline; direct photodegradation
Solvent, Reactivity, Storage, Stability	acetone; NR; NR; NR
Radiolabel, Source, State, Purity	14C-labelled TBBPA; NR; NR; radiochemical purity >98% Notes: NR
Duration and Test Temperature	not specified; 'various time periods'; not reported
Light Source, Intensity, and additional light details	UV-light; not reported; not reported
Source Wavelength Lower and Upper	254 nm; not reported
Test Details and Control	The test substance was irradiated on the surface of silica gel plates.; not reported
Initial Concentration, Reference Compound	not reported; not reported
Substance Wavelength Lower and Upper	not reported; not reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	not reported; 0.12 days; 1.1 days
Indirect Type Results, Indirect Rate Constant Lower and Upper	not reported; not reported; not reported
Method Details Results and Products Details Results	Degradation products determined by TLC and MS; 8 transitory degradation products found by TLC; 4 products identified by MS (structures provided in Figure 3.1)
Parameter Value and Parameter Results	Half-life for the initial phase = 0.12d; half-life for the second phase = 1.1d; loss of test material
Reference Substance Results, Percent Degradation Results and Standard Deviation Results	not reported; not reported; not reported
Results Remarks, Sample time Results, Results Details	Rapid degradation was observed; degradation curve was biphasic.; not reported; not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The purity of the test substance was reported.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	Details were not reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	N/A	Details were not reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions				

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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Photolysis in Air			
HERO ID:	5238261			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
	Metric 6:	Testing Conditions	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
	Metric 7:	Testing Consistency	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reporting was acceptable for a secondary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	Not applicable.

Overall Quality Determination**High**

* Related References: Primary source: Yu C. C. (1979). Photolysis of Firemaster BP-4A. Velsicol Chemical Corporation Laboratory Report, January 1979.

Study Citation:	ECB, (2008). Risk assessment of 2,2’,6,6’-tetrabromo-4,4’-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Photolysis in Air			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	none; experimental; other: Non-guideline; direct photodegradation			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; solid-state; NR Notes: NR			
Duration and Test Temperature	not specified; not reported			
Light Source, Intensity, and additional light details	UV-light; not reported; not reported			
Source Wavelength Lower and Upper	not reported; not reported			
Test Details and Control	not reported; not reported			
Initial Concentration, Reference Compound	not reported; not reported			
Substance Wavelength Lower and Upper	not reported; not reported			
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	not reported; not reported; not reported			
Indirect Type Results, Indirect Rate Constant Lower and Upper	not reported; not reported; not reported			
Method Details Results and Products	not reported; major product: 2,4,6-tribromophenol			
Details Results				
Parameter Value and Parameter Results	not reported; not reported			
Reference Substance Results, Percent Degradation Results and Standard Deviation Results	not reported; not reported; not reported			
Results Remarks, Sample time Results, Results Details	not reported; not reported; not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	N/A	Details were not reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	Details were not reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	N/A	Details were not reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Photolysis in Air			
HERO ID:	5238261			
		EVALUATION		
Domain		Metric	Rating	Comments
	Metric 6:	Testing Conditions	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
	Metric 7:	Testing Consistency	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Limited details were reported in this secondary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Complete details were not reported in this secondary source; detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable; however, no quantitative data were reported.
	Metric 18:	QSAR Models	N/A	Not applicable.

Overall Quality Determination

Medium

* Related References: Primary source: Sjödin A. (2000). Occupational and dietary exposure to organohalogen substances, with special emphasis on polybrominated diphenyl ethers. Doctoral Dissertation, Stockholm University.

Study Citation:	He, M., Li, X., Zhang, S., Sun, J., Cao, H., Wang, W. (2016). Mechanistic and kinetic investigation on OH-initiated oxidation of tetrabromobisphenol A. Chemosphere 153:262-269.
OECD Harmonized Template:	Photolysis in Air
HERO ID:	3203920

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Calculation; other: Computational determination of rate of OH-initiated oxidation
Solvent, Reactivity, Storage, Stability	NA; NA; NA; NA
Radiolabel, Source, State, Purity	NA; NA; NA; NA Notes: Used in computational investigation
Duration and Test Temperature	Not applicable; 298 K
Light Source, Intensity, and additional light details	Not applicable; Not applicable; Not applicable
Source Wavelength Lower and Upper	Not Reported; Not applicable
Test Details and Control	Thermodynamic calculations performed with Gaussian 09 program suite. Rate constants of initial reactions calculated using canonical transition state theory with Eckart tunneling effect.; Not applicable
Initial Concentration, Reference Compound	Not reported Not reported; Not Reported
Substance Wavelength Lower and Upper	Not applicable; Not applicable
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not reported; Not reported; Not Reported
Indirect Type Results, Indirect Rate Constant Lower and Upper	Hydroxyl radical reaction rate constant; Not Reported; $1.02 \times 10^{-12} \text{ cm}^3 / \text{molecule s}$
Method Details Results and Products Details Results	Rate constant calculated by modified Arrhenius expression: $k(T) = AT^n \exp(-E/[RT])$ Where R = ideal gas constant 8.314 J/K mol and A, n, E/R were determined for each elementary reaction; Intermediate products reported structurally, not by name
Parameter Value and Parameter Results	280.8 hours; Atmospheric lifetime
Reference Substance Results, Percent Degradation Results and Standard Deviation Results	Not reported; Not reported; Not reported
Results Remarks, Sample time Results, Results Details	Positive dependence on temperature.; Not reported; Atmospheric lifetime $T = 1/k[\text{OH}]$ Where [OH] = the atmospheric concentration of the hydroxyl radical $9.7\text{E}5 \text{ molecule cm}^{-3}$

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	N/A	The metric is not applicable to this study type.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The metric is not applicable to this study type.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to this study type.

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Study Citation:	He, M., Li, X., Zhang, S., Sun, J., Cao, H., Wang, W. (2016). Mechanistic and kinetic investigation on OH-initiated oxidation of tetrabromobisphenol A. Chemosphere 153:262-269.			
OECD Harmonized Template:	Photolysis in Air			
HERO ID:	3203920			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	Simulated conditions were appropriate.
	Metric 6:	Testing Conditions	High	Simulated conditions were adequately reported.
	Metric 7:	Testing Consistency	High	Simulated conditions were consistent amongst groups.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	N/A	The metric is not applicable to this study type.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability and uncertainty were accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Sufficient details on elementary reactions and other parameters were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Kinetic calculations were described and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (2015). Flame retardants in printed circuit boards. Final report.
OECD Harmonized Template:	Photolysis in Air
HERO ID:	7500050

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Not Reported
Confidentiality, Type, Guideline	Not Reported; Not Reported; Not Reported
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported
Duration and Test Temperature	Not Reported; Not Reported
Light Source, Intensity, and additional light details	Not Reported; Not Reported; Not Reported
Source Wavelength Lower and Upper	Not Reported; Not Reported
Test Details and Control	Photolysis of TBBPA in the presence of UV light and hydroxyl radicals; Not Reported
Initial Concentration, Reference Compound	Not Reported Not Reported; Not Reported
Substance Wavelength Lower and Upper	Not Reported; Not Reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not Reported; Not Reported; Not Reported
Indirect Type Results, Indirect Rate Constant Lower and Upper	50%/33 hour; Not Reported; Not Reported
Method Details Results and Products	Not Reported; TBBPA was no longer detected after 5-6 days with an estimated 33 hour half-life. TBBPA decomposition produced 2,4,6-tribromophenol and other bromine containing compounds that were not fully identified.
Details Results	Not Reported; Not Reported
Parameter Value and Parameter Results	Not Reported; Not Reported
Reference Substance Results, Percent Degradation Results and Standard	Not Reported; Not Reported; Not Reported
Deviation Results	Not Reported; Not Reported; Not Reported
Results Remarks, Sample time Results, Results Details	Not Reported; Not Reported; Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Limited details reported in this secondary source; detail may be in primary literature.

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Study Citation:	U.S. EPA, (2015). Flame retardants in printed circuit boards. Final report.			
OECD Harmonized Template:	Photolysis in Air			
HERO ID:	7500050			
Domain		Metric	EVALUATION Rating	Comments
	Metric 6:	Testing Conditions	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	Not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 18:	QSAR Models	N/A	Not applicable to this study type.

Overall Quality Determination

Medium

* Related References: Source (not in HERO at time of extraction): Eriksson J and Jakobsson E (1998) Decomposition of tetrabromobisphenol A in the presence of UV-light and hydroxyl radicals. Organohalogen Compounds 35:419-422.

Study Citation:	Bao, Y., Niu, J. (2015). Photochemical transformation of tetrabromobisphenol A under simulated sunlight irradiation: Kinetics, mechanism and influencing factors. Chemosphere 134:550-556.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	2861542

EXTRACTION				
Parameter		Data		
CASRN and Test Material		79-94-7; TBBPA		
Confidentiality, Type, Guideline		None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Photolysis kinetics of TBBPA using simulated sunlight irradiation		
Solvent, Reactivity, Storage, Stability		Methanol; NR; NR; NR		
Radiolabel, Source, State, Purity		NR; J&K Chemical, China; Stock solutions of 1.0g/L were prepared in methanol; 98.0% Notes: tetrabromobisphenol A (2,2',6,6'-tetrabromo-4,4'-isopropylidendiphenol)		
Duration and Test Temperature		3 hours; 20±2°C		
Light Source, Intensity, and additional light details		Xenon lamp; 500W; Xenon lamp: CHF-XM-500W from Trusttech, China		
Source Wavelength Lower and Upper		300; 800		
Test Details and Control		Photolysis of 50 mL of TBBPA without stirring; Dark controls: concentration of TBBPA (1 mg/L) changed within ±5%, indicating that the degradation without irradiation was negligible		
Initial Concentration and Reference Compound		0.1-10 mg/L; Not reported		
Substance Wavelength Lower and Upper		Not reported; Not reported		
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper		Not reported; Not reported; Not reported		
Indirect Rate Constant Lower and Upper		Not reported; Not reported		
Method Details Results and Products		The rate constants were calculated from linear regression of the corresponding semi-log plots; Br anion, bisphenol A, 2,6-dibromophenol, 2-bromophenol and phenol		
Parameter Value and Parameter Results		Not Reported; Not reported		
Reference Compound, Reference		Not reported; Not reported; Not reported; Not reported		
Substance Results, Percent Degradation Results and Standard Deviation Results				
Results Remarks, Sample time Results, Results Details		Rate constants of TBBPA at concentrations of 0.1-10 mg/L ranged from 3.03E-2/min to 0.7E-2/min with half lives ranging from 22.8 min to 99.02 min, respectively.; 0, 10, 20, 40, 60, 90, 120, 180 minutes; photodecomposition rate decreases with increasing pHSupplementary data 1 (not publicly available) summarizes the parameters including degradation rate, initial-final pH changes, k, half-lives (t1/2), and R2		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance identified by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Control was included and appropriate.
	Metric 4:	Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Bao, Y., Niu, J. (2015). Photochemical transformation of tetrabromobisphenol A under simulated sunlight irradiation: Kinetics, mechanism and influencing factors. Chemosphere 134:550-556.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	2861542			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6:	Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 7:	Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed and reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Details were omitted; however, the lack of data is not likely to hinder the interpretation of the results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	No confounding variables were noted or identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Details were omitted; however, the lack of data is not likely to hinder the interpretation of the results. Supplementary material would add detail.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	There were omissions in the calculation details; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results are reasonable. Supplementary material would add detail.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5238261

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	none; calculated; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): not specified
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Duration and Test Temperature	Not reported; Not reported
Light Source, Intensity, and additional light details	UV-light; Not reported; Not reported
Source Wavelength Lower and Upper	Not reported; Not reported
Test Details and Control	Half-life = 10.2 days in spring, 6.6 days in summer, 25.9 days in autumn, and 80.7 days in winter.; Not reported
Initial Concentration and Reference Compound	Not reported Not reported; Not reported
Substance Wavelength Lower and Upper	Not reported; Not reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not reported; 6.6 days; 80.7 days
Indirect Rate Constant Lower and Upper	Not reported; Not reported
Method Details Results and Products	Not reported; Not reported
Details Results	
Parameter Value and Parameter Results	Not reported; Not reported
Reference Compound, Reference	Not reported; Not reported; Not reported; Not reported
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	Not reported; Not reported; Estimates were based on an unpublished report and no further details are available

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified by name.
Metric 2:	Test Substance Purity	Medium	No details were reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design			
Metric 3:	Study Controls	N/A	No details were reported in this secondary source; detail may be in primary literature.
Metric 4:	Test Substance Stability	N/A	No details were reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions			
Metric 5:	Test Method Suitability	N/A	No details were reported in this secondary source; detail may be in primary literature.
Metric 6:	Testing Conditions	N/A	No details were reported in this secondary source; detail may be in primary literature.

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Study Citation:		ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).		
OECD Harmonized Template:		Photolysis in Water		
HERO ID:		5238261		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	N/A	No details were reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	N/A	No details were reported in this secondary source; detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable to this study.
	Metric 10:	Sampling Methods	N/A	Not applicable to this study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	N/A	No details were reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	N/A	No details were reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	No details were reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	N/A	No details were reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	No details were reported in this secondary source; detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Although no details were reported in this secondary source, the results are reasonable.
	Metric 18:	QSAR Models	N/A	No details were reported in this secondary source; detail may be in primary literature.

Overall Quality Determination

Low

* Related References: Cites a secondary source, HERO ID 6766403 (not in distiller at time of extraction) which cites an unpublished report.WHO (1995). Environmental Health Criteria 172. Tetrabromobisphenol A and derivatives. International Programme on Chemical Safety. World Health Organization, Geneva. Citing: Bayer (1990). Unpublished report. As quoted in WHO (1995).

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	Not Reported; degradation products; Not Reported			
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported			
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported			
Duration and Test Temperature	5 days; not reported			
Light Source, Intensity, and additional light details	solar light; not reported; not reported			
Source Wavelength Lower and Upper	not reported; not reported			
Test Details and Control	test substance was in acetonitrile; not reported			
Initial Concentration and Reference Compound	0.5 g/L; not reported			
Substance Wavelength Lower and Upper	not reported; not reported			
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	not reported; not reported; not reported			
Indirect Rate Constant Lower and Upper	not reported; not reported			
Method Details Results and Products Details Results	not reported; Main polar degradation products formed included 2,6-dibromophenol, 3-hydroxy-4-isopropylene-2,6-dibromophenol, and tribromophenol. Only trace amounts of debrominated derivatives of tetrabromobisphenol-A were found (e.g. tribromobisphenol-A, dibromobisphenol-A, bromobisphenol-A and bisphenol-A). A number of other, high molecular weight degradation products were also evident including 2,2'-dihydroxy-3,3'-dibromo-5,5'-di(3,5-dibromo-4-hydroxycumyl)- biphenyl and 2,6-dibromo-4-(3',5'-dibromo-4'-hydroxycumyl)-1-(3'',5''-dibromo-4''- hydroxy-phenoxy)-benzene.			
Parameter Value and Parameter Results	not reported; not reported			
Reference Compound, Reference Substance Results, Percent Degradation Results and Standard Deviation Results	not reported; not reported; not reported; not reported			
Results Remarks, Sample time Results, Results Details	not reported; not reported; not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	Test substance identified.
	Metric 2:	Test Substance Purity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 4:	Test Substance Stability	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
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Study Citation:		ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).		
OECD Harmonized Template:		Photolysis in Water		
HERO ID:		5238261		
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Low	Study was conducted in acetonitrile; however, acetonitrile is not expected to react or affect the results.
	Metric 6:	Testing Conditions	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 7:	Testing Consistency	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 8:	System Type and Design	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable to this study.
	Metric 10:	Sampling Methods	N/A	Not applicable to this study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Although limited details were reported in this secondary source; the results are reasonable
	Metric 18:	QSAR Models	N/A	Not applicable to this study.

Overall Quality Determination

Medium

* Related References: Primary source cited: Debrauwer L., Riu A., Jouahri M., Rathahao E., Jouanin I., Antignac J-P., Cariou R., LeBizec B. and Zalko D. (2005). Probing new approaches using atmospheric pressure photoionization for the analysis of brominated flame retardants and their related degradation products by liquid chromatography-mass spectrometry. J. Chromatogr. A, 1082, 98-109.

Study Citation:	ECB, (2008). Risk assessment of 2,2’,6,6’-tetrabromo-4,4’-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; Not Reported			
Confidentiality, Type, Guideline	Not Reported; experimental; Not Reported			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; N; NR; NR Notes: NR			
Duration and Test Temperature	varied; NR			
Light Source, Intensity, and additional light details	simulated solar light; 20 W; fluorescent tube			
Source Wavelength Lower and Upper	290; >290 nm			
Test Details and Control	glass vessels at various pHs (in the range 5.5 to 11).; NR			
Initial Concentration and Reference Compound	5 umol/L; NR			
Substance Wavelength Lower and Upper	NR; NR			
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	NR; NR; NR			
Indirect Rate Constant Lower and Upper	NR; NR			
Method Details Results and Products Details Results	NR; major degradation products found in this study were 4-hydroxyl-2,6-dibromophenol, 4-isopropyl-2,6-dibromophenol, 4-isopropylene-2,6-dibromophenol, 4-isopropyl-2,6-dibromophenol and 4-(2-hydroxyisopropyl)-2,6-dibromophenol			
Parameter Value and Parameter Results	NR; NR			
Reference Compound, Reference Substance Results, Percent Degradation Results and Standard Deviation Results	NR; NR; NR; NR			
Results Remarks, Sample time Results, Results Details	NR; NR; half-lives of 16 minutes at pH 10, 17 minutes at pH 9, 18 minutes at pH 8.1 and pH 7.9, 24 minutes at pH 7.4, 30 minutes at pH7.1, 41 minutes at pH 6.9, 99 minutes at pH 6.1 and 350 minutes at pH 5.5			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1: Metric 2:	Test Substance Identity Test Substance Purity	High Medium	The test substance was identified by name. Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 2: Test Design	Metric 3: Metric 4:	Study Controls Test Substance Stability	Medium Medium	Limited details were reported in this secondary source; additional detail may be in primary literature. Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	5238261			
Domain	Metric	EVALUATION		Comments
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions (e.g., temperature was not constant or was not in a standard range for the test but, results can be extrapolated to approximate appropriate temperatures); however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 8:	System Type and Design	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not appropriate for this type of study
	Metric 10:	Sampling Methods	N/A	Not appropriate for this type of study
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not appropriate for this type of study
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Although, limited details were reported in this secondary source; similar results were seen in other cited studies.
	Metric 18:	QSAR Models	N/A	Not appropriate for this type of study

Overall Quality Determination**Medium**

* Related References: Primary source cited: Cantillana T., Eriksson J. and Bergman Å (2004). TBBPA and its derivatives. Synthesis and photochemical reactions. Results presented at SETAC Europe 14th Annual Meeting (abstract only).

Study Citation:	Eriksson, J., Rahm, S., Green, N., Bergman, A., Jakobsson, E. (2004). Photochemical transformations of tetrabromobisphenol A and related phenols in water. Chemosphere 54(1):117-126.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	645880

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; 3,3',5,5'-TBBPA
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Photochemical transformation in water
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich Chemical Company, Inc.; NR; NR
Duration and Test Temperature	Not reported; Not reported
Light Source, Intensity, and additional light details	Fluorescent tube; Not reported; Fluorescent tube was placed in the middle of a cylinder isolated by a glass wall
Source Wavelength Lower and Upper	250; 400
Test Details and Control	Using a double beam spectrophotometer UV spectra was recorded in water for the determination of quantum yield disappearance; uncertainty in measurement of the irradiance of the individual fluorescent tubes was $\pm 15\%$ for wavelengths < 320 nm and $\pm 10\%$ for wavelengths between 320 and 400 nm.; Not reported
Initial Concentration and Reference Compound	77 μ M; Not reported
Substance Wavelength Lower and Upper	Not reported; 310 nm
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Disappearance quantum yield = 0.039; Not reported; Half-life = 30 minutes
Indirect Rate Constant Lower and Upper	Not reported; Not reported
Method Details Results and Products	UV irradiation results at additional pH values were reported; First order rate constant for the disappearance of TriBBPA (a common impurity in TBBPA) = 0.034
Details Results	Not Reported; Mean first order rate constant k at pH 7.1 = 0.38 ($k \times 10^3/\text{sec}$; n=10)
Parameter Value and Parameter Results	Not reported; Not reported; Not reported; Not reported
Reference Compound, Reference	Not reported; Not reported; Not reported; Not reported
Substance Results, Percent Degradation Results and Standard Deviation Results	Reaction rate, half-life, and quantum yield were shown to be dependent on pH with higher pHs having faster rates, lower half-lives, and higher quantum yields.; Not reported; Not reported
Results Remarks, Sample time Results, Results Details	

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	Medium
Domain 2: Test Design	Metric 3:	Study Controls	Low
	Metric 4:	Test Substance Stability	Medium

The test substance was definitively identified.

The test substance source was reported; however, purity not reported or verified.

Concurrent control group/reference substance details were not included.

The test substance stability, homogeneity, and storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Study Citation:	Eriksson, J., Rahm, S., Green, N., Bergman, A., Jakobsson, E. (2004). Photochemical transformations of tetrabromobisphenol A and related phenols in water. Chemosphere 54(1):117-126.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	645880			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were some omissions in testing conditions; however, sufficient data results were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	N/A	Not applicable; multiple study groups were not reported.
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

* Related References: Cited in HSDB and ECHA

Study Citation:	Han, S. K., Bilski, P., Karriker, B., Sik, R. H., Chignell, C. F. (2008). Oxidation of flame retardant tetrabromobisphenol A by singlet oxygen. Environmental Science & Technology 42(1):166-172.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	2602696

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	no; experimental; Not Reported
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich Chemical Co. (Milwaukee, WI, USA); NR; NR Notes: NR
Duration and Test Temperature	5 minutes; room temperature
Light Source, Intensity, and additional light details	1 Kw Xe arc lamp; NR; NR
Source Wavelength Lower and Upper	NR; >400 nm
Test Details and Control	in the presence of photooxidizer rose bengal; in alkaline buffer (pH 10); Nr
Initial Concentration and Reference Compound	1 mM; NR
Substance Wavelength Lower and Upper	NR; NR
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	NR; NR; NR
Indirect Rate Constant Lower and Upper	NR; NR
Method Details Results and Products	NR; NR
Details Results	
Parameter Value and Parameter Results	NR; NR
Reference Compound, Reference	NR; NR; NR; NR
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	NR; NR; generates three radicals, one of which as identified as the 2,6-dibromo-p-benzosemiquinone radical

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The test substance source was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	This metric does not apply to this study type.
	Metric 4: Test Substance Stability	Low	The test substance stability was not reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	Medium	The test method appears suitable.

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Study Citation:	Han, S. K., Bilski, P., Karriker, B., Sik, R. H., Chignell, C. F. (2008). Oxidation of flame retardant tetrabromobisphenol A by singlet oxygen. Environmental Science & Technology 42(1):166-172.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	2602696			
Domain		Metric	EVALUATION Rating	Comments
	Metric 6:	Testing Conditions	Medium	Some testing conditions were reported.
	Metric 7:	Testing Consistency	Medium	The testing conditions were consistent.
	Metric 8:	System Type and Design	Medium	Equilibrium was not reported.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric does not apply to this study type.
	Metric 10:	Sampling Methods	N/A	This metric does not apply to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Uninformative	Study was done in the presence of a photooxidizer; not a desired endpoint.
	Metric 12:	Test Substance Purity	Low	Details regarding sampling methods of the outcome(s) were not fully reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Confounding variables were not reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric does not apply to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was suitable.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric does not apply to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	This metric does not apply to this study type.
Overall Quality Determination			Uninformative	

Study Citation:	Han, S. K., Sik, R. H., Motten, A. G., Chignell, C. F., Bilski, P. J. (2009). Photosensitized oxidation of tetrabromobisphenol a by humic acid in aqueous solution. Photochemistry and Photobiology 85(6):1299-1305.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5551726

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, Type, Guideline	None; experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): photosensitized oxidation by humic acid
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	None; Aldrich Chemical Co. (Milwaukee, WI); NR; NR Notes: TBBPA
Duration and Test Temperature	1200 s (from figure); room temperature
Light Source, Intensity, and additional light details	450 W Hg lamp; 1 kW Xe arc lamp; not reported; TBBPA doesn't absorb light over ca. 375 nm
Source Wavelength Lower and Upper	>400 nm; 650 nm (from figure)
Test Details and Control	Irradiation of humic acid produced singlet oxygen which reacted with TBBPA.; not reported
Initial Concentration and Reference Compound	1 mM; not reported
Substance Wavelength Lower and Upper	250 (from figure); 350 (from figure)
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	not reported; not reported; ~one third rate of TBBPA with humic acid
Indirect Rate Constant Lower and Upper	not reported; not reported
Method Details Results and Products	Reaction was quenched by addition of sodium azide which confirmed that reaction was dependent on singlet oxygen; not reported
Details Results	
Parameter Value and Parameter Results	Not Reported; oxygen consumption
Reference Compound, Reference	not reported; not reported; ~6% via direct photolysis and ~24% with humic acid (from figure); not reported
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	Not Reported; 600 seconds for direct photolysis and 700 seconds for indirect photolysis(from figure); A reaction mechanism was proposed and included generation of singlet oxygen which reacts with TBBPA to generate a peroxy-TBBPA diradical which degrades to 2,6-dibromo-p-benzosemiquinone anion radical (presence confirmed spectroscopically) which will produce 2,6-dibromo-p-benzoquinone in the presence of water or a hydrogen source.

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High The test substance was identified by name.
	Metric 2:	Test Substance Purity	High The source or purity of the test substance was reported.
Domain 2: Test Design			
	Metric 3:	Study Controls	N/A The study did not require concurrent control groups.

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Study Citation:	Han, S. K., Sik, R. H., Motten, A. G., Chignell, C. F., Bilski, P. J. (2009). Photosensitized oxidation of tetrabromobisphenol a by humic acid in aqueous solution. Photochemistry and Photobiology 85(6):1299-1305.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	5551726			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	Medium	Some test conditions across samples or study groups were not reported, but these discrepancies were not likely to have a substantial impact on study results.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	N/A	Details regarding sampling methods of the outcome(s) were not fully reported, and the omissions were likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups (if applicable) were reported in the study
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	kinetic calculations were not clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.

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Study Citation:	Han, S. K., Sik, R. H., Motten, A. G., Chignell, C. F., Bilski, P. J. (2009). Photosensitized oxidation of tetrabromobisphenol a by humic acid in aqueous solution. Photochemistry and Photobiology 85(6):1299-1305.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5551726

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18:	QSAR Models	N/A The metric is not applicable to this study type.

Overall Quality Determination	High
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Study Citation:	Han, S. K., Yamasaki, T., Yamada, K. (2016). Photodecomposition of tetrabromobisphenol A in aqueous humic acid suspension by irradiation with light of various wavelengths. Chemosphere 147:124-130.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	4326461

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Not Reported
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): LC-MS analysis to identify TBBPA photoproducts in alkaline buffer (pH 9.0)
Solvent, Reactivity, Storage, Stability	phosphate buffer in distilled water (pH 9.0); NR; Samples were prepared in the dark; NR
Radiolabel, Source, State, Purity	NR; Tokyo Chemical Industries; NR; 98%
Duration and Test Temperature	5 minutes; Room temperature
Light Source, Intensity, and additional light details	0.25 kW Hg lamp; Not Reported; Not Reported
Source Wavelength Lower and Upper	>300 nm; Not Reported
Test Details and Control	1.0 mg/mL humic acid added to test mixture; Sodium azide (20 mM) was added to scavenge singlet oxygen
Initial Concentration and Reference Compound	1.0 mM; Not Reported
Substance Wavelength Lower and Upper	Not Reported; Not Reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not Reported; Not Reported; Not Reported
Indirect Rate Constant Lower and Upper	Not Reported; Not Reported
Method Details Results and Products	Not Reported; Not Reported
Details Results	
Parameter Value and Parameter Results	Not Reported; Not Reported
Reference Compound, Reference	Not Reported; Not Reported; Not Reported; Not Reported
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	Not Reported; Not Reported; TBBPA degradation in the environment may occur through reactions with photochemically generated reactive species, including singlet oxygen and hydroxyl radicals. 2,6-dibromo-5-isopropenylphenol radical, 2,6-dibromobenzosemiquinone, and 2,6-dibromo-4-(2-hydroxypropan-2-yl)phenol were identified by LC-MS. Tribromohydroxybisphenol A was detected in the sodium azide control, indicating formation via OH radicals rather than 1-O2 (singlet oxygen).

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate blank and control groups were reported.
	Metric 4:	Test Substance Stability	High	The test substance storage and preparation conditions were reported and appropriate.

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Study Citation:	Han, S. K., Yamasaki, T., Yamada, K. (2016). Photodecomposition of tetrabromobisphenol A in aqueous humic acid suspension by irradiation with light of various wavelengths. Chemosphere 147:124-130.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	4326461			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups. Controlled variables were reported.
	Metric 8:	System Type and Design	Medium	The system type and design were not capable of appropriately maintaining substance concentrations or not described in detail but the deviation was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study group.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study group.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome assessment (i.e. rate not reported; however, degradation products and a degradation pathway were determined).
	Metric 12:	Test Substance Purity	High	Sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was accounted for and unlikely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical methods were suitable for detection and quantification of the target chemical and transformation products.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistic methods and kinetic calculations were described and addressed the datasets.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Han, S. K., Yamasaki, T., Yamada, K. (2016). Photodecomposition of tetrabromobisphenol A in aqueous humic acid suspension by irradiation with light of various wavelengths. Chemosphere 147:124-130.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	4326461

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Reactive species formed in aqueous TBBPA–humic acid suspensions above the TBBPA pKa (~7.4) under ambient and UV light were characterized using EPR spectroscopy and LC-MS
Solvent, Reactivity, Storage, Stability	phosphate buffer in distilled water (pH 9.0); NR; Samples were prepared in the dark; NR
Radiolabel, Source, State, Purity	NR; Tokyo Chemical Industries; aqueous; 98%
Duration and Test Temperature	70 min (per figure 4); Room temperature
Light Source, Intensity, and additional light details	0.25 kW Hg lamp; Ambient light: 2.8 W/m2 and Visible light (lamp): 950 W/m2; Not Reported
Source Wavelength Lower and Upper	ambient or >400 nm (visible light); Not Reported
Test Details and Control	2.0 mL clear Teflon tube, with continuous stirring at a constant speed; Dark controls included; generation of 2,6-DBSQ not observed in controls. Controls with sodium azide included to scavenge singlet oxygen.
Initial Concentration and Reference Compound	1.0 mM; Not Reported
Substance Wavelength Lower and Upper	Not Reported; at alkaline pH TBBPA has absorption max of 320 nm
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not Reported; Not Reported; Not Reported
Indirect Rate Constant Lower and Upper	Not Reported; Not Reported
Method Details Results and Products	EPR spectrometer with 10 mW microwave irradiation (9.438 GHz) and 0.063 mT field modulation (100 kHz); Not Reported
Details Results	
Parameter Value and Parameter Results	Not Reported; Not Reported
Reference Compound, Reference	Not Reported; No 2,6-DBSQ• was formed in the dark (0.8 W m ²).; Not Reported; Not Reported
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	Ambient light rate constant (2,6-dibromo-p-semiquinone radical formation) = 0.24 x 10 ⁻⁹ M/s, visible light rate constant (2,6-dibromo-p-semiquinone radical formation) = 8.4 x 10 ⁻⁹ M/s (experimental conditions: TBBPA 1.0 mM, HA 1.0 mg/mL, pH 9.0); <50 minutes; Under visible light (950 W m ²) and ambient light (2.8 W m ²), the generation rate of 2,6-DBSQ• had a rate constant of 8.4 x 10 M s ⁻¹ for visible light and 0.24 x 10 M s ⁻¹ for ambient light. Overall, the generation rate rose with increasing light intensity.

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate blank and control groups were reported.
	Metric 4:	Test Substance Stability	High	The test substance storage and preparation conditions were reported and appropriate.
Domain 3: Test Conditions				

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Study Citation:	Han, S. K., Yamasaki, T., Yamada, K. (2016). Photodecomposition of tetrabromobisphenol A in aqueous humic acid suspension by irradiation with light of various wavelengths. Chemosphere 147:124-130.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	4326461			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups. Controlled variables were reported.
	Metric 8:	System Type and Design	Medium	The system type and design were not capable of appropriately maintaining substance concentrations or not described in detail but the deviation was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study group.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study group.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was accounted for and unlikely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical methods were suitable for detection and quantification of the target chemical and transformation products.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistic methods and kinetic calculations were described and addressed the datasets.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Han, S. K., Yamasaki, T., Yamada, K. (2016). Photodecomposition of tetrabromobisphenol A in aqueous humic acid suspension by irradiation with light of various wavelengths. Chemosphere 147:124-130.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	4326461

Parameter		EXTRACTION		
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Reactive species formed in aqueous TBBPA–humic acid suspensions above the TBBPA pKa (~7.4) under ambient and UV light characterized using EPR spectroscopy and LC-MS.			
Solvent, Reactivity, Storage, Stability	phosphate buffer in distilled water (pH 9.0); NR; Samples were prepared in the dark; NR			
Radiolabel, Source, State, Purity	NR; Tokyo Chemical Industries; aqueous; 98%			
Duration and Test Temperature	up to 600 seconds; Room temperature			
Light Source, Intensity, and additional light details	0.25 kW Hg lamp; Visible light (lamp): 950 W/m2; Not Reported			
Source Wavelength Lower and Upper	>400 nm (visible light); Not Reported			
Test Details and Control	2.0 mL clear Teflon tube, with continuous stirring at a constant speed; pH adjusted with NaOH or HCl; Dark controls included; generation of 2,6-DBSQ not observed in controls. Controls with sodium azide included to scavenge singlet oxygen.			
Initial Concentration and Reference Compound	1.0 mM; Not Reported			
Substance Wavelength Lower and Upper	Not Reported; at alkaline pH, TBBPA has absorption max of 320 nm			
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not Reported; Not Reported; Not Reported			
Indirect Rate Constant Lower and Upper	Not Reported; Not Reported			
Method Details Results and Products	EPR spectrometer 10 mW microwave irradiation (9.438 GHz) and 0.063 mT field modulation (100 kHz); Not Reported			
Details Results				
Parameter Value and Parameter Results	Not Reported; Not Reported			
Reference Compound, Reference	Not Reported; Not Reported; Not Reported; results are the mean ± standard deviation (n = 4)			
Substance Results, Percent Degradation Results and Standard Deviation Results				
Results Remarks, Sample time Results, Results Details	Not Reported; 600 seconds per figure 3; Rate constant (1/s) of 2,6-dibromo-p-semiquinone radical formation (10^{-6} M) at pH 6.8, 8, 9, and 10 and humic acid concentration of 1.0 mg/mL: 0.0007, 0.0024, 0.0084, and 0.0120 (Fig 3A) up to 360 sec, the rate plateaus >360 sec. The reaction rate increased significantly at pH values above the compound's pKa, but showed little change at pH values below the pKa. This is consistent with the solubility of TBBPA in water increasing with pH.			
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate blank and control groups were reported.
	Metric 4:	Test Substance Stability	High	The test substance storage and preparation conditions were reported and appropriate.
Domain 3: Test Conditions				
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Study Citation:	Han, S. K., Yamasaki, T., Yamada, K. (2016). Photodecomposition of tetrabromobisphenol A in aqueous humic acid suspension by irradiation with light of various wavelengths. Chemosphere 147:124-130.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	4326461			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups. Controlled variables were reported.
	Metric 8:	System Type and Design	Medium	The system type and design were not capable of appropriately maintaining substance concentrations or not described in detail but the deviation was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study group.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study group.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was accounted for and unlikely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical methods were suitable for detection and quantification of the target chemical and transformation products.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistic methods and kinetic calculations were described and addressed the datasets.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Han, S. K., Yamasaki, T., Yamada, K. (2016). Photodecomposition of tetrabromobisphenol A in aqueous humic acid suspension by irradiation with light of various wavelengths. Chemosphere 147:124-130.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	4326461

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Reactive species formed in aqueous TBBPA–humic acid suspensions above the TBBPA pKa (~7.4) under ambient and UV light were characterized using EPR spectroscopy and LC-MS.
Solvent, Reactivity, Storage, Stability	phosphate buffer in distilled water (pH 9.0); NR; Samples were prepared in the dark; NR
Radiolabel, Source, State, Purity	NR; Tokyo Chemical Industries; aqueous; 98%
Duration and Test Temperature	up to 480 seconds; Room temperature
Light Source, Intensity, and additional light details	0.25 kW Hg lamp; Visible light (lamp): 950 W/m ² ; Not Reported
Source Wavelength Lower and Upper	>400 nm (visible light); Not Reported
Test Details and Control	2.0 mL clear Teflon tube, with continuous stirring at a constant speed for 10 s to ensure complete mixing 0-1.0 mg/mL humic acid added to test mixture; pH adjusted with NaOH or HCl; Dark controls included; generation of 2,6-DBSQ not observed in controls. Controls with sodium azide included to scavenge singlet oxygen.
Initial Concentration and Reference Compound	1.0 mM; Not Reported
Substance Wavelength Lower and Upper	Not Reported; at alkaline pH, TBBPA has absorption max of 320 nm
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not Reported; Not Reported; Not Reported
Indirect Rate Constant Lower and Upper	Not Reported; Not Reported
Method Details Results and Products	EPR spectrometer 10 mW microwave irradiation (9.438 GHz) and 0.063 mT field modulation (100 kHz); Not Reported
Details Results	
Parameter Value and Parameter Results	Not Reported; Not Reported
Reference Compound, Reference	Not Reported; Not Reported; Not Reported; results are the mean ± standard deviation (n = 4)
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	Not Reported; 480 seconds per figure 2; Rate constant (1/s) of 2,6-dibromo-p-semiquinone radical formation (10 ⁻⁶ M) at 0.1, 0.25, 0.5, and 1.0 mg/mL humic acid concentrations and pH 9: 0.0019, 0.0034, 0.0048, and 0.0084, respectively (Fig 2A) up to 480 sec, the rate plateaus >480 sec. In absence of humic acid, no radical formation was observed.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate blank and control groups were reported.
	Metric 4:	Test Substance Stability	High	The test substance storage and preparation conditions were reported and appropriate.

Domain 3: Test Conditions

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Study Citation:	Han, S. K., Yamasaki, T., Yamada, K. (2016). Photodecomposition of tetrabromobisphenol A in aqueous humic acid suspension by irradiation with light of various wavelengths. Chemosphere 147:124-130.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	4326461			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups. Controlled variables were reported.
	Metric 8:	System Type and Design	Medium	The system type and design were not capable of appropriately maintaining substance concentrations or not described in detail but the deviation was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study group.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study group.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was accounted for and unlikely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical methods were suitable for detection and quantification of the target chemical and transformation products.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistic methods and kinetic calculations were described and addressed the datasets.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	He, M., Li, X., Zhang, S., Sun, J., Cao, H., Wang, W. (2016). Mechanistic and kinetic investigation on OH-initiated oxidation of tetrabromobisphenol A. Chemosphere 153:262-269.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	3203920

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; calculation; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Computational determination of rate of OH-initiated oxidation
Solvent, Reactivity, Storage, Stability	NA; NA; NA; NA
Radiolabel, Source, State, Purity	NA; NA; NA; NA Notes: Used in computational investigation
Duration and Test Temperature	Not applicable; 298 K
Light Source, Intensity, and additional light details	Not applicable; Not applicable; Not applicable
Source Wavelength Lower and Upper	Not applicable; Not applicable
Test Details and Control	Thermodynamic calculations performed with Gaussian 09 program suite. Rate constants of initial reactions calculated using canonical transition state theory with Eckart tunneling effect.; Not applicable
Initial Concentration and Reference Compound	Not reported Not reported; Not reported
Substance Wavelength Lower and Upper	Not applicable; Not applicable
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not reported; Not Reported; Not reported
Indirect Rate Constant Lower and Upper	Not Reported; 1.93E-12 cm ³ /molecule-second
Method Details Results and Products	Rate constant calculated by modified Arrhenius expression: $k(T) = AT^n \exp(-E/[RT])$ Where R = ideal gas constant 8.314 J /K mol and A, n, E/R were determined for each elementary reaction; Major products are 2,6-dibromo-p-hydroquinone, 4-isopropylene-2,6-dibromophenol and 4-(2-hydroxyisopropyl)-2,6-dibromophenol
Details Results	Not Reported; Hydroxyl radical reaction rate constant
Parameter Value and Parameter Results	Not reported; Not reported; Not reported; Not reported
Reference Compound, Reference	
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	The reaction is prompted in water. Positive dependence on temperature; Not reported; Not Reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	N/A	Not applicable for computational studies.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to the study type.

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Study Citation:	He, M., Li, X., Zhang, S., Sun, J., Cao, H., Wang, W. (2016). Mechanistic and kinetic investigation on OH-initiated oxidation of tetrabromobisphenol A. Chemosphere 153:262-269.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	3203920			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	Simulated conditions were appropriate.
	Metric 6:	Testing Conditions	High	Simulated conditions were adequately reported.
	Metric 7:	Testing Consistency	High	Simulated conditions were consistent amongst groups.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	N/A	Not applicable for computational studies.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability and uncertainty were accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Sufficient details on elementary reactions and other parameters were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Kinetic calculations were described and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Li, Q., Wang, L., Zhang, L., Xie, H. (2019). Rapid degradation of tetrabromobisphenol A under the UV/TiO ₂ /KPS systems in alkaline aqueous solutions. Research on Chemical Intermediates 45(2):757-768.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5497489

EXTRACTION				
Parameter	Data			
CASRN and Test Material	Not Reported; TBBPA			
Confidentiality, Type, Guideline	none; experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Non-guideline: photooxidation in wastewater remediation - photocatalysis systems UV/TiO2/KPS in alkaline solutions			
Solvent, Reactivity, Storage, Stability	distilled water; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; Aladdin Industry Corporation; NR; 97% Notes: NR			
Duration and Test Temperature	120 minutes; not reported			
Light Source, Intensity, and additional light details	high-pressure mercury lamp; not reported; 100W			
Source Wavelength Lower and Upper	280 nm; 400 nm			
Test Details and Control	Experiments conducted in a rotating photoreactor with a central quartz tube cold well. TiO2 nanoparticles, concentrations tested ranged from 0-500 mg/L, were uniformly dispersed using an ultrasonic vibrator for 30 minutes; potassium persulfate concentrations tested ranged from 0.5-8mM, experimental pH values tested = 9, 10, 11, 12. Optimal conditions were examined.; not reported			
Initial Concentration and Reference Compound	50-80 mg/L; not reported			
Substance Wavelength Lower and Upper	not reported; not reported			
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	not reported; not reported; not reported			
Indirect Rate Constant Lower and Upper	not reported; not reported			
Method Details Results and Products	TBBPA: HPLC with UV-Vis detector set at 209 nm; Bromide: ion chromatography; TOC: Jena Multi N/C 2100 analyzer; CO2, H2O			
Details Results				
Parameter Value and Parameter Results	Not Reported; removal efficiency of TOC			
Reference Compound, Reference	not reported; not reported; ca. 70.1% TOC removal was observed in the UV/TiO2/KPS homo/heterogeneous photocatalysis system, 26.7% TOC			
Substance Results, Percent Degradation Results and Standard Deviation Results	removal was observed in the UV/TiO2 system, and 18.8% TOC removal was observed in the UV/KPS system; not reported			
Results Remarks, Sample time Results, Results Details	results reported for TBBPA = 50 mg/L, pH = 12, TiO2 = 200 mg/L, and KPS = 2 mM; KPS = 0 mM in UV/TiO2 system and TiO2 = 0 mg/L in UV/KPS system.; 180 minutes; The rate of bromide ion production was evaluated after 180 minutes of irradiation: the concentration of bromide was 27.7 mg/L in the UV/TiO2/KPS system, 17.5 mg/L in the UV/TiO2 system, and 1.01 mg/L in the UV/KPS system.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified clearly.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design	Metric 3:	Study Controls	Low	A dark control was not included; UV only control was not included.
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Study Citation:	Li, Q., Wang, L., Zhang, L., Xie, H. (2019). Rapid degradation of tetrabromobisphenol A under the UV/TiO ₂ /KPS systems in alkaline aqueous solutions. Research on Chemical Intermediates 45(2):757-768.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	5497489			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, the lack of detail was not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	There were minor differences between the assessment methodology and the intended outcome assessment; direct or indirect photolysis rates were not reported for UV irradiation alone. Non-industrial/experimental technology for wastewater removal.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited detail regarding analytical methods.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The study results were reasonable; however, did not address an outcome of interest.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**Medium**

Study Citation:	Sunday, M. O., Takeda, K., Sakugawa, H. (2020). Singlet oxygen photogeneration in coastal seawater: Prospect of large-scale modeling in seawater surface and its environmental significance. Environmental Science & Technology 54(10):6125-6133.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	10113612

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	no; calculation; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): calculation using reaction rate constants of IO ₂ and •OH from surface seawater with TBBPA
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: Calculation; TBBPA not directly tested
Duration and Test Temperature	NR; 20°C
Light Source, Intensity, and additional light details	solar simulator equipped with 500 W Xe lamp; NR; NR
Source Wavelength Lower and Upper	NR; NR
Test Details and Control	photoirradiation of seawater to determine the concentrations of singlet oxygen (IO ₂) and hydroxyl radicals (•OH); seawater samples obtained from Seto Inland Sea, Japan; NR
Initial Concentration and Reference Compound	NR NR; NR
Substance Wavelength Lower and Upper	NR; NR
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	NR; NR; NR
Indirect Rate Constant Lower and Upper	k (singlet oxygen) = 3.90x10 ⁸ M-1s-1; k (hydroxyl radical) = 4.80x10 ⁹ M-1s-1
Method Details Results and Products	based on the average concentration of Singlet oxygen (at steady state) of 3.28x10 ⁻¹⁴ M and concentration of OH radical (at steady state) of 8.96x10 ⁻¹⁸ M determined in this study; NR
Details Results	NR; NR
Parameter Value and Parameter Results	NR; NR
Reference Compound, Reference	NR; NR; NR; NR
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	half-lives are based on measured concentrations for IO ₂ and •OH using rate constants from the literature; NR; Indirect photolysis in seawater: Half-life for the reaction with singlet oxygen = 0.63 days; Half-life for the reaction with hydroxyl radicals = 186 days. Reference value rate constants for TBBPA were obtained from: Han, S. K.; Bilski, P.; Karriker, B.; Sik, R. H.; Chignell, C. F. Oxidation of flame retardant Tetrabromobisphenol A by singlet oxygen. Environ. Sci. Technol., 2008, 42(1), 166-172. https://www.ncbi.nlm.nih.gov/pubmed/18350892 and Zhang, J.; He, S. L.; Hou, M. F.; Wang, L. P.; Tian, L. J. Kinetics of the Ozonation of Tetrabromobisphenol-A in Wastewater. Advanced Materials Research, 2011, 383-390, 2945-2950. https://doi.org/10.4028/www.scientific.net/amr.383-390.2945

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	N/A	This metric is not applicable to the study.
Domain 2: Test Design				

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Study Citation:	Sunday, M. O., Takeda, K., Sakugawa, H. (2020). Singlet oxygen photogeneration in coastal seawater: Prospect of large-scale modeling in seawater surface and its environmental significance. Environmental Science & Technology 54(10):6125-6133.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	10113612			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 3:	Study Controls	N/A	This metric is not applicable to the study.
	Metric 4:	Test Substance Stability	N/A	This metric is not applicable to the study.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	N/A	This metric is not applicable to the study.
	Metric 6:	Testing Conditions	High	Conditions for calculation basis reported.
	Metric 7:	Testing Consistency	N/A	This metric is not applicable to the study.
	Metric 8:	System Type and Design	N/A	This metric is not applicable to the study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Rate constants were not measured in this study.
	Metric 12:	Test Substance Purity	N/A	This metric is not applicable to the study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	This metric is not applicable to the study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	N/A	This metric is not applicable to the study.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Calculations were clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible (i.e., rate constants from the literature were used for the calculation; while the source was details about the studies are unknown).
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination**Medium**

* Related References: The study cites HERO ID Han et al. (2009) (HERO ID 5551726) and Wang, X. et al. (2015) (HERO ID 4308866)

Study Citation:	Van Esch, G. J. (1995). Tetrabromobisphenol A and derivatives / first draft prepared by G. J. van Esch.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	6670287

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Calculated; Not Reported
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Duration and Test Temperature	NR; NR
Light Source, Intensity, and additional light details	NR; NR; NR
Source Wavelength Lower and Upper	NR; NR
Test Details and Control	Not Reported; NR
Initial Concentration and Reference Compound	NR NR; NR
Substance Wavelength Lower and Upper	NR; NR
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	NR; NR; NR
Indirect Rate Constant Lower and Upper	NR; NR
Method Details Results and Products	NR; NR
Details Results	
Parameter Value and Parameter Results	NR; NR
Reference Compound, Reference	NR; NR; NR; Not Reported
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	NR; NR; Half-life = 10.2 days in spring, 6.6 in summer, 25.9 in autumn, and 80.7days in winter.Cloud cover lengthened half-life by a factor of 2.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity were not reported in the secondary source.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Concurrent control group details were not reported in the secondary source.
	Metric 4:	Test Substance Stability	Medium	Test substance stability, homogeneity, preparation, and storage conditions were not reported in the secondary source.
Domain 3: Test Conditions				

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Study Citation:	Van Esch, G. J. (1995). Tetrabromobisphenol A and derivatives / first draft prepared by G. J. van Esch.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	6670287			
Domain	Metric	EVALUATION		Comments
	Metric 5:	Test Method Suitability	Medium	Test method details were not reported in the secondary source however there is no indication that the methodology for producing the information was biased towards a particular outcome.
	Metric 6:	Testing Conditions	Medium	Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 7:	Testing Consistency	Medium	Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 10:	Sampling Methods	N/A	Rating of this factor is not applicable to this kind of information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 12:	Test Substance Purity	Medium	Sampling methodology is unknown is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty were not reported in the secondary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited data is reported in the secondary source but study data are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	No statistical methods or kinetic calculations were reported in the secondary source.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results are reasonable based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.

Overall Quality Determination**Medium**

* Related References: Cites: Bayer (1990) Chemical dossier on tetrabromobisphenol A. Leverkusen, Germany, Bayer AG (Unpublished report).

Study Citation:	Waligroski, G. J., Grannas, A. M. (2014). Photochemical degradation of a brominated flame retardant (tetrabromobisphenol A) in ice under field and laboratory conditions. Abstracts of Papers of the American Chemical Society 248:COLL 286.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5622691

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	no; experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): not reported
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Duration and Test Temperature	NR; NR
Light Source, Intensity, and additional light details	NR; NR; NR
Source Wavelength Lower and Upper	NR; NR
Test Details and Control	Conducted in snow and ice in Barrow, Alaska; NR
Initial Concentration and Reference Compound	NR NR; NR
Substance Wavelength Lower and Upper	NR; NR
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	NR; NR; NR
Indirect Rate Constant Lower and Upper	NR; NR
Method Details Results and Products	NR; Efficiently degrade under direct photolysis conditions in frozen aqueous samples under natural barrows sunlight.
Details Results	
Parameter Value and Parameter Results	NR; NR
Reference Compound, Reference	NR; NR; NR; NR
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	NR; NR; NR

EVALUATION

Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	N/A	This metric cannot be evaluated due to the lack of information.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	This metric cannot be evaluated due to the lack of information.
	Metric 4:	Test Substance Stability	N/A	This metric cannot be evaluated due to the lack of information.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	N/A	This metric cannot be evaluated due to the lack of information.

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Study Citation:	Waligroski, G. J., Grannas, A. M. (2014). Photochemical degradation of a brominated flame retardant (tetrabromobisphenol A) in ice under field and laboratory conditions. Abstracts of Papers of the American Chemical Society 248:COLL 286.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	5622691			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	N/A	This metric cannot be evaluated due to the lack of information.
	Metric 7:	Testing Consistency	N/A	This metric cannot be evaluated due to the lack of information.
	Metric 8:	System Type and Design	N/A	This metric cannot be evaluated due to the lack of information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric cannot be evaluated due to the lack of information.
	Metric 10:	Sampling Methods	N/A	This metric cannot be evaluated due to the lack of information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	N/A	This metric cannot be evaluated due to the lack of information.
	Metric 12:	Test Substance Purity	N/A	This metric cannot be evaluated due to the lack of information.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	This metric cannot be evaluated due to the lack of information.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric cannot be evaluated due to the lack of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	N/A	This metric cannot be evaluated due to the lack of information.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric cannot be evaluated due to the lack of information.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Uninformative	No quantitative data reported; source is only an abstract.
	Metric 18:	QSAR Models	N/A	This metric cannot be evaluated due to the lack of information.

Overall Quality Determination

Uninformative

* Related References: No quantitative data; source is only an abstract.

Study Citation:	Wang, S., Wang, Z., Hao, C., Peijnenburg, W. (2019). A DFT/TDDFT study on the mechanisms of direct and indirect photodegradation of tetrabromo-bisphenol A in water. Chemosphere 220:40-46.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5554697

EXTRACTION

Parameter	Data
CASRN and Test Material	not reported; TBBPA
Confidentiality, Type, Guideline	no; calculation; transformation products; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Non-guideline:density functional theory calculations for analysis of indirect and direct photodegradation mechanisms with reactive oxygen species
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Duration and Test Temperature	Not applicable; Not applicable
Light Source, Intensity, and additional light details	Degradation with natural sunlight predicted; Not applicable; Not applicable
Source Wavelength Lower and Upper	Not applicable; Not applicable
Test Details and Control	Indirect photodegradation mechanisms with reactive oxygen species was evaluated using computational methods; mechanisms include addition and substitution reactions, and hydrogen abstraction. Calculations were performed using the Gaussian 09 software package; electronic absorption spectra calculations for the different dissociated states of TBBPA in water using density functional theory DFT and time dependent density functional theory TDDFT.; Not applicable
Initial Concentration and Reference Compound	Not applicable Not applicable; not reported
Substance Wavelength Lower and Upper	266 nm (neutral TBBPA); 308 nm (ionized TBBPA)
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	not reported; not reported; not reported
Indirect Rate Constant Lower and Upper	not reported; not reported
Method Details Results and Products Details Results	not reported; Neutral TBBPA reaction with hydroxyl radical: 7 transformation product structures identified along with water and bromide; including C1-C7 cleavage products 4-hydroxy-2,6-dibromophenol and a neutral radical. Neutral TBBPA: Ea (OH addition at C1) = 4.0 kcal/mol; Ea (OH addition at C2) = 1.3 kcal/mol; Ea (OH addition at C3) = 4.9 kcal/mol; Ea (OH addition at C5) = 3.9 kcal/mol; Ea (OH addition at C6) = 1.3 kcal/mol Neutral TBBPA reaction with singlet oxygen molecules: mechanism proposed with 2 main transformation product structures identified resulting from C1-C7 cleavage; Ea (1O2 addition) = 11.9 kcal/mol. Ionized TBBPA reaction with hydroxyl radical: 12 transformation product structures identified along with water and bromide; including C1-C7 cleavage products 4-hydroxy-2,6-dibromophenol and a neutral radical along with similar C7-C13 cleavage products. Ionized TBBPA: Ea (OH addition at C1) = 12.8 kcal/mol; Ea (OH addition at C2) = 1.2 kcal/mol; Ea (OH addition at C3) = 13.5 kcal/mol; Ea (OH addition at C5) = 5.6 kcal/mol; Ea (OH addition at C6) = 14.5 kcal/mol; Ea (OH addition at C8) = 6.2 kcal/mol; Ea (OH addition at C9) = 1.4 kcal/mol; Ea (OH addition at C11) = 1.9 kcal/mol; Ea (OH addition at C12) = 5.5 kcal/mol; Ea (OH addition at C13) = 1.7 kcal/mol Ionized TBBPA reaction with singlet oxygen molecules: mechanism proposed with 2 main transformation product structures identified resulting from C7-C13 cleavage; Ea (1O2 addition) = 5.4 kcal/mol.
Parameter Value and Parameter Results	not reported; not reported
Reference Compound, Reference	not reported; not reported; not reported; not reported
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	not reported; not reported; Direct photodegradation mechanisms of TBBPA in water: Neutral TBBPA reaction Ea (C1-C7 cleaved) = 34.2 kcal/mol; Ea (C6-C8 formed) = 26.1 kcal/mol; 3 transformation products structurally identified.Ionized TBBPA reaction Ea = (C1-C7 cleaved) = 52.9 kcal/mol; Ea (C7-C13 cleaved) = 46.9 kcal/mol; Ea (C6-C8 formed) = 41.5 kcal/mol; 5 transformation products structurally identified.

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Study Citation:	Wang, S., Wang, Z., Hao, C., Peijnenburg, W. (2019). A DFT/TDDFT study on the mechanisms of direct and indirect photodegradation of tetrabromo-bisphenol A in water. Chemosphere 220:40-46.				
OECD Harmonized Template:	Photolysis in Water				
HERO ID:	5554697				
Domain		Metric	EVALUATION Rating		Comments
Domain		Metric	EVALUATION Rating		Comments
Domain 1: Test Substance					
	Metric 1:	Test Substance Identity	High	The test substance was identified clearly.	
	Metric 2:	Test Substance Purity	N/A	The metric is not applicable to this type of study.	
Domain 2: Test Design					
	Metric 3:	Study Controls	N/A	The metric is not applicable to this type of study.	
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to this type of study.	
Domain 3: Test Conditions					
	Metric 5:	Test Method Suitability	High	The test method was suitable for the intended outcome of interest.	
	Metric 6:	Testing Conditions	N/A	The metric is not applicable to this type of study.	
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to this type of study.	
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this type of study.	
Domain 4: Test Organisms					
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this type of study.	
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this type of study.	
Domain 5: Outcome Assessment					
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.	
	Metric 12:	Test Substance Purity	N/A	The metric is not applicable to this type of study.	
Domain 6: Confounding/Variable Control					
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this type of study.	
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this type of study.	
Domain 7: Data Presentation and Analysis					
	Metric 15:	Data Reporting	N/A	The metric is not applicable to this type of study.	
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this type of study.	
Domain 8: Other					
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable and compared to literature values.	

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Study Citation:	Wang, S., Wang, Z., Hao, C., Peijnenburg, W. (2019). A DFT/TDDFT study on the mechanisms of direct and indirect photodegradation of tetrabromo-bisphenol A in water. Chemosphere 220:40-46.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5554697

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18:	QSAR Models	High
			The computational method was described and appropriate.

Overall Quality Determination	High
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Study Citation:	Wang, X., Hu, X., Zhang, H., Chang, F., Luo, Y. (2015). Photolysis kinetics, mechanisms, and pathways of tetrabromobisphenol A in water under simulated solar light irradiation. Environmental Science & Technology 49(11):6683-6690.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	4308866

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Photolysis in aqueous solution
Solvent, Reactivity, Storage, Stability	stock solutions in ultrapure water; NR; All stock solutions were refrigerated after preparation.; NR
Radiolabel, Source, State, Purity	No; Dr. Ehrenstofer Germany; NR; 99%
Duration and Test Temperature	180 minutes; pH 8.0
Light Source, Intensity, and additional light details	photochemical reaction chamber XPA-7; 20 mW/cm ² ; 350W-Xe, Xujiang, China
Source Wavelength Lower and Upper	>290; not reported
Test Details and Control	Irradiation conducted in quartz glass reaction cells placed 5.5 cm from lamp center. Initial pH fixed at 8 by adjusting with NaOH and HClO ₄ , but not controlled during reaction.; not reported
Initial Concentration and Reference Compound	10E-4 Molar; not reported
Substance Wavelength Lower and Upper	broad peak at ca. 230 (from supporting info); peak at ca. 310 (from supporting info)
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	not reported; not reported; not reported
Indirect Rate Constant Lower and Upper	not reported; not reported
Method Details Results and Products	ultra performance liquid chromatography (UPLC); hydroxyl-tribromobisphenol A; triBBPA; BiBBPA; 4-(2-hydroxyisopropyl)-2,6-dibromophenol; 4-isopropylene-2,6-dibromophenol; 2,6-dibromophenol
Details Results	
Parameter Value and Parameter Results	Not Reported; test material analysis
Reference Compound, Reference	not reported; not reported; not reported; relative errors less than 5%
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	Reaction pathways for reductive debromination under a nitrogen atmosphere, reaction with reactive oxygen species, and hv induced hydrolysis are proposed.; 2 hours; phototransformation rate = 0.0093/minutes (r-squared = 0.990) (from supporting info)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Photolysis in the presence of methanol (MEH),furfuryl alcohol (FA), sodium azide (NaN ₃), and rose bengal (RB) were conducted as references.
	Metric 4: Test Substance Stability	High	The test substance preparation and storage conditions were reported.
Domain 3: Test Conditions			

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Study Citation:	Wang, X., Hu, X., Zhang, H., Chang, F., Luo, Y. (2015). Photolysis kinetics, mechanisms, and pathways of tetrabromobisphenol A in water under simulated solar light irradiation. Environmental Science & Technology 49(11):6683-6690.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	4308866			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were some omissions in testing conditions; however, sufficient data results were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Testing was consistent across study groups.
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some analytical details were omitted; however this is not expected to have a significant impact on the results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however this is not expected to have a significant impact on the results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results are reasonable; however, limited due to lack of control and analytical detail.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Wang, Z., Cao, L., Wan, Y., Wang, J., Bai, F., Xie, P. (2021). Enhanced degradation of tetrabromobisphenol A by Fe ³⁺ /sulfite process under simulated sunlight irradiation. Chemosphere 285:31442-31442.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	10116343

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, Type, Guideline	no; experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Batch experiments with simulated sunlight system
Solvent, Reactivity, Storage, Stability	stock solution prepared in 0.1 M NaOH; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Macklin Biochemical Co., Ltd. (Shanghai, China); Not Reported; analytical grade (or better)
Duration and Test Temperature	30 minutes; 25 ± 1°C
Light Source, Intensity, and additional light details	xenon lamp simulated sunlight system; NR; xenon lamp (PL-X300D, Pulinsaisi, Beijing, China)
Source Wavelength Lower and Upper	NR; NR
Test Details and Control	Tested in a quartz beaker (500 mL) equipped with a thermostat and magnetic stirring (270 r/min), covered by aluminum foil to avoid the natural sunlight. pH adjusted by diluted sodium hydroxide (0.1 M) and sulfuric acid (0.1 M) solutions; NR
Initial Concentration and Reference Compound	5 µM; NR
Substance Wavelength Lower and Upper	NR; NR
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	NR; k(obs) = 0.0244 min ⁻¹ ; NR
Indirect Rate Constant Lower and Upper	NR; NR
Method Details Results and Products	HPLC - UV detection; NR
Details Results	
Parameter Value and Parameter Results	NR; test material
Reference Compound, Reference	NR; NR; NR; NR
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	NR; 30 min; k(obs) = 0.0244 min ⁻¹ (direct photolysis following pseudo-first-order kinetics).

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source of the test substance was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Study Citation:	Wang, Z., Cao, L., Wan, Y., Wang, J., Bai, F., Xie, P. (2021). Enhanced degradation of tetrabromobisphenol A by Fe ³⁺ /sulfite process under simulated sunlight irradiation. Chemosphere 285:31442-31442.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	10116343			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	Medium	The system type and design were likely capable of appropriately maintaining substance concentrations but the omission in system design was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques were not considered or accounted for in data evaluation resulting in some uncertainty; however, the deviations or omissions were not likely to have a substantial impact on study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were clearly described and address the dataset(s); no statistical analyses were conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination**High**

Study Citation:	Weng, R., Tian, F., Yu, Z., Ma, J., Lv, Y., Xi, B. (2021). Efficient mineralization of TBBPA via an integrated photocatalytic reduction/oxidation process mediated by MoS2/SnIn4S8 photocatalyst. Chemosphere 285:31542-31542.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	10116315			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-97-4; TBBPA			
Confidentiality, Type, Guideline	no; experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): non-guideline study			
Solvent, Reactivity, Storage, Stability	stock solution: 4 g/L in methanol; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Duration and Test Temperature	up to 6 hours; not specified; ambient assumed			
Light Source, Intensity, and additional light details	visible light; Not Reported; Not Reported			
Source Wavelength Lower and Upper	Not Reported; Not Reported			
Test Details and Control	Batch photocatalytic experiment; CELLAB500 multipoint reactor (Zhongjiaojinyuan Co. LTD, Beijing, China) coupled with six 40-mL quartz tubes; 0.25, 0.5, 0.75, and 1.0 g/L of MoS2/SnIn4S8 composite was added and the mixture as a photocatalyst. Controls w/o photocatalyst were not reported/clearly described.; NR			
Initial Concentration and Reference Compound	5, 10, 20 (100 μL TBBPA stock solution in 39.9 mL of deionized water) mg/L; NR			
Substance Wavelength Lower and Upper	NR; NR			
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	NR; NR; NR			
Indirect Rate Constant Lower and Upper	0.3724 h-1; 0.9999 h-1			
Method Details Results and Products	GC/MS; HPLC; debromination product: BPA			
Details Results	Ln(C/Co); test material			
Parameter Value and Parameter Results	NR; NR; 93.4% loss of test material with 21.3% mineralization; NR			
Reference Compound, Reference Substance Results, Percent Degradation Results and Standard Deviation Results	Not Reported; periodically; rate constant k = 0.9999, 0.7657, and 0.3837 at TBBPA concentration: 5, 10, 20 mg/L, respectively (Fig 4d, pH 7, 0.25 g/L photocatalyst)rate constant k = 0.4479, 0.7657, 0.6238, and 0.3724 at 0.25, 0.5, 0.75, and 1.0 g/L photocatalyst (Fig 4c, pH 7, 10 mg/L TBBPA)			
Results Remarks, Sample time Results, Results Details				
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	The source and purity of the test substance were not reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Uninformative	The study did not include or report crucial control groups that consequently made the study unusable.
	Metric 4:	Test Substance Stability	High	The test substance preparation conditions were reported.
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Study Citation:	Weng, R., Tian, F., Yu, Z., Ma, J., Lv, Y., Xi, B. (2021). Efficient mineralization of TBBPA via an integrated photocatalytic reduction/oxidation process mediated by MoS2/SnIn4S8 photocatalyst. Chemosphere 285:31542-31542.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	10116315			
Domain		Metric	EVALUATION Rating	Comments
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions (temperature not reported).
	Metric 7:	Testing Consistency	Medium	The conditions of the test were not fully documented.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Uninformative	Deficiencies in the outcome assessment methodology of the assessment or reporting were likely to have a substantial impact on results. No controls without a photocatalyst reported.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were not considered or accounted for in data evaluation resulting in some uncertainty.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	No statistical analyses were reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination			Uninformative	

Study Citation:	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. Environmental Science and Pollution Research 23(16):16406-16416.
OECD Harmonized Template:	Photolysis in Soil
HERO ID:	3359132

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; other: Not reported
Solvent, Reactivity, Storage, Stability	Isooctane; NR; Opaque bottles at -20°C; NR
Radiolabel, Source, State, Purity	NA; AccuStandard Inc., CT, USA; Liquid; >98%
Duration and Test Temperature	256 hours; 25°C
Light Source, Intensity, and additional light details	Not applicable; dark; Not Reported; Not applicable; Not applicable
Source Wavelength Lower and Upper	Not applicable; Not applicable
Test Details and Control	Soil sample packed into a column (15 cm length, 100 mm diameter), exposed to ozone at 0.3 mg L/g, flow rate 100 mL/min. Analysis conducted on degradation in 1 - 15 cm of soil. Ozone concentration based on the average atmospheric ozone concentration in south China.; 1 gram blank soil sample
Initial Concentration, Reference Compound	0.1 ug/g; Blank soil sample
Substance Wavelength Lower and Upper	not reported; not reported
Moisture and Soil Details	not reported; 1 kg clean soil sample collected from grassland by university in Guangzhou, China. Soil pH 7.58
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not Reported; Not Reported; Not Reported
Reference Compound, Method Details Results, and Products Details Results	Blank soil sample; Not Reported; not reported
Analytical Method and Analytical Details	GC-MS operated in electron impact ionization mode; LOD 3 ng/g; Samples extracted by ultrasonic extraction with acetone: n-hexane, concentrated by rotary evaporator, cleaned on column, concentrated again, reduced by N2 stream; recovery 82-95%
Parameter Value and Parameter Results	Not Reported; Not Reported
Reference Substance Results, Percent Degradation Results and Standard Deviation Results	18.5%/30 day; 33.37, 66.3, 73.2, 79.92, 87.65, 91.99, 95.2, and 98.86% on 1-3 cm surface soil; Not Reported
Results Remarks, Sample time Results, Results Details	Half-life: 2.5 hours; 2, 4, 8, 16, 32, 64, 128, and 256 hours; Degradation on 1-3 cm surface soil. average removal gradually decreased due to adsorption. Ozone utilization ratios for the first 2h: 9.27, 9.22, 6.02, 4.82, and 1.6 ng TBBPA / mg ozone at 1-3, 4-6, 7-9, 10-12, and 13-15 cm depth.

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
Domain 2: Test Design	Metric 3:	Study Controls	Medium
Analytical blanks were included for soil samples, the blank showed substance loss that may have been significant and was not explicitly addressed.			

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Study Citation:	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. Environmental Science and Pollution Research 23(16):16406-16416.			
OECD Harmonized Template:	Photolysis in Soil			
HERO ID:	3359132			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 4:	Test Substance Stability	High	Test substance preparation and storage conditions were reported and appropriate.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Appropriate test conditions were reported (light, temperature, pH), however some soil characteristics were not reported (organic matter content, moisture).
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Samples were collected with appropriate frequency however degradation rates were not calculated.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sorption inhibition of photodegradation was considered in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Percent recovery and limits of detection were reported and appropriate, the analytical method was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical methods were not explicitly applied.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. Environmental Science and Pollution Research 23(16):16406-16416.			
OECD Harmonized Template:	Photolysis in Soil			
HERO ID:	3359132			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	None; Experimental; other: Not reported			
Solvent, Reactivity, Storage, Stability	Isooctane; NR; Opaque bottles at -20°C; NR			
Radiolabel, Source, State, Purity	NA; AccuStandard Inc., CT, USA; Liquid; >98%			
Duration and Test Temperature	2 hours; 25°C			
Light Source, Intensity, and additional light details	Not applicable; dark; Not Reported; Not applicable; Not applicable			
Source Wavelength Lower and Upper	Not applicable; Not applicable			
Test Details and Control	Soil sample packed into a column (15 cm length, 44 mm diameter), exposed to ozone at 1, 3, 5, 7.5, and 10 mg L/g, flow rate 100 mL/min. Analysis conducted on degradation in 1 - 15 cm of soil.; 1 gram blank soil sample			
Initial Concentration, Reference Compound	0.1 ug/g; Blank soil sample			
Substance Wavelength Lower and Upper	not reported; not reported			
Moisture and Soil Details	not reported; 1 kg clean soil sample collected from grassland by university in Guangzhou, China. Soil pH 7.58			
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not Reported; Not Reported; Not Reported			
Reference Compound, Method Details Results, and Products Details Results	Blank soil sample; Not Reported; not reported			
Analytical Method and Analytical Details	GC-MS operated in electron impact ionization mode; LOD 3 ng/g; Samples extracted by ultrasonic extraction with acetone: n-hexane, concentrated by rotary evaporator, cleaned on column, concentrated again, reduced by N2 stream; recovery 82-95%			
Parameter Value and Parameter Results	Not Reported; Not Reported			
Reference Substance Results, Percent Degradation Results and Standard Deviation Results	18.5%/30 day; 32.89, 38.52, 85.07, 87.48, and 90.37%; Not Reported			
Results Remarks, Sample time Results, Results Details	Not Reported; 2 hours; Degradation on surface soil at 1, 3, 5, 7.5, and 10 mg/L ozone.			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Analytical blanks were included for soil samples, the blank showed substance loss that may have been significant and was not explicitly addressed.
	Metric 4:	Test Substance Stability	High	Test substance preparation and storage conditions were reported and appropriate.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
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Study Citation:	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. Environmental Science and Pollution Research 23(16):16406-16416.			
OECD Harmonized Template:	Photolysis in Soil			
HERO ID:	3359132			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	Medium	Appropriate test conditions were reported (light, temperature, pH), however some soil characteristics were not reported (organic matter content, moisture).
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Samples were collected with appropriate frequency however degradation rates were not calculated.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sorption inhibition of photodegradation was considered in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Percent recovery and limits of detection were reported and appropriate, the analytical method was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical methods were not explicitly applied.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. Environmental Science and Pollution Research 23(16):16406-16416.			
OECD Harmonized Template:	Photolysis in Soil			
HERO ID:	3359132			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	None; Experimental; other: Not reported			
Solvent, Reactivity, Storage, Stability	Isooctane; NR; Opaque bottles at -20°C; NR			
Radiolabel, Source, State, Purity	NA; AccuStandard Inc., CT, USA; Liquid; >98%			
Duration and Test Temperature	24 February - 15 April, 2014 (outdoors); 256 hours (indoors); Max. 28°C (outdoors); 25°C (indoors)			
Light Source, Intensity, and additional light details	Natural sunlight and artificial UV light; Not Reported; Max. 1.0 mW/cm^2 (outdoors); 1.0 mW/cm^2 (indoors); Sunlight; Artificial light: 16-W mercury UV lamp with filters			
Source Wavelength Lower and Upper	300 nm; 400 nm			
Test Details and Control	Not Reported; 1 gram blank soil sample			
Initial Concentration, Reference Compound	0.1 ug/g; Blank soil sample			
Substance Wavelength Lower and Upper	not reported; not reported			
Moisture and Soil Details	not reported; 1 kg clean soil sample collected from grassland by university in Guangzhou, China. Soil pH 7.58			
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not Reported; Not Reported; Not Reported			
Reference Compound, Method Details Results, and Products Details Results	Blank soil sample; Not Reported; not reported			
Analytical Method and Analytical Details	GC-MS operated in electron impact ionization mode; LOD 3 ng/g; Samples extracted by ultrasonic extraction with acetone: n-hexane, concentrated by rotary evaporator, cleaned on column, concentrated again, reduced by N2 stream; recovery 82-95%			
Parameter Value and Parameter Results	Not Reported; Not Reported			
Reference Substance Results, Percent Degradation Results and Standard Deviation Results	18.5%/30 day; Not Reported; 67.88% (outdoor) 83.29% (indoor)			
Results Remarks, Sample time Results, Results Details	Irradiance from 24-hour cycle of sunlight corresponded to 8 h artificial UV light under laboratory conditions.; 256 hours; Removal: 41.23%/2 hours (indoors); 44.28%/16 hours (outdoors). Solar exposure not constant and therefore rate was slower than indoor experiment.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Analytical blanks were included for soil samples, the blank showed substance loss that may have been significant and was not explicitly addressed.
	Metric 4:	Test Substance Stability	High	Test substance preparation and storage conditions were reported and appropriate.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
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Study Citation:	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. Environmental Science and Pollution Research 23(16):16406-16416.			
OECD Harmonized Template:	Photolysis in Soil			
HERO ID:	3359132			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	Medium	Appropriate test conditions were reported (light, temperature, pH), however some soil characteristics were not reported (organic matter content, moisture).
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Samples were collected with appropriate frequency however degradation rates were not calculated.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sorption inhibition of photodegradation was considered in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Percent recovery and limits of detection were reported and appropriate, the analytical method was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical methods were not explicitly applied.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Brenner, A., Mukmenev, I., Abeliovich, A., Kushmaro, A. (2006). Biodegradability of tetrabromobisphenol A and tribromophenol by activated sludge. Ecotoxicology 15(4):399-402.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	1414772

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; other; experimental; other: biodegradability by activated sludge
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	None; NR; NR; NR
Blank and Control	not reported; not reported
Oxygen and Inoculum	anaerobic; anaerobic; aerobic; anaerobic; aerobic/anaerobic; activated sludge, adapted: sludge collected from a municipal wastewater treatment plant that handles a combined domestic and industrial wastewater, and added with contaminated sediments brought from Ramat-Hovav site, that might have been contained indigenous bacteria exposed to TBBPA.
Duration, Parameter, System, and Sampling Frequency	almost 1 year; test mat.: five reactor systems; not reported
pH Adjusted and pH	yes; 8.5
Concentration	ca. 230 mg/L
Composition and Test Temperature	nitrogen and phosphorous salt; carbon sources for 5 experiments: 400 mg TOC/L used: solid waste organics; glucose/sucrose; TBP; Peptone, Triptone, Yeast extract; sucrose/acetate; not reported
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	not reported; nitrogen; nitrogen; oxygen; nitrogen; nitrogen with oxygen pulse for 30 min every 4 hours.; not reported; feed contained ~40% TBBPA, ~20% 2,4,6-TBP, 8% 2,4-dibromophenol and other unreported materials
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	HPLC; test mat.; Not Reported
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	0%; Not Reported; 6; 6; 4; 4; 2 months; not reported
Results Remarks and Results Details	no TBBPA biodegradation has been observed in any of the reactors and no intermediates such as BPA that may indicate partial biotransformation of TBBPA have been detected.; Not Reported
Results Mean Total Recovery and Results per Recovery	not reported; not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity were not reported
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results

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Study Citation:	Brenner, A., Mukmenev, I., Abeliovich, A., Kushmaro, A. (2006). Biodegradability of tetrabromobisphenol A and tribromophenol by activated sludge. Ecotoxicology 15(4):399-402.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	1414772			
Domain	Metric	EVALUATION Rating	Comments	
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor deviations.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	Medium	some test conditions across samples or study groups were not reported, but these discrepancies were not likely to have a substantial impact on study results.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	an inoculum that was pre-adapted to the test substance was used for a biodegradation rate study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	there was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	This metric met the criteria for medium confidence as expected for this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	kinetic calculations were not clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.

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Study Citation:	Brenner, A., Mukmenev, I., Abeliovich, A., Kushmaro, A. (2006). Biodegradability of tetrabromobisphenol A and tribromophenol by activated sludge. Ecotoxicology 15(4):399-402.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	1414772

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18:	QSAR Models	N/A
			The metric is not applicable to this study type.

Overall Quality Determination	Medium
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Study Citation:	Chen, J., Wu, J., Fan, L., Jia, R. (2021). Studies on the characteristics and mechanism of aerobic biodegradation of tetrabromobisphenol A by <i>Irpex lacteus</i> F17. <i>Journal of Basic Microbiology</i> 61(5):419-429.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	7849881

Parameter	Data
CASRN and Test Material	Not Reported; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other; experimental; other: non-guideline
Solvent, Reactivity, Storage, Stability	dichloromethane stock solution 10,000 mg/L; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aladdin Industrial Corporation; NR; 98%
Blank and Control	Control experiments in MSM containing 20 mg/L TBBPA without inoculum; NR
Oxygen and Inoculum	aerobic; other:: mycelial pellets; <i>I. lacteus</i> F17, a white-rot fungus isolated from a decayed wood chip pile in the vicinity of Hefei, China
Duration, Parameter, System, and Sampling Frequency	12 days; test mat.: flask; day 12
pH Adjusted and pH	yes; 5.0
Concentration	20 mg/L
Composition and Test Temperature	20 mL mineral salt medium (MSM) pH 4.5–5.0; 0, 1, 2, 5, and 8 g/L of glucose concentrations were added to the MSM and tested separately; 30°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	NR; NR; yes; flasks shaken at 160 rpm; experiments were carried out in triplicate
Results Details Method, Results per Degradation Parameter, and	HPLC (to measure residual TBBPA); ion chromatography (to measure Br-); GC-MS (to identify intermediates); Not Reported; NR
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	~60% (no added carbon source); ~80% (with glucose or sodium pyruvate); NR; 12 days; NR
Results Remarks and Results Details	The control, with no added carbon source, had a degradation rate of ~60% (figure 1e). The control results ranged between 18-70% (figure 1 a-e). With added carbon sources, the degradation rate = 80.12% (8 g/L glucose), 79.09% (8 g/L sodium pyruvate), ~72% (2 g/L sodium citrate) and 74.4% (10 mg/L phenol).; NR
Results Mean Total Recovery and Results per Recovery	NR; NR

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	A concurrent negative control, or blank group, toxicity control, and positive control were included (where applicable).

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Study Citation:	Chen, J., Wu, J., Fan, L., Jia, R. (2021). Studies on the characteristics and mechanism of aerobic biodegradation of tetrabromobisphenol A by <i>Irpex lacteus</i> F17. <i>Journal of Basic Microbiology</i> 61(5):419-429.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	7849881			
Domain	Metric	EVALUATION		Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	Low	The system type and design were not fully described.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	The test organism, species, or inoculum source are not routinely used for similar study types or were not appropriate for the evaluation of the specific outcome(s) of interest or route.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.

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Study Citation:	Chen, J., Wu, J., Fan, L., Jia, R. (2021). Studies on the characteristics and mechanism of aerobic biodegradation of tetrabromobisphenol A by <i>Irpex lacteus</i> F17. <i>Journal of Basic Microbiology</i> 61(5):419-429.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	7849881

		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination	Medium
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Study Citation:	Chen, J., Wu, J., Fan, L., Jia, R. (2021). Studies on the characteristics and mechanism of aerobic biodegradation of tetrabromobisphenol A by <i>Irpex lacteus</i> F17. <i>Journal of Basic Microbiology</i> 61(5):419-429.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	7849881

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other; experimental; other: non-guideline
Solvent, Reactivity, Storage, Stability	dichloromethane stock solution 10,000 mg/L; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aladdin Industrial Corporation; NR; 98%
Blank and Control	Control experiments in MSM containing 20 mg/L TBBPA without inoculum; NR
Oxygen and Inoculum	aerobic; other:: mycelial pellets; <i>I. lacteus</i> F17, a white-rot fungus isolated from a decayed wood chip pile in the vicinity of Hefei, China
Duration, Parameter, System, and Sampling Frequency	12 days; test mat.: flask; day 12
pH Adjusted and pH	yes; pH 3.0, 4.0, 5.0, 6.0, 7.0, and 8.0 were tested separately
Concentration	20 mg/L
Composition and Test Temperature	20 mL mineral salt medium (MSM) pH 4.5–5.0; 8 g/L glucose; 30°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	NR; NR; yes; flasks shaken at 160 rpm; experiments were carried out in triplicate
Results Details Method, Results per Degradation Parameter, and	HPLC; ion chromatography; GC-MS (intermediates); Not Reported; NR
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	~42-75%; NR; 12 days; NR
Results Remarks and Results Details	At pH 3.0, 4.0, 5.0, 6.0, 7.0, and 8.0, the degradation rates were approximately 42, 74.23, 75.31, 72, 75, and 72%, respectively.; NR
Results Mean Total Recovery and Results per Recovery	NR; NR

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	A concurrent negative control, or blank group, toxicity control, and positive control were included (where applicable).
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				

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Study Citation:	Chen, J., Wu, J., Fan, L., Jia, R. (2021). Studies on the characteristics and mechanism of aerobic biodegradation of tetrabromobisphenol A by <i>Irpex lacteus</i> F17. <i>Journal of Basic Microbiology</i> 61(5):419-429.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	7849881			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	Low	The system type and design were not fully described.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	The test organism, species, or inoculum source are not routinely used for similar study types or were not appropriate for the evaluation of the specific outcome(s) of interest or route.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed .
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination

Medium

Study Citation:	Gerecke, A. C., Giger, W., Hartmann, P. C., Heeb, N. V., Kohler, H. P., Schmid, P., Zennegg, M., Kohler, M. (2006). Anaerobic degradation of brominated flame retardants in sewage sludge. Chemosphere 64(2):311-317.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	1443845

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Incubation of TBBPA with yeast and starch under methanogenic conditions
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich (Buchs, Switzerland); NR; 97%
Blank and Control	Yes; heat-sterilized sludge (autoclaved at 120C for 60 min, twice 24 h apart) were performed simultaneously.; internal standards added, alpha-HCH positive controls
Oxygen and Inoculum	anaerobic; sewage, domestic, non-adapted: freshly collected digested sewage sludge (sewage treatmentplant Dubendorf, Switzerland, serving 45000 people; mesophilic stabilizer operated at 37 C; June 3, 2003, pH=7.6, 3% dry weight). up to 238 days; test mat.: Glass serum bottles; Not reported
Duration, Parameter, System, and Sampling Frequency	
pH Adjusted and pH	Not Reported; 7.6
Concentration	4.6 nmol
Composition and Test Temperature	TBBPA 4.6 nmol, Yeast 50 mg and starch 20 mg; 37±1C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; yes; Not reported
Results Details Method, Results per Degradation Parameter, and	GC; Half-life; Not Reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	0.59 days; Not reported; Not reported; degradation rate constant was not significantly different from zero (p=0.64 for linear regressionof time versus ln concentration)
Results Remarks and Results Details	Not reported; Rate constant=1.2±0.06/day
Results Mean Total Recovery and Results per Recovery	Not reported; Recoveries were generalized for all analytes in the study and ranged from 40-90%; results were corrected accordingly

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance source was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 4:	Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Gerecke, A. C., Giger, W., Hartmann, P. C., Heeb, N. V., Kohler, H. P., Schmid, P., Zennegg, M., Kohler, M. (2006). Anaerobic degradation of brominated flame retardants in sewage sludge. Chemosphere 64(2):311-317.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	1443845			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5: Test Method Suitability	High		This metric met the criteria for high confidence as expected for this type of study.
	Metric 6: Testing Conditions	High		This metric met the criteria for high confidence as expected for this type of study.
	Metric 7: Testing Consistency	High		This metric met the criteria for high confidence as expected for this type of study.
	Metric 8: System Type and Design	High		This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9: Outcome Assessment Methodology	High		This metric met the criteria for high confidence as expected for this type of study.
	Metric 10: Sampling Methods	N/A		The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11: Test Substance Identity	High		This metric met the criteria for high confidence as expected for this type of study.
	Metric 12: Test Substance Purity	Medium		Sampling timing was based on figure, not reported.
Domain 6: Confounding/Variable Control				
	Metric 13: Confounding Variables	High		This metric met the criteria for high confidence as expected for this type of study.
	Metric 14: Health Outcomes Unrelated to Exposure	N/A		The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15: Data Reporting	Low		Relative results were reported.
	Metric 16: Statistical Methods and Kinetic Calculations	Medium		Kinetic results were reported but calculations were not described.
Domain 8: Other				
	Metric 17: Verification or Plausibility of Results	High		The study results are reasonable.
	Metric 18: QSAR Models	N/A		The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	5348243			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; screening test; Experimental; other: Augmented biodegradation.			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; Fischer Scientific Canada; NR; ACS grade			
Blank and Control	TBBPA in Milli-Q water; TBBPA, seed inoculum in dilution water (no sludge)			
Oxygen and Inoculum	aerobic; other:: aerobic sludge from conventional activated sludge reactor and bioaugmented with soil based strains of Bacillus brevis and Bacillus pumilus.			
Duration, Parameter, System, and Sampling Frequency	5 days; test mat.: batch bioreactors containing a magnetic stir bar; MLSS 25.3 mg/L; 0, 1, 3, 5 days			
pH Adjusted and pH	Not Reported; not reported			
Concentration	30 ng/L			
Composition and Test Temperature	Dilution water with optimal nutrients; 22±1°C			
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	not reported; not reported; not reported; Not Reported			
Results Details Method, Results per Degradation Parameter, and	Solid phase extraction; liquid-liquid extraction clean up followed by GC-NCI-MS analysis; method detection limit 2.4 ug/L; biodegradation; Not Reported			
Direct Quantum Yield Results	48%; not reported; not reported; Not Reported			
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments				
Results Remarks and Results Details	biodegradation 22% without augmentation; biodegradation rate constant 0.127/day;; first order degradation kinetics			
Results Mean Total Recovery and Results per Recovery	method recovery is 81%; Not Reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	The test substance was identified by name and CASRN.	
Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported.	
Domain 2: Test Design				
Metric 3:	Study Controls	High	Concurrent controls were included.	
Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.	
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Study Citation:		Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.		
OECD Harmonized Template:		Biodegradation in Water		
HERO ID:		5348243		
Domain		Metric	EVALUATION	
			Rating	Comments
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	5348243			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; screening test; Experimental; other: Augmented biodegradation.			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; Fischer Scientific Canada; NR; ACS grade			
Blank and Control	TBBPA in Milli-Q water; TBBPA, seed inoculum in dilution water (no sludge)			
Oxygen and Inoculum	aerobic; other:: aerobic sludge from a membrane sludge reactor and bioaugmented with soil based strains of Bacillus brevis and Bacillus poilus.			
Duration, Parameter, System, and Sampling Frequency	5 days; test mat.: batch bioreactors containing a magnetic stir bar; MLSS 43.3 mg/L; 0, 1, 3, 5 days			
pH Adjusted and pH	Not Reported; not reported			
Concentration	30 ng/L			
Composition and Test Temperature	Dilution water with optimal nutrients; 22±1°C			
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	not reported; not reported; not reported; Not Reported			
Results Details Method, Results per Degradation Parameter, and	Solid phase extraction; liquid-liquid extraction clean up followed by GC-NCI-MS analysis; method detection limit 2.4 ug/L; biodegradation; Not Reported			
Direct Quantum Yield Results	53%; not reported; not reported; Not Reported			
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	biodegradation rate constant 0.171/day; first order degradation kinetics			
Results Remarks and Results Details	method recovery is 81%; Not Reported			
Results Mean Total Recovery and Results per Recovery				
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name and CASRN.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Concurrent controls were included.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
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Study Citation:		Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.		
OECD Harmonized Template:		Biodegradation in Water		
HERO ID:		5348243		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Li, F., Jiang, B., Nastold, P., Kolvenbach, B. A., Chen, J., Wang, L., Guo, H., Corvini, P. F. X., Ji, R. (2015). Enhanced transformation of tetrabromobisphenol A by nitrifiers in nitrifying activated sludge. Environmental Science & Technology 49(7):4283-4292.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	2960750

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: TBBPA transformation using nitrifying activated sludge
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	Uniformly 14C-labeled TBBPA; synthesized from uniformly 14C ring-labeled phenol (14C-phenol) in two steps; NR; NR; chemical purity: 97%, radiochemical purity 99%
Blank and Control	abiotic transformation was evaluated using sterilized sludge; no CO2 was observed indicating that biodegradation was responsible for the mineralization of TBBPA in active sludges; Not reported
Oxygen and Inoculum	aerobic; activated sludge, non-adapted: Nitrifying activated sludge from a nitrification tank of a municipal waste water treatment plant in China
Duration, Parameter, System, and Sampling Frequency	31 days; test mat.: Not reported; Not reported
pH Adjusted and pH	Not Reported; 7.5-8.0
Concentration	Not Reported
Composition and Test Temperature	sludge precipitate (biomass) was resuspended in mineral salts medium, this mixed liquor suspended solids (MLSS) was amended with an initial N concentration of 10 mg/L; 30°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; yes; NAS ammonia-oxidizing activity >30 mg N/g SS/h
Results Details Method, Results per Degradation Parameter, and	High performance liquid chromatography (HPLC) coupled to a radio flow detector with liquid scintillation counter (HPLC-14C-LSC) for analysis of extractable radioactivity; bound residue measured by LSC.; mineralization; Not Reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	17%; ±0.7; Not reported; Not Reported
Results Remarks and Results Details	17% mineralization in the presence of nitrifying activated sludge, $k = 0.125 \pm 0.03 \text{ day}^{-1}$ ($t_{1/2} = 5.5 \pm 1.3 \text{ days}$), 4.3% mineralization when nitrification inhibitor was added, $k = 0.024 \pm 0.007/\text{day}$, half-life: $28.9 \pm 8.4 \text{ days}$. 12 metabolites were identified: single benzene ring, O-methyl TBBPA ether, and nitro compounds; First-order degradation kinetics rate constant $= 0.125 \pm 0.003/\text{day}$; half-life $= \ln 2/k = 5.5 \pm 1.3 \text{ days}$ (10.3 is reported in the abstract)
Results Mean Total Recovery and Results per Recovery	Recovery from sludge: $97 \pm 2\%$; $55.8 \pm 0.4\%$ of the initial radioactivity was bound to the sludge at the end of the incubation period.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
Metric 2:	Test Substance Purity	High	The test substance purity was reported.
Domain 2: Test Design			

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Study Citation:	Li, F., Jiang, B., Nastold, P., Kolvenbach, B. A., Chen, J., Wang, L., Guo, H., Corvini, P. F. X., Ji, R. (2015). Enhanced transformation of tetrabromobisphenol A by nitrifiers in nitrifying activated sludge. Environmental Science & Technology 49(7):4283-4292.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	2960750			
Domain		Metric	EVALUATION Rating	Comments
	Metric 3:	Study Controls	High	Controls were reported and valid.
	Metric 4:	Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6:	Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 7:	Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 8:	System Type and Design	Medium	There were omissions in test design; however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The inoculum source was reported; however is not routinely used for aerobic biodegradation studies.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There was a discrepancies in the abstract compared to the body.
	Metric 12:	Test Substance Purity	Medium	Details were omitted; however, the lack of data is not likely to hinder the interpretation of the results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of uncertainty were not reported but their omission likely did not impact the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this review article.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Details were omitted; however, the lack of data is not likely to hinder the interpretation of the results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Lin, X. Q., Li, Z. L., Nan, J., Su, J. H., Liang, B., Li, C. J., Wang, A. J. (2021). Biodegradation and metabolism of tetrabromobisphenol A in microbial fuel cell: Behaviors, dynamic pathway and the molecular ecological mechanism. Journal of Hazardous Materials 417:126104.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	10113644

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other; experimental; other: non-guideline
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Aladdin, China; Not Reported; 98%
Blank and Control	abiotic control (AC); NR
Oxygen and Inoculum	anaerobic; other:: microbial consortium capable of reductive debromination; specific bacterial communities were evaluated and described. Pro-teobacteria was the most dominant phylum, present in the biofilm of CB at 65.3%, DB at 76.1%, and the OC at 33.1%.
Duration, Parameter, System, and Sampling Frequency	3 days cycles; degrading performance stabilized after 16 cycles (48 d) of acclimation, 18 cycles reported; test mat.: Microbial fuel cells; reactors were operated in a batch mode; Not specified, data presented from each cycle
pH Adjusted and pH	yes; phosphate-buffered solution; pH = 7.2
Concentration	10 mg/L
Composition and Test Temperature	The anolyte contained 0.31 g/L NH ₄ Cl, 0.13 g/L KCl, 5 mM phosphate-buffered solution (PBS, pH = 7.2), 1 mL/L mineral elements, 1 mL/L vitamin, 10 mg/L TBBPA and 2 mM sodium lactate; exchanged every 3 days (cycle.); 25±2°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	NR; NR; NR; Cells were operated in four different modes: Closed Bioanode (CB) had microbes present, electrical circuit connected normally. Disconnected Bioanode (DB) started like CB (microbes + connected circuit) and after 39 days, the circuit is disconnected. Open Circuit (OC) never connected to circuit from the start and microbes present. Abiotic Control (AC) had no microbes.
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	UPLC/triple quadrupole mass spectrometer/ time-of-flight mass spectrometry; TBBPA removal efficiency (Et) was calculated with $Et = Cr/Ci \times 100$, where Cr and Ci indicated the decreased molar concentration of TBBPA in a cycle and the initial molar concentration of TBBPA, respectively. Br- formation efficiency (EBr) was calculated with $EBr = CBr/Cr \times 4 \times 100$, where CBr indicated the molar concentration of Br- formation in a cycle. BPA formation efficiency (EBPA) was calculated with $EBPA = CBPA/Cr \times 100$, where CBPA indicated the molar concentration of BPA formation in a cycle.; NR
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	TBBPA removal efficiency (Et) in OC = 73.1±0.6%, Experimental condition results: CB = 97.1±0.5% and DB = 97.2±0.5%; 0.5-0.6%; 3 days; TBBPA removal efficiency (Et) in the abiotic control went from an initial value of ~56% to negligible after 5 operating cycles
Results Remarks and Results Details	In the open circuit: only reductive debromination was observed; Br- generation was 83.5 ± 0.6% and complete removal of TBBPA was observed after a 10 day prolonged period with 97.4 ± 0.7% Br- and 97.2 ± 0.5% BPA generation. Degradation products identified in the OC: tribromobisphenol A (TriBBPA), debromobisphenol A (DBBPA) and monobromobisphenol A (MBBPA). In the experimental treatments with the closed bioanode (CB) and disconnected bioanode (DB), Br- generation was nearly 97% with BPA generation of 5.1 ± 0.2% in CB and 8.3 ± 0.2% in DB. Degradation products identified in the CB and DB: Tribromobisphenol A; Debromobisphenol A; Monobromobisphenol A; Bisphenol A; metabolite H1: C ₁₅ H ₁₅ BrO ₅ (5-(2-(3-bromo-4,5-dihydroxy phenyl)propyl)benzenetriol); metabolite H2: C ₁₃ H ₁₅ BrO ₂ (3-bromo-5-(2-dimethyl-3-1,3-pyrrolylene)benzenediol); metabolite H3: C ₁₅ H ₁₈ O ₆ (3,4,5-trihydroxyphenyl-2-propenyl-(4,5-dienol) propanoic acid); metabolite H4: C ₁₆ H ₁₆ Br ₂ O ₄ (5-(2-(3,5-dihydroxy-4-methoxyphenyl)propyl)benzenetriol).; NR
Results Mean Total Recovery and Results per Recovery	NR; NR

EVALUATION

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Study Citation:	Lin, X. Q., Li, Z. L., Nan, J., Su, J. H., Liang, B., Li, C. J., Wang, A. J. (2021). Biodegradation and metabolism of tetrabromobisphenol A in microbial fuel cell: Behaviors, dynamic pathway and the molecular ecological mechanism. Journal of Hazardous Materials 417:126104.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	10113644			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	A concurrent negative control was included.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were fully not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups. The conditions of the exposure were documented.
	Metric 8:	System Type and Design	Medium	Some system design details were not reported; however, but the deviation was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	The test organism information or inoculum source were reported; however, the microbial consortium was acclimated to TBBPA.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
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Study Citation:	Lin, X. Q., Li, Z. L., Nan, J., Su, J. H., Liang, B., Li, C. J., Wang, A. J. (2021). Biodegradation and metabolism of tetrabromobisphenol A in microbial fuel cell: Behaviors, dynamic pathway and the molecular ecological mechanism. Journal of Hazardous Materials 417:126104.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	10113644			
		EVALUATION		
Domain		Metric	Rating	Comments
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable; the reported values in the abiotic control were outside expected range in the initial cycles and no discussion was provided; however, no serious study deficiencies were identified.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study.
Overall Quality Determination			High	

Study Citation:	Macedo, W. V., Bernegossi, A. C., Sabatini, C. A., Corbi, J. J., Zaiat, M. (2020). Application of Dispersive Liquid-Liquid Microextraction Followed by High-Performance Liquid Chromatography/Tandem Mass Spectrometry Analysis to Determine Tetrabromobisphenol A in Complex Matrices. Environmental Toxicology and Chemistry 39(11):2147-2157.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	10115753			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-97-4; TBBPA			
Confidentiality, EndPoint, Type, Guideline	no; other; experimental; other: Batch study			
Solvent, Reactivity, Storage, Stability	Stock solutions were prepared in acetonitrile; Not Reported; solutions were stored at −20 °C; Not Reported			
Radiolabel, Source, State, Purity	stable isotope labeled internal standard (13C12-TBBPA) Wellington Laboratories; Sigma-Aldrich; Not Reported; 97%			
Blank and Control	NR; matrix blank, a blank sample (ultrapure water) was used for the extraction evaluation; NR			
Oxygen and Inoculum	anaerobic; sewage, domestic (adaptation not specified): laboratory-made domestic sewage; anaerobic sludge collected from an up-flow anaerobic sludge blank (UASB) reactor treating poultry slaughterhouse wastewater			
Duration, Parameter, System, and Sampling Frequency	10 days; test material: batch reactors; NR			
pH Adjusted and pH	Not Reported; Not Reported			
Concentration	100 - µg/L			
Composition and Test Temperature	beef extract, sucrose, soluble starch, NaCl, MgCl2·6H2O, and CaCl2·2H2O supplemented with a micronutrient solution; 30 °C			
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not Reported; Not Reported; Not Reported; TBBPA was quantified at the end of the test solid and aqueous phases			
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	ultrasound-dispersive liquid–liquid microextraction–liquid chromatography–mass spectrometry (US–DLLME–LC–MS/MS) method’ HPLC with ESI-MS; LOQ = 1 µg/L domestic sewage, 50 ng/g anaerobic sludge; TBBPA concentration; Not Reported			
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	Not Reported; Not Reported; 10 days; Not Reported			
Results Remarks and Results Details	Final concentrations of TBBPA in the domestic sewage (aqueous) = 0.2 ± 0.03 µg/L and in anaerobic sludge (solid) = 507 ± 79 ng/g; NR			
Results Mean Total Recovery and Results per Recovery	liquid–liquid extraction; 48.5 to 50.7% recovery			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Low	Although blanks and internal standards were discussed, the full biodegradation study details were unpublished.
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Study Citation:	Macedo, W. V., Bernegossi, A. C., Sabatini, C. A., Corbi, J. J., Zaiat, M. (2020). Application of Dispersive Liquid-Liquid Microextraction Followed by High-Performance Liquid Chromatography/Tandem Mass Spectrometry Analysis to Determine Tetrabromobisphenol A in Complex Matrices. Environmental Toxicology and Chemistry 39(11):2147-2157.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	10115753			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Low	Limited details; the biodegradation study was unpublished.
	Metric 7:	Testing Consistency	Low	Limited details; the biodegradation study was unpublished.
	Metric 8:	System Type and Design	Medium	The system type and design was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test organism information or inoculum source were reported.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Uninformative	There was incomplete reporting of outcome assessment methods.
	Metric 12:	Test Substance Purity	Low	Limited study details were reported; the biodegradation study was unpublished.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Limited study details were reported; the biodegradation study was unpublished.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Uninformative	Limited study details were reported; the biodegradation study results were unpublished.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Limited details; the biodegradation study was unpublished.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination**Uninformative**

Study Citation:	Macedo, W. V., Duarte Oliveira, G. H., Zaiat, M. (2021). Tetrabromobisphenol A (TBBPA) anaerobic biodegradation occurs during acidogenesis. Chemosphere 282:30995-30995.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	10115755

EXTRACTION

Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other; experimental; other: anaerobic structured bed reactor study
Solvent, Reactivity, Storage, Stability	methanol; Not Reported; stock solution stored in a freezer (-20°C); Not Reported
Radiolabel, Source, State, Purity	stable isotope-labeled internal standard (13C12-TBBPA) Wellington Laboratories (Guelph, Canada); Sigma-Aldrich; solution; 97%
Blank and Control	NR; NR
Oxygen and Inoculum	anaerobic; activated sludge, domestic, non-adapted: Lab-made domestic sewage. Inoculum: anaerobic sludge collected from an Up-flow Anaerobic Sludge Blanket (UASB) reactor treating poultry slaughterhouse wastewater (Brazil). The inoculum was pretreated in the acidogenic reactor by the acid shock method (pH 3.0, 30°C for 24h).
Duration, Parameter, System, and Sampling Frequency	100 days; test mat.: bench-scale anaerobic structured bed reactors (ASTBR): acidogenic (Acidogenic Reactor, AR) conditions; 35 samples collected intermittently over the 100 days based on data in Fig 1a.
pH Adjusted and pH	yes; influent pH of 6.92 ± 0.13 (bulk pH: 5.5±0.2)
Concentration	50 (feed solution) µg/L
Composition and Test Temperature	Lab-made wastewater made to simulate the soluble fraction of domestic sewage with a theoretical influent chemical oxygen demand (COD) of 500 mg O2/L.; 30°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	NR; NR; NR; Theoretical TBBPA loading rates of 1 g /m3 d; HRT = 1.2 hours.
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	liquid chromatography-tandem mass spectrometry (LC-MS/MS); Liquid and solid analysis: LOD = 2 ng/L and LOQ = 1 µg/L; test material loss; based on pseudo-steady-state (from day 50 to day 100), with the removal efficiencies varying less 15%; NR
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	86.8% biodegradation of TBBPA; based on TBBPA mass balance; ±0.05; Not specified; NR
Results Remarks and Results Details	Overall, ~89.4% removal of TBBPA AR (includes ~3% adsorbed)First-order rate constant estimation K(app): 8.64±0.62 h-1; K(app*): 0.52 h-1 gVSS-1The percentage of TBBPA degraded in the reactors was obtained by considering the influent and effluent TBBPA concentrations throughout the operational period, the TBBPA adsorbed in the suspended and adhered biomass, and the TBBPA possibly adsorbed in the effluent volatile suspended solids (VSS). After 47 days, phenol was detected in the effluent at concentrations of 20 ± 6.6. Metabolic pathways of TBBPA biodegradation to phenol and the formation of benzoyl-CoA is presented in Fig 4.; The applied, removed, and biotransformed TBBPA were 0.87 ± 0.10, 0.78 ± 0.35, and 0.68 ± 0.11 gTBBPA/m3d.
Results Mean Total Recovery and Results per Recovery	Microextraction procedure cited to another source; NR

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	High	The test substance was identified definitively.
	Metric 2:	High	The source and purity of the test substance were reported.

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Study Citation:		Macedo, W. V., Duarte Oliveira, G. H., Zaiat, M. (2021). Tetrabromobisphenol A (TBBPA) anaerobic biodegradation occurs during acidogenesis. Chemosphere 282:30995-30995.		
OECD Harmonized Template:		Biodegradation in Water		
HERO ID:		10115755		
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 2: Test Design				
	Metric 3:	Study Controls	Low	The study did not include or report crucial control groups.
	Metric 4:	Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples.
	Metric 8:	System Type and Design	High	The system type and design were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product concentrations, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
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Study Citation:	Macedo, W. V., Duarte Oliveira, G. H., Zaiat, M. (2021). Tetrabromobisphenol A (TBBPA) anaerobic biodegradation occurs during acidogenesis. Chemosphere 282:30995-30995.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	10115755

		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination

High

Study Citation:	Macedo, W. V., Duarte Oliveira, G. H., Zaiat, M. (2021). Tetrabromobisphenol A (TBBPA) anaerobic biodegradation occurs during acidogenesis. Chemosphere 282:30995-30995.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	10115755

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other; experimental; other: anaerobic structured bed reactor study
Solvent, Reactivity, Storage, Stability	methanol; Not Reported; stock solution stored in a freezer (-20°C); Not Reported
Radiolabel, Source, State, Purity	stable isotope-labeled internal standard (13C12-TBBPA) Wellington Laboratories (Guelph, Canada); Sigma-Aldrich; solution; 97%
Blank and Control	NR; NR
Oxygen and Inoculum	anaerobic; activated sludge, domestic (adaptation not specified): Lab-made domestic sewage. Inoculum: anaerobic sludge collected from an Up-flow Anaerobic Sludge Blanket (UASB) reactor treating poultry slaughterhouse wastewater (Brazil). The inoculum was pretreated in the acidogenic reactor by the acid shock method (pH 3.0, 30°C for 24h).
Duration, Parameter, System, and Sampling Frequency	100 days; test mat.: bench-scale anaerobic structured bed reactor (ASTBR): multistep methanogenic (Methanogenic Reactor, MR) conditions; NR
pH Adjusted and pH	no; influent pH of 7.95 ± 0.12 (bulk pH: 6.9±0.1)
Concentration	100 feed solution µg/L
Composition and Test Temperature	Lab-made wastewater made to simulate the soluble fraction of domestic sewage with a theoretical influent chemical oxygen demand (COD) of 500 mg O ₂ /L.; 30°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	NR; NR; NR; Theoretical TBBPA loading rates of 0.4 g/m ³ d; HRT = 6 hours. Influent TBBPA concentrations differed due to the influent pH of the domestic sewage.
Results Details Method, Results per Degradation Parameter, and	liquid chromatography-tandem mass spectrometry (LC-MS/MS); Liquid and solid analysis: LOD = 2 ng/L and LOQ = 1 µg/L; test material loss; based on pseudo-steady-state (from day 50 to day 100), with the removal efficiencies varying less 15%; NR
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	97% biodegradation of TBBPA; based on TBBPA mass balance; ±0.01; Not specified; NR
Results Remarks and Results Details	Overall, ~98% removal of TBBPA MR (includes ~1% adsorbed)First-order rate constant estimation K(app): 8.78±3.8 h ⁻¹ ; K(app*): 1.15 h ⁻¹ gVSS ⁻¹ The percentage of TBBPA degraded in the reactors was obtained byconsidering the influent and effluent TBBPA concentrations throughout the operational period, the TBBPA adsorbed in the suspended andadhered biomass, and the TBBPA possibly adsorbed in the effluent volatile-suspended solids (VSS). After 47 days, phenol was detected in the effluent at concentrations of 10.1 ± 11. Metabolic pathways of TBBPA biodegradation to phenol and the formation of benzoyl-CoA is presented in Fig 4.; The applied, removed, and biotransformed TBBPA were 0.36 ± 0.04, 0.35 ± 0.04, and 0.34 ± 0.04 gTBBPA / m ³ d.
Results Mean Total Recovery and Results per Recovery	NR; NR

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High The source and purity of the test substance were reported.
Domain 2: Test Design			

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Study Citation:	Macedo, W. V., Duarte Oliveira, G. H., Zaiat, M. (2021). Tetrabromobisphenol A (TBBPA) anaerobic biodegradation occurs during acidogenesis. Chemosphere 282:30995-30995.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	10115755			
EVALUATION				
Domain		Metric	Rating	Comments
	Metric 3:	Study Controls	Low	The study did not include or report crucial control groups.
	Metric 4:	Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples.
	Metric 8:	System Type and Design	High	The system type and design were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product concentrations, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

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Study Citation:	Macedo, W. V., Duarte Oliveira, G. H., Zaiat, M. (2021). Tetrabromobisphenol A (TBBPA) anaerobic biodegradation occurs during acidogenesis. Chemosphere 282:30995-30995.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	10115755

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	6300802			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; screening test; Experimental; Not Reported: Japanese MITI Test			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Blank and Control	Not reported; Not reported			
Oxygen and Inoculum	not specified; activated sludge (adaptation not specified): 30 mg/L inoculum			
Duration, Parameter, System, and Sampling Frequency	Not reported; test mat.: Not reported; Not reported			
pH Adjusted and pH	Not Reported; Not reported			
Concentration	100 mg/L			
Composition and Test Temperature	Not reported; Not reported			
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; Not Reported; Not reported			
Results Details Method, Results per Degradation Parameter, and	Not reported; Theoretical BOD; Not Reported			
Direct Quantum Yield Results				
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	0%; Not reported; 14 days; Not reported			
Results Remarks and Results Details	Not reported; Not reported			
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 4:	Test Substance Stability	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 3: Test Conditions				
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Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	6300802			
Domain	Metric	EVALUATION		Comments
	Metric 5:	Test Method Suitability	Medium	The test method is an OECD standard test and is suitable for this measurement. However the test substance may not be soluble enough to achieve the desired starting concentration of 100 mg/L. This may be available in the primary source.
	Metric 6:	Testing Conditions	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 7:	Testing Consistency	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 8:	System Type and Design	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Details regarding the test organism were not provided in the secondary source but may be available in the primary source.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Details regarding this metric were limited; however, additional information may be included in the primary source.
	Metric 12:	Test Substance Purity	Medium	Details regarding the sampling methods were not reported in the secondary source but may be available in the primary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The outcome of interest was reported clearly.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Due to limited information in the secondary source, the plausibility of the study results cannot be determined.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.

Overall Quality Determination**Medium**

* Related References: NITE; Chemical Risk Information Platform (CHRIP). Biodegradation and Bioconcentration. Tokyo, Japan: Natl Inst Tech Eval. Available from, as of April 10, 2018: <http://www.safe.nite.go.jp/english/db.html>

Study Citation:	Peng, X., Jia, X. (2013). Optimization of parameters for anaerobic co-metabolic degradation of TBBPA. Bioresource Technology 148:386-393.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	4182352

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; other: Experimental; other: Not reported; batch biodegradation experiments with acclimated anaerobic microorganisms.
Solvent, Reactivity, Storage, Stability	Acetone (100,000 mg/L); NR; NR; NR
Radiolabel, Source, State, Purity	NA; Sigma Chemical Co. (St. Louis, MO, US); NR; NR
Blank and Control	Sterile control, solvent controls; Not reported
Oxygen and Inoculum	anaerobic; anaerobic microorganisms: Microorganisms acclimated with increasing concentrations of the test substance ranging from 0.1 to 0.5 mg/L over 240 d prior to study start.
Duration, Parameter, System, and Sampling Frequency	10 days; test mat.: 100 mL glass serum vials with 60 mL mixed liquor (100 mg/L VSS) from anaerobic reactor; vials sealed and submerged in shaking water bath for mixing; Not reported
pH Adjusted and pH	Yes; Not reported
Concentration	0.5 mg/L
Composition and Test Temperature	Co-metabolites tested in various levels. Sodium formate (mg/L): 5 (level 1); 10 (level 2); 15 (level 3). Yeast extraction (mg/l): 1 (level 1); 2 (level 2); 3 (level 3). TBBPA (mg/L): 0.5 (level 1); 3 (level 2); 5 (level 3).; Not reported
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; Not reported; Not Reported
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	HPLC; NaOH added to samples prior to analysis; Test substance disappearance; Not Reported
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	Approx. 25% with TBBPA as sole carbon source; Not reported; 10 days; Negligible degradation observed in 10 d, but figures report ca. 10% degradation from the sterilized test group within after 10 days.
Results Remarks and Results Details	Data reported as with and without strains, clarification of what this means in the study was not included. TBBPA caused toxicity to the inoculum at high concentrations. Degradation rates were higher in the presence of different carbon sources compared to when TBBPA was the sole course of carbon. Rates ranged from 19.1% to 96.2%, with maximum degradation in the presence of sodium formate.; Half-life: 43.4 days (with and without strains)With strains:Kinetic equation: $\ln c = -0.0160t - 0.6951$ ($R^2 = 0.9535$)Degradation rate constant: 0.016 /dWithout strains:Kinetic equation: $\ln c = -0.0080t - 0.7032$ ($R^2 = 0.9615$)Degradation rate constant: 0.008 /d
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium The test substance source, but not purity, was reported.
Domain 2: Test Design	Metric 3:	Study Controls	Low Sterile and solvent controls were included, abiotic loss was negligible.

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Study Citation:	Peng, X., Jia, X. (2013). Optimization of parameters for anaerobic co-metabolic degradation of TBBPA. Bioresource Technology 148:386-393.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	4182352			
Domain		EVALUATION		
		Metric	Rating	Comments
	Metric 4:	Test Substance Stability	Medium	Test substance preparation was reported, storage was not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Minimal testing conditions were reported, pH was adjusted but not reported.
	Metric 7:	Testing Consistency	High	Test set up was consistent across replicates.
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Inoculum described generally, source not reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining biodegradation rates.
	Metric 12:	Test Substance Purity	Medium	Sampling frequency was not reported, sample preparation methods may be described elsewhere.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	The study overall is low in method details, results are reported as "with" and "without strains", strains are not reported and this is not clarified in the paper.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	The analytical method was appropriate, extraction recovery and limits of detection were not reported but may be reported elsewhere.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Kinetic calculations were described and conducted appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The results were reasonable based on the method however the confidence in this value is low based on missing study details.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			Low	

Study Citation:	Peng, X., Wang, Z., Wei, D., Huang, Q., Jia, X. (2017). Biodegradation of tetrabromobisphenol A in the sewage sludge process. Journal of Environmental Sciences 61:39-48.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	5517716

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; experimental; other: Biodegradation in sewage sludge
Solvent, Reactivity, Storage, Stability	acetone; NR; NR; NR
Radiolabel, Source, State, Purity	None; Sigma Chemical Co. (St Louis, MO, US); NR; NR Notes: TBBPA
Blank and Control	blank run without sewage sludge (from figure); not reported
Oxygen and Inoculum	anaerobic; anaerobic sludge: TBBPA-degrading sludge collected from previous experiment at 60, 120, 180, 240, 280 days.
Duration, Parameter, System, and Sampling Frequency	20 days; test mat: serum vial batch reactor submerged in shaking water bath; varied
pH Adjusted and pH	yes; 7.0±0.2
Concentration	0.5 mg/L
Composition and Test Temperature	nutrient and trace elements feed solution was not reported; however it was based on formulations used in previous cited studies.; 30°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	not reported; not reported; Not Reported; The batch reactor contained 60 mL of the mixed liquor, which contained 100 mg/L volatile suspended solids.
Results Details Method, Results per Degradation Parameter, and	HPLC; % degradation; Not Reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	17.5%, 26.6%, 73.4%, 79.8%, 96%, 96% for 60, 120, 180, 240, 280 day-acclimated sludge, respectively.; not reported; day 20; ~15% (from figure) degradation without sludge.
Results Remarks and Results Details	Not Reported; Little degradation found with unacclimated sludge.
Results Mean Total Recovery and Results per Recovery	not reported; not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
Domain 2: Test Design	Metric 3:	Study Controls	Medium
	Metric 4:	Test Substance Stability	Medium

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Study Citation:	Peng, X., Wang, Z., Wei, D., Huang, Q., Jia, X. (2017). Biodegradation of tetrabromobisphenol A in the sewage sludge process. Journal of Environmental Sciences 61:39-48.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	5517716			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5: Test Method Suitability	High		The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium		There were omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7: Testing Consistency	Medium		Some test conditions across samples or study groups were not reported, but these discrepancies were not likely to have a substantial impact on study results.
	Metric 8: System Type and Design	N/A		The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9: Outcome Assessment Methodology	High		The test inoculum source was reported and is routinely used for similar study types and appropriate for the study method or route.
	Metric 10: Sampling Methods	N/A		The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11: Test Substance Identity	Medium		There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12: Test Substance Purity	Medium		Limited details were reported for sampling methods; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13: Confounding Variables	Medium		Sources of variability were discussed.
	Metric 14: Health Outcomes Unrelated to Exposure	N/A		The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15: Data Reporting	Medium		The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16: Statistical Methods and Kinetic Calculations	High		Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17: Verification or Plausibility of Results	Medium		The study results were reasonable.
	Metric 18: QSAR Models	N/A		The metric is not applicable to this study type.

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Study Citation:	Peng, X., Wang, Z., Wei, D., Huang, Q., Jia, X. (2017). Biodegradation of tetrabromobisphenol A in the sewage sludge process. Journal of Environmental Sciences 61:39-48.		
OECD Harmonized Template:	Biodegradation in Water		
HERO ID:	5517716		
Domain		EVALUATION	
Metric		Rating	Comments
Overall Quality Determination		High	

Study Citation:	Peng, X., Wang, Z., Wei, D., Huang, Q., Jia, X. (2017). Biodegradation of tetrabromobisphenol A in the sewage sludge process. Journal of Environmental Sciences 61:39-48.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	5517716

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; experimental; other: Biodegradation in sewage sludge
Solvent, Reactivity, Storage, Stability	acetone; NR; NR; NR
Radiolabel, Source, State, Purity	None; Sigma Chemical Co. (St Louis, MO, US); NR; NR Notes: TBBPA
Blank and Control	blank run without sewage sludge (from figure); not reported
Oxygen and Inoculum	anaerobic; anaerobic sludge: TBBPA-degrading sludge collected from previous experiment at 0 days.
Duration, Parameter, System, and Sampling Frequency	20 days; test mat: serum vial batch reactor submerged in shaking water bath; varied
pH Adjusted and pH	yes; 7.0±0.2
Concentration	0.5 mg/L
Composition and Test Temperature	nutrient and trace elements feed solution was not reported; however it was based on formulations used in previous cited studies.; 30°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	not reported; not reported; Not Reported; The batch reactor contained 60 mL of the mixed liquor, which contained 100 mg/L volatile suspended solids.
Results Details Method, Results per Degradation Parameter, and	HPLC; % degradation; Not Reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	6.0, 9.0, 12.8, 15.5, 17.5; not reported; day 4, 8, 12, 16, 20; ~15% (from figure) degradation without sludge.
Results Remarks and Results Details	Not Reported; Little degradation found with unacclimated sludge.
Results Mean Total Recovery and Results per Recovery	not reported; not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
Domain 2: Test Design	Metric 3:	Study Controls	Medium
	Metric 4:	Test Substance Stability	Medium
Domain 3: Test Conditions			

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Study Citation:	Peng, X., Wang, Z., Wei, D., Huang, Q., Jia, X. (2017). Biodegradation of tetrabromobisphenol A in the sewage sludge process. Journal of Environmental Sciences 61:39-48.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	5517716			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	Medium	Some test conditions across samples or study groups were not reported, but these discrepancies were not likely to have a substantial impact on study results.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test inoculum source was reported and is routinely used for similar study types and appropriate for the study method or route.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	Medium	Limited details were reported for sampling methods; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability were discussed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Peng, X., Wang, Z., Wei, D., Huang, Q., Jia, X. (2017). Biodegradation of tetrabromobisphenol A in the sewage sludge process. Journal of Environmental Sciences 61:39-48.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	5517716

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; experimental; other: Biodegradation in sewage sludge
Solvent, Reactivity, Storage, Stability	acetone; NR; NR; NR
Radiolabel, Source, State, Purity	None; Sigma Chemical Co. (St Louis, MO, US); NR; NR Notes: TBBPA
Blank and Control	blank run without sewage sludge (from figure); not reported
Oxygen and Inoculum	anaerobic; anaerobic sludge: The anaerobic sewage sludge was collected from wastewater treatment facilities in the Zhongkai industrial park in Huizhou, Guangdong Province, China.
Duration, Parameter, System, and Sampling Frequency	280 days; test mat: water-jacketed chemostat reactor in continuous mode. 9 day hydraulic retention time.; 5-10 days
pH Adjusted and pH	yes; 7.0±0.2
Concentration	0.1 - 0.5 mg/L
Composition and Test Temperature	NH4Cl, MgCl2·7H2O, K2HPO4, CaCl2 and trace element solution; 30°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	not reported; not reported; Not Reported; slowly stirred using a magnetic stirrer
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	HPLC; % degradation; Not Reported
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	9.4-84.1%; not reported; every 10 days (from figure); not reported
Results Remarks and Results Details	0-50 days (influent 0.1 mg/L): 9.4-51.7% degradation; 60-70 days (influent 0.2 mg/L): 50.4% degradation; 80-280 days (influent 0.5 mg/L): 37.1-84.1% degradation.; When the TBBPA concentration of influent increased to 0.5 mg/L, the adaptability of the microorganisms to TBBPA decreased due to the toxicity of higher TBBPA concentrations to microorganisms. Degradation rate decreased for 50.4% to 37.1%.
Results Mean Total Recovery and Results per Recovery	not reported; not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design	Metric 3: Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4: Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Study Citation:	Peng, X., Wang, Z., Wei, D., Huang, Q., Jia, X. (2017). Biodegradation of tetrabromobisphenol A in the sewage sludge process. Journal of Environmental Sciences 61:39-48.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	5517716			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5: Test Method Suitability	High		The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium		There were omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7: Testing Consistency	Medium		Some test conditions across samples or study groups were not reported, but these discrepancies were not likely to have a substantial impact on study results.
	Metric 8: System Type and Design	N/A		The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9: Outcome Assessment Methodology	High		The test inoculum source was reported and is routinely used for similar study types and appropriate for the study method or route.
	Metric 10: Sampling Methods	N/A		The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11: Test Substance Identity	Medium		There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12: Test Substance Purity	Medium		Limited details were reported for sampling methods; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13: Confounding Variables	Medium		Sources of variability were discussed.
	Metric 14: Health Outcomes Unrelated to Exposure	N/A		The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15: Data Reporting	Medium		The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16: Statistical Methods and Kinetic Calculations	High		Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17: Verification or Plausibility of Results	Medium		The study results were reasonable.
	Metric 18: QSAR Models	N/A		The metric is not applicable to this study type.

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Study Citation:	Peng, X., Wang, Z., Wei, D., Huang, Q., Jia, X. (2017). Biodegradation of tetrabromobisphenol A in the sewage sludge process. Journal of Environmental Sciences 61:39-48.		
OECD Harmonized Template:	Biodegradation in Water		
HERO ID:	5517716		
Domain		EVALUATION	
Metric		Rating	Comments
Overall Quality Determination		High	

Study Citation:	Ramaswamy, R., Zhao, S., Bae, S., He, J. (2021). Debromination of TetraBromoBisphenol-A (TBBPA) depicting the metabolic versatility of Dehalococcoides. Journal of Hazardous Materials 419:26408-26408.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	10115882

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Not Reported
Confidentiality, EndPoint, Type, Guideline	No; Screening test; Not Reported; other: Metabolic debromination by Dehalococcoides mccartyi strains CG1, CG4, and CG5
Solvent, Reactivity, Storage, Stability	Acetone; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich (St. Louis, MO, USA); NR; >98% Notes: Stock concentration 7.3 mM
Blank and Control	Abiotic controls were setup in the same way as other samples in an autoclaved buffered DCB-1 medium without adding the inoculum.; NR
Oxygen and Inoculum	Anaerobic; other:: Organohalide respiring bacteria isolated from e-waste recycling site.
Duration, Parameter, System, and Sampling Frequency	10 days; Test material: Not Reported; Days 1, 3, 5, 7, and 10
pH Adjusted and pH	NR; NR
Concentration	7.3 µM
Composition and Test Temperature	100 mL sodium bicarbonate buffered DCB-1 medium with 2 mM of Na ₂ S, L-cysteine, and dithiothreitol (DTT).; NR
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	NR; NR; NR; Not Reported
Results Details Method, Results per Degradation Parameter, and	GC-MS; TBBPA concentration reduction; NR
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	100% after 10 days; NR; NR; NR
Results Remarks and Results Details	Only strain CG1 showed complete debromination of TBBPA to BPA in the 120 day incubation. It was then selected for the 10 day time course study. Over 10 days, TBBPA and degradation products TriBBPA, DiBBPA, and MoBBPA were all debrominated to BPA.; Approximate TBBPA concentration (µM) at day 0, 1, 3, 5, 7, 10 of incubation, respectively: 7.3, 5.8, 3.2, 0.8, 0.2, 0.0. (from Fig 2)
Results Mean Total Recovery and Results per Recovery	NR; NR

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	High	Abiotic controls were reported.
	Metric 4:	Test Substance Stability	High	The test substance stability and preparation conditions were reported and appropriate.

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Study Citation:	Ramaswamy, R., Zhao, S., Bae, S., He, J. (2021). Debromination of TetraBromoBisphenol-A (TBBPA) depicting the metabolic versatility of Dehalococoides. Journal of Hazardous Materials 419:26408-26408.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	10115882			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some of the testing conditions, including temperature, were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 7:	Testing Consistency	Low	The number of testing groups used was not reported.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Pure culture, an isolated strain from an e-waste recycling site was used.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Biodegradation rate constant was not calculated; however, degradation over time and degradation products were reported.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and are appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability in concentration measurements were reported and not likely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate and target chemical and transformation products concentrations were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not reported; however, the omission is unlikely to have a substantial impact on the study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	No reference substances were used but the study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Yang, C. W., Chen, W. Z., Chang, B. V. (2017). Biodegradation of tetrabromobisphenol-A in sludge with spent mushroom compost. International Biodeterioration & Biodegradation 119(Elsevier):387-395.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	5547026

EXTRACTION				
Parameter		Data		
CASRN and Test Material		79-94-7; Tetrabromobisphenol-A		
Confidentiality, EndPoint, Type, Guideline		None; other; Experimental; other: Shake flask batch biodegradation experiments in sludge		
Solvent, Reactivity, Storage, Stability		NR; NR; NR; NR		
Radiolabel, Source, State, Purity		NR; Aldrich Chemical Co. (Milwaukee, WI); NR; 97.0%		
Blank and Control		Sterile control included; autoclaved at 121C for 20 minutes for 3 days; Not reported		
Oxygen and Inoculum		aerobic; sewage, domestic, non-adapted: semi-solid slurry of sewage sludge from the Dihus wastewater treatment plant, Taipei		
Duration, Parameter, System, and Sampling Frequency		72 days; test mat.: Glass bottles; periodically		
pH Adjusted and pH		Not Reported; 7.0		
Concentration		100 mg/kg		
Composition and Test Temperature		basal medium pH 7.2; 30C		
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design		Not reported; Not reported; yes; Glass bottles with 40 mL of medium and 100 mg/kg TBBPA		
Results Details Method, Results per Degradation Parameter, and		GC with electron capture detector; Recovery from sludge: 94.5%; LOD: 0.02 mg/L; Half-life; Not Reported		
Direct Quantum Yield Results				
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments		21.0 days; correlation coefficient=0.949 (P < 0.05); Not reported; remaining percentage of TBBPA ranged from 91.5% to 97.8% in the sludge after 35 days		
Results Remarks and Results Details		Not reported; Rate constant=0.033/day		
Results Mean Total Recovery and Results per Recovery		Not reported; Not reported		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Control group details were included.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation, and storage conditions were not reported.
Domain 3: Test Conditions				
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Study Citation:	Yang, C. W., Chen, W. Z., Chang, B. V. (2017). Biodegradation of tetrabromobisphenol-A in sludge with spent mushroom compost. International Biodeterioration & Biodegradation 119(Elsevier):387-395.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	5547026			
Domain		Metric	EVALUATION Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing condition reporting but the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	Medium	Test conditions across samples or study groups were not reported.
	Metric 8:	System Type and Design	High	The system type and design were appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	Inoculum was reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods were not fully reported, but the omissions were not likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty in the measurements and were not considered or accounted for in data evaluation resulting in some uncertainty.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Details regarding statistical methods were not fully reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Arbeli, Z., Ronen, Z. (2003). Enrichment of a Microbial Culture Capable of Reductive Debromination of the Flame Retardant Tetrabromobisphenol-A, and Identification of the Intermediate Metabolites Produced in the Process. Biodegradation 14(6):385-395.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5763002

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other; experimental; other: Debromination in anaerobic sediment
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich (Milwaukee, Wis.); NR; NR Notes: NR
Oxygen and Inoculum	anaerobic; sediment (not specified): Collected from an industrial complex in the northern Negev desert, Israel; 20% wt/wt sediment slurry
Duration, Parameter, System, and Sampling Frequency	77 days; test material; Semi-continuous batch reactor; Stage 1: 23% liquid exchanged, Mineral Medium (MM), 90 μ M TBBPA added, 0.5 g/L glucose added; Stage 2: 23% liquid exchanged, MM, 120 μ M TBBPA added, 0.5 g/L added glucose; Stage 3: 50% slurry exchanged, 15% sterile sediment in MM, 0 μ M TBBPA added, 0.5 g/L glucose added; Stage 4: 21% slurry exchanged, 15% sterile sediment in MM, 90 μ M TBBPA added, 0.5 g/L glucose added; Stage 5: 50% slurry exchanged, 15% sterile sediment in MM, 60 μ M TBBPA added, 0.5 g/L glucose added.; NR
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	NR; NR; Sediment: mineral medium, TBBPA, glucose or ethanol; NR; NR; 7.4
Control Dark, Control, and Blank Concentration	NR; NR; sediment in mineral media w/ glucose w/o TBBPA NR 90 - NR 720 μ M
Analytical Method, Analytical Details, and Results Per Degredation Parameter	GC-MS and NMR; monitored loss of bromine atoms using base peak analysis. Used NMR to determine structures of intermediates.; Test material
Results Remarks	NR
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	NR; NR; NR; NR
Results Details	90 μ M TBPPA and 0.1% vol/vol added repeatedly: Following the first addition, 91.6% TBBPA was debrominated to BPA in 4 days; after the second addition, 71.8% was converted to BPA in 6 days; after the third addition 41% was converted in 8 days
Mean Total Recovery Results and Results Per Recovery	NR; NR
Results Value, Direct Quantum Yield Results, and Transformation Products	NR; NR; intermediates detected: TriBBPA, 2,2'-dibromobisphenol-A (predominant metabolite), and MonoBBPA

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified
	Metric 2: Test Substance Purity	Medium	Test substance purity was not reported.
Domain 2: Test Design	Metric 3: Study Controls	Medium	No concurrent control group details were reported.

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Study Citation:	Arbeli, Z., Ronen, Z. (2003). Enrichment of a Microbial Culture Capable of Reductive Debromination of the Flame Retardant Tetrabromobisphenol-A, and Identification of the Intermediate Metabolites Produced in the Process. Biodegradation 14(6):385-395.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5763002			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 4:	Test Substance Stability	Medium	Test substance stability was not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	Medium	Some test conditions were reported.
	Metric 7:	Testing Consistency	Medium	Minor inconsistencies in test conditions across samples.
	Metric 8:	System Type and Design	Medium	Equilibrium was not reported.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test inoculum was reported.
	Metric 10:	Sampling Methods	N/A	This metric does not apply to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome of interest was reported.
	Metric 12:	Test Substance Purity	Medium	Sampling method was not reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Confounding variables were not reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric does not apply to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric meets the qualifications for high metric rating.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	This metric does not apply to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination			High	

Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1705680

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	none; screening test; experimental; other: Non-guideline Biodegradation in contaminated sediment via reductive debromination.
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	None; NR; NR; NR
Oxygen and Inoculum	anaerobic; other: Streambed sediments from a contaminated stream near an industrial park enriched in a semi-continuous batch reactor (SCBR). Test conditions varied to evaluate carbon source and electron donor: tests run with ethanol (34.35 mM), pyruvate (17.5 mM), glucose (5.55 mM), acetate (17.5 mM), acetate and hydrogen (17.5 mM and 25% of the serum bottle atmosphere, respectively), acetate and formate (17.5 mM and 43.5 mM, respectively), citrate (5.2 mM), succinate (8.47 mM).
Duration, Parameter, System, and Sampling Frequency	11-35 days; other (BPA production); Anaerobic chamber; sealed serum bottles; atmosphere: 80% N ₂ and 20% CO ₂ ; incubated at 30°C; without shaking; Mineral medium was prepared according to Boyle et al. (1999) with some modifications.; done in triplicate
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; water/enriched sediment; 10% vol/vol mixed debrominating culture in mineral medium; natural water; not reported; 7.4±0.2
Control Dark, Control, and Blank Concentration	yes; not reported; 1- sterile grey chalk, 2- no added carbon source (no debromination observed after 35 days) 90 µM (µmol/L)
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC (TBBPA and metabolites); HPLC: Ronen and Abeliovich, 2000; other (BPA production)
Results Remarks	Debromination of TBBPA was supported by pyruvate, ethanol, acetate and hydrogen, glucose, and the combination of acetate and formate. Acetate, succinate, and citrate alone did not support debromination.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not reported; Not Reported
Results Details	not reported
Mean Total Recovery Results and Results Per Recovery	TBBPA recovery for analysis via desorption and dissolution: 101.2 ± 10.2%; not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	% of TBBPA converted (Table 1) (debromination) Pyruvate: 97.5%/11 days Ethanol: 88.7%/11 days Acetate and hydrogen: 88.2%/17 days Glucose: 96.5%/35 days Acetate + formate: 45.9%/35 days Acetate: no debromination observed after 35 days Succinate: no debromination observed after 35 days Citrate: no debromination observed after 35 days; Not Reported; BPA

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source or purity were not reported; however, the omissions or identified impurities were not likely to have a substantial impact on the study results.

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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1705680			
Domain	Metric	EVALUATION Rating		Comments
Domain 2: Test Design	Metric 3:	Study Controls	Low	Concurrent control details were not included; the lack of data may limit the interpretation of study results.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to have a substantial impact on study results.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	The conditions of the exposure were documented.
	Metric 8:	System Type and Design	High	The system type and design (sealed) were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	Medium	The inoculum source was reported, but are not routinely used for similar study types (enrichment culture/sediments from contaminated site); however, the deviation was not likely to have a substantial impact on study results.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	Low	Deficiencies in the outcome assessment methodology of the assessment or reporting were likely to have a substantial impact on results. Initial BPA in sediments unclear.
	Metric 12:	Test Substance Purity	Medium	Some sampling method details were not reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were not reported in the study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Low	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not conducted or were not described clearly.

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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1705680

		EVALUATION		
Domain	Metric	Rating		Comments
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to the study type.

Overall Quality Determination	Medium
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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1705680			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	Not Reported; tetrabromobisphenol A			
Confidentiality, EndPoint, Type, Guideline	none; screening test; experimental; other: Non-guideline: Biodegradation/microbial activity in TBBPA contaminated sediment.			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	None; NR; NR; NR			
Oxygen and Inoculum	anaerobic; natural water / sediment: Streambed sediments and fracture fillings from a contaminated stream near an industrial park augmented with acetate; presence of anaerobic microbial activity supported by measuring sulphate reduction.			
Duration, Parameter, System, and Sampling Frequency	up to 109 days; test mat; Anaerobic chamber; atmosphere: 94% N2 and 6% H2; incubated at 30°C; without shaking; Mineral medium was prepared according to Boyle et al. (1999) with some modifications.; done in triplicate, sampling timepoints presented in Fig 1.			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; headspace analysis (methane) and liquid phase (acetate and sulphate); sediment or fracture fillings and water mixed at 1:10 wt/vol and supplemented with 3 g/L acetate; natural water (incubation without shaking); not reported; 7.4±0.2			
Control Dark, Control, and Blank Concentration	yes; not reported; autoclaved sample			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC (TBBPA and metabolites); GC-MS (Methane); HPLC: Ronen and Abeliovich, 2000; GC-MS -APHA, 1992: Standard Methods for the Examination of Water and Wastewater; test mat.; CH4 evolution (reported but not correlated to TBBPA disappearance)			
Results Remarks	Microbial activity was confirmed by reduction of sulphate with near stoichiometric coupling to acetate consumption; the measured methanogenesis was a minor process in the sediment with 360 nmol methane (in 10mL slurry) produced after 18 days. Final concentrations of TBBPA were not reported; BPA concentrations were not indicated. Results were not presented for surface sediment samples; no TBBPA debromination observed over 4 months in the fracture filling samples (data/results not provided).			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not reported; not reported			
Results Details	Not Reported			
Mean Total Recovery Results and Results Per Recovery	not reported; not reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	not reported; not reported; BPA was mentioned but not measured in this experiment			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source or purity were not reported; however, the omissions or identified impurities were not likely to have a substantial impact on the study results.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Some concurrent control details were not included; however, the lack of data was not likely to have a substantial impact on study results.
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Study Citation:		Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.		
OECD Harmonized Template:		Biodegradation in Sediment		
HERO ID:		1705680		
Domain	Metric	EVALUATION		Comments
	Metric 4:	Test Substance Stability	Rating Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Low	Contaminated sediment concentration reported; target chemical concentrations were not fully evaluated for the experiment.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	The conditions of the exposure were documented.
	Metric 8:	System Type and Design	High	The system type and design (sealed) were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The inoculum source was reported, but are not routinely used for similar study types (contaminated soil); however, the deviation was not likely to have a substantial impact on study results.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Uninformative	The assessment methodology did not address or report the outcome(s) of interest. This is a serious flaw that makes the study unusable.
	Metric 12:	Test Substance Purity	Medium	Some sampling method details were not reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	Data was not presented.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Uninformative	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not conducted or were not described clearly.
Domain 8: Other				
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Study Citation:		Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.		
OECD Harmonized Template:		Biodegradation in Sediment		
HERO ID:		1705680		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible (i.e., reference substance(s) not used or physical-chemical properties unknown and unable to be estimated).
	Metric 18:	QSAR Models	N/A	This metric is not applicable to the study type.
Overall Quality Determination		Uninformative		

Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1705680

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	none; screening test; experimental; other: Non-guideline: Biodegradation in contaminated sediment via reductive debromination.
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	None; NR; NR; NR
Oxygen and Inoculum	anaerobic; other: Streambed sediments from a contaminated stream near an industrial park enriched in a semi-continuous batch reactor (SCBR). Test conditions varied to evaluate optimal debromination at pH values ranging from 6-9.
Duration, Parameter, System, and Sampling Frequency	3 days; other (BPA production); The experiment was conducted in an anaerobic chamber using sealed flasks under an atmosphere of 94% N and 6% H ₂ , and incubated at 30 °C without shaking. The mineral medium was prepared according to Boyle et al. (1999) with some modifications.; Samples run in triplicate, sampling frequency not reported
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; water/enriched sediment; 20% vol/vol SCBR enriched slurry in mineral medium with 10% grey chalk; natural water; not reported; 6-9 (adjusted with 1N NaOH or 1N HCl as needed))
Control Dark, Control, and Blank Concentration	yes; not reported; autoclaved sample 90 µM (µmol/L)
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC (TBBPA and metabolites); HPLC: Ronen and Abeliovich, 2000; other (BPA production)
Results Remarks	Optimal conditions for TBBPA debromination (Fig.2) after 3 days: pH of 7–8 based on the concentration of BPA ~ 65-70 µmol/L.No significant differences were observed for debromination at pH 7, 7.5, and 8, with a slight decrease in debromination observed at pH 6 and 6.5. Debromination was inhibited at pH 8.5 and pH 9. The authors noted BPA was detected in sediment samples (data not presented) and it was unclear if it was a result of TBBPA debromination or another contaminant. Sorption to sediments and relation to TBBPA dehalogenation was uncertain.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not reported; Not Reported
Results Details	not reported
Mean Total Recovery Results and Results Per Recovery	TBBPA recovery for analysis via desorption and dissolution: 101.2 ± 10.2%; not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	~72-78%/3 days (at pH of 7–8 based on % debromination to BPA = BPA formed/Initial TBBPA x 100) in); Not Reported; BPA

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source or purity were not reported; however, the omissions or identified impurities were not likely to have a substantial impact on the study results.
Domain 2: Test Design				

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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1705680			
Domain	Metric	EVALUATION		Comments
	Metric 3:	Study Controls	Medium	Some concurrent control details were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	The conditions of the exposure were documented.
	Metric 8:	System Type and Design	High	The system type and design (sealed) were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The inoculum source was reported, but are not routinely used for similar study types (enrichment culture/sediments from contaminated site); however, the deviation was not likely to have a substantial impact on study results.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Deficiencies in the outcome assessment methodology of the assessment or reporting were likely to have a substantial impact on results. Initial BPA in sediments unclear.
	Metric 12:	Test Substance Purity	Medium	Some sampling method details were not reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not conducted or were not described clearly.
Domain 8: Other				

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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1705680

		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 17: Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.	
	Metric 18: QSAR Models	N/A	This metric is not applicable to the study type.	

Overall Quality Determination

Medium

Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1705680

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	none; screening test; experimental; other: Non-guideline: Biodegradation in contaminated sediment via reductive debromination.
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	None; NR; NR; NR
Oxygen and Inoculum	anaerobic; other: Streambed sediments from a contaminated stream near an industrial park enriched in a semi-continuous batch reactor (SCBR). Test conditions varied to evaluate optimal debromination at NaCl concentrations 0-60 g/L.
Duration, Parameter, System, and Sampling Frequency	10 days; other (BPA production); Anaerobic chamber; sealed flasks; atmosphere: 94% N ₂ and 6% H ₂ ; incubated at 30°C; without shaking; Mineral medium was prepared according to Boyle et al. (1999) with some modifications.; done in triplicate, frequency not reported
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; water/enriched sediment; 20% vol/vol SCBR enriched slurry in mineral medium with 10% grey chalk; natural water; not reported; 7.4±0.2
Control Dark, Control, and Blank Concentration	yes; not reported; autoclaved sample 90 µM (µmol/L)
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC (TBBPA and metabolites); HPLC: Ronen and Abeliovich, 2000; other (BPA production)
Results Remarks	Optimal conditions for TBBPA debromination (Fig.2) after 10 days: salinity of 2–3% NaCl (concentration of BPA ~ 60 µmol/L). The authors noted BPA was detected in sediment samples (data not presented) and it was unclear if it was a result of TBBPA debromination or another contaminant. Sorption to sediments and relation to dehalogenation was uncertain.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not reported; Not Reported
Results Details	not reported
Mean Total Recovery Results and Results Per Recovery	TBBPA recovery for analysis via desorption and dissolution: 101.2 ± 10.2%; not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	~67%/10 days (at 2–3% NaCl based on % debromination to BPA = BPA formed/Initial TBBPA x 100)); Not Reported; BPA

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source or purity were not reported; however, the omissions or identified impurities were not likely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Some concurrent control details were not included; however, the lack of data was not likely to have a substantial impact on study results.

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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1705680			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	The conditions of the exposure were documented.
	Metric 8:	System Type and Design	High	The system type and design (sealed) were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The inoculum source was reported, but are not routinely used for similar study types (enrichment culture/sediments from contaminated site); however, the deviation was not likely to have a substantial impact on study results.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Deficiencies in the outcome assessment methodology of the assessment or reporting were likely to have a substantial impact on results. Initial BPA in sediments unclear.
	Metric 12:	Test Substance Purity	Medium	Some sampling method details were not reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not conducted or were not described clearly.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.

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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1705680

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18:	QSAR Models	N/A This metric is not applicable to the study type.

Overall Quality Determination	Medium
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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1705680

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	none; screening test; experimental; other: Non-guideline: Biodegradation in contaminated sediment via reductive debromination.
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	None; NR; NR; NR
Oxygen and Inoculum	anaerobic; other: Streambed sediments from a contaminated stream near an industrial park enriched in a semi-continuous batch reactor (SCBR). Test conditions varied to evaluate optimal debromination temperature = 26, 30, and 38°C.
Duration, Parameter, System, and Sampling Frequency	2 days; other (BPA production); Anaerobic chamber; sealed flasks; atmosphere: 94% N2 and 6% H2; incubated at 26-38°C; without shaking; Mineral medium was prepared according to Boyle et al. (1999) with some modifications.; done in triplicate
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; water/enriched sediment; 20% vol/vol SCBR enriched slurry in mineral medium with 10% grey chalk; natural water; not reported; 7.4±0.2
Control Dark, Control, and Blank Concentration	yes; not reported; autoclaved sample 90 µM (µmol/L)
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC (TBBPA and metabolites); GC-MS (Methane); HPLC: Ronen and Abeliovich, 2000; other (BPA production)
Results Remarks	Optimal conditions for TBBPA debromination (Fig.2) after 2 days: temperature = 30°C (concentration of BPA ~ 75 µmol/L). The authors noted BPA was detected in sediment samples (data not presented) and it was unclear if it was a result of TBBPA debromination or another contaminant. Sorption to sediments and relation to dehalogenation was uncertain.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not reported; Not Reported
Results Details	not reported
Mean Total Recovery Results and Results Per Recovery	TBBPA recovery for analysis via desorption and dissolution: 101.2 ± 10.2%; not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	~83%/2 days (at 30°C based on % debromination to BPA = BPA formed/Initial TBBPA x 100)); Not Reported; BPA

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source or purity were not reported; however, the omissions or identified impurities were not likely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Some concurrent control details were not included; however, the lack of data was not likely to have a substantial impact on study results.

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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1705680			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	The conditions of the exposure were documented.
	Metric 8:	System Type and Design	High	The system type and design (sealed) were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The inoculum source was reported, but are not routinely used for similar study types (enrichment culture/sediments from contaminated site); however, the deviation was not likely to have a substantial impact on study results.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Deficiencies in the outcome assessment methodology of the assessment or reporting were likely to have a substantial impact on results. Initial BPA in sediments unclear.
	Metric 12:	Test Substance Purity	Medium	Some sampling method details were not reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not conducted or were not described clearly.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.

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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1705680

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18:	QSAR Models	N/A This metric is not applicable to the study type.

Overall Quality Determination	Medium
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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1705680

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	none; screening test; experimental; other: Non-guideline: Biodegradation in contaminated sediment via reductive debromination.
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	None; NR; NR; NR
Oxygen and Inoculum	anaerobic; other: Streambed sediments from a contaminated stream near an industrial park enriched in a semi-continuous batch reactor (SCBR). Test conditions varied to evaluate TBBPA alone and debromination in the presence of various electron acceptors: Na ₂ SO ₄ (40 mM), NaNO ₃ (40 mM), Na ₂ SO ₃ (40 mM), and amorphous Fe (250 nM).
Duration, Parameter, System, and Sampling Frequency	7-15 days; other (BPA production); Anaerobic chamber; sealed serum bottles; atmosphere: 80% N ₂ and 20% CO ₂ ; incubated at 30°C; without shaking; Mineral medium was prepared according to Boyle et al. (1999) with some modifications.; done in triplicate; sampling frequency not reported
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; water/enriched sediment; 10% vol/vol mixed debrominating culture in mineral medium with 1.5% grey chalk; natural water; not reported; 7.4±0.2
Control Dark, Control, and Blank Concentration	yes; not reported; 1- no added electron acceptor 90 µM (µmol/L)
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC (TBBPA and metabolites); HPLC: Ronen and Abeliovich, 2000; other (BPA production)
Results Remarks	Debromination of TBBPA was inhibited by all inorganic electron acceptors tested; % of TBBPA converted to BPA after 7 days with iron, sulphate, and nitrate reported as 70%, 60%, and 13%; debromination appeared to be fully inhibited by sulphite (Fig 3).
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not reported; Not Reported
Results Details	not reported
Mean Total Recovery Results and Results Per Recovery	TBBPA recovery for analysis via desorption and dissolution: 101.2 ± 10.2%; not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	89% of TBBPA converted to BPA after 7 days (Fig 3); Not Reported; BPA

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source or purity were not reported; however, the omissions or identified impurities were not likely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3:	Study Controls	Low	Concurrent control details were not included; the lack of data may limit the interpretation of study results.

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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1705680			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	The conditions of the exposure were documented.
	Metric 8:	System Type and Design	High	The system type and design (sealed) were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The inoculum source was reported, but are not routinely used for similar study types (enrichment culture/sediments from contaminated site); however, the deviation was not likely to have a substantial impact on study results.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Deficiencies in the outcome assessment methodology of the assessment or reporting were likely to have a substantial impact on results. Initial BPA in sediments unclear.
	Metric 12:	Test Substance Purity	Medium	Some sampling method details were not reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were not reported in the study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not conducted or were not described clearly.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.

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Study Citation:	Arbeli, Z., Ronen, Z., Diaz-Baez, M. C. (2006). Reductive dehalogenation of tetrabromobisphenol-A by sediment from a contaminated ephemeral streambed and an enrichment culture. Chemosphere 64(9):1472-1478.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1705680

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18:	QSAR Models	N/A
			This metric is not applicable to the study type.

Overall Quality Determination	Medium
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Study Citation:	Chang, B. V., Yuan, S. Y., Ren, Y. L. (2012). Aerobic degradation of tetrabromobisphenol-A by microbes in river sediment. Chemosphere 87(5):535-541.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1782196

EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; Tetrabromobisphenol-A			
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Degradation in river sediment			
Solvent, Reactivity, Storage, Stability	dichloromethane; NR; NR; NR			
Radiolabel, Source, State, Purity	No; Aldrich Chemical Co. (Milwaukee, WI); NR; 97.0%			
Oxygen and Inoculum	aerobic; natural water / sediment: 3 river sediment samples from a heavily contaminated river, Erren River, in southern Taiwan collected July 2008. BPA, nonylphenol (NP), polybrominateddiphenyl ethers (PBDEs), and tetrachlorobisphenol-A (TCBPA) were all noted as having been found in the river sediment in other studies. Sediment microcosms deliberately adapted to TBBPA in the experiment degraded TBBPA only slightly faster (t1/2 of 9days vs 11 days).			
Duration, Parameter, System, and Sampling Frequency	20 days; test mat.; 125 mL serum bottles shake at 120 rpm at; Not reported			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	Not reported; sediment; 1 g sediment; microbial activity: 3.8E5 CFU/mL; 49 mL basal medium; Not reported; Sediment samples: A: 7.2, B: 6.6, C: 6.8; Basal medium pH: 7.2; test pH: 7.0			
Control Dark, Control, and Blank Concentration	yes; Not reported; Autoclaved controls 50 µg/g			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	GC- electron capture detector; LOD: 0.02 mg/L; recovery=91.5%; 7			
Results Remarks	Bacillus pumilus and Rhodococcus ruber were identified as the dominant bacteria responsible for TBBPA degradation			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Mean: 11 days; A: 13.1 days, B: 9.0 days, C: 11.0 days; correlation coefficient r=0.93; Sterile sediment; Remaining TBBPA ranged from 95.5-96.4%			
Results Details	Mean=6.6E-2/d. A: 0.053/d, B: 0.077/d, C: 0.063/day			
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	loss of test material after 20 days: A: 60.5%, B: 78.6%, C: 68.1%; Not Reported; Not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance purity and source were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 4:	Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Chang, B. V., Yuan, S. Y., Ren, Y. L. (2012). Aerobic degradation of tetrabromobisphenol-A by microbes in river sediment. Chemosphere 87(5):535-541.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1782196			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6:	Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source and characteristics were reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed and reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Some sampling details were not reported but their omission was not likely to impact the study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No confounding variables between study groups were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some data were not reported such as percent recovery, but the omissions were not likely to impact the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Some calculation details were not reported but their omission was not likely to impact the study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

* Related References: Cited in HSDB

Study Citation:	Chang, B., Liu, J., Liao, C. (2014). Aerobic degradation of bisphenol-A and its derivatives in river sediment. Environmental Technology 35(4):416-424.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5496888

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol-A
Confidentiality, EndPoint, Type, Guideline	None; ready biodegradability; Experimental; other
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich Chemical Co. (Milwaukee, WI); NR; 97.0%
Oxygen and Inoculum	aerobic; natural water / sediment: marine: Sediment samples (0-15cm depth) were collected from the Erren River, Taiwan
Duration, Parameter, System, and Sampling Frequency	20 days; test mat.; 125 mL serum bottle.; Samples were collected approximately every 2-3 days.
Results Sample Time, Compartment, Sludge Compartment, Water	Not reported; 44 mL of medium containing 65.3 K ₂ HPO ₄ , 25.5 KH ₂ PO ₄ , 133.8 Na ₂ HPO ₄ 12H ₂ O, 5.1 NH ₄ Cl, 82.5 CaCl ₂ , 67.5 MgSO ₄ 7H ₂ O, and 0.75 FeCl ₃ 6H ₂ O (all mg/L) was added to a 125mL serum bottle with 5g sediment and 50 µg/g TBBPA.; Not reported; Not reported; Not reported; 7.0
Compartment, CEC, and pH	yes; Not reported; Sterilized controls were autoclaved at 121°C for 30 min.
Control Dark, Control, and Blank Concentration	50 µg/L
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Gas chromatography with electron capture detector and HP-5 capillary column.; Limit of detection: 0.02 mg/L; 7
Results Remarks	Not reported
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	11.2 days; Not reported; Not reported; Not reported
Results Details	degradation rate constant k ₁ =0.062 day ⁻¹ ; Degradation data fit a first order equation (S=So [^] (-k ₁ t) with an r ^{^2} of 0.96.
Mean Total Recovery Results and Results Per Recovery	91.5%; After 20 days, sterile controls contained 92.1-96.3% of initial test substance concentration.
Results Value, Direct Quantum Yield Results, and Transformation Products	k (1/d)=0.062; Not Reported; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
Domain 2: Test Design	Metric 3:	Study Controls	High
	Metric 4:	Test Substance Stability	Medium

The test substance was identified using common nomenclature.

The test substance purity was reported and appropriate.

Appropriate sterilized controls were used.

Some of the details regarding the test substance preparation and storage conditions were not reported but the omissions are unlikely to have a substantial impact on the study results.

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Study Citation:	Chang, B., Liu, J., Liao, C. (2014). Aerobic degradation of bisphenol-A and its derivatives in river sediment. Environmental Technology 35(4):416-424.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5496888			
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	The testing conditions were consistent across the sample groups of interest.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Some of the details regarding inoculum were not reported but the omissions are unlikely to have a substantial impact on the study results.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Some of the details regarding the sampling method, such as sampling frequency, were not clearly reported but the omissions are unlikely to have had a substantial impact on the study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Uncertainty in the concentration measurements were not reported; however, the omission is unlikely to have substantial impact on the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The concentrations of the test substance were not reported but the omissions are unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis and kinetic calculations were reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable as compared to the results from other studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Chang, B., Yuan, S. Y., Ren, Y. (2012). Anaerobic degradation of tetrabromobisphenol-A in river sediment. Ecological Engineering 49:73-76.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	2046400			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; Tetrabromobisphenol-A			
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; Aldrich Chemical Co. (Milwaukee, WI); NR; 98.0%			
Oxygen and Inoculum	anaerobic; natural sediment: Adaptation: 50 ug/g TBBPA added to 500 g sediment at 14d intervals under static conditions at 30°C for 6 mo			
Duration, Parameter, System, and Sampling Frequency	35d; test mat.; anaerobic glove box filled with N2 (85%), H2 (10%), and CO2 (5%); Not reported			
Results Sample Time, Compartment, Sludge Compartment, Water	Not reported; Not reported; Not reported; Not reported; Not reported; 7.0			
Compartment, CEC, and pH				
Control Dark, Control, and Blank Concentration	yes; Not reported; Autoclaved controls included; 92.1%-95.3% TBBPA remained after 35d 50 ug/g			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	GC-MS; Sediments were extracted with DCM and analyzed; LOD=0.02 mg/L; 7			
Results Remarks	TBBPA is biodegradable under anaerobic conditions in sediment.			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	16.6 days; Not Reported; Not reported; Not reported			
Results Details	Degradation rate constant=0.0417/day (first order kinetics)			
Mean Total Recovery Results and Results Per Recovery	91.5%; Not reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	Not Reported; Not Reported; Degradation products were monitored at 0, 20, and 35 d; dibromobisphenol-A identified at day 20 and BPA identified at day 30			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Sterile controls were included.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
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Study Citation:		Chang, B., Yuan, S. Y., Ren, Y. (2012). Anaerobic degradation of tetrabromobisphenol-A in river sediment. Ecological Engineering 49:73-76.		
OECD Harmonized Template:		Biodegradation in Sediment		
HERO ID:		2046400		
Domain		Metric	EVALUATION	
			Rating	Comments
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	The system type and design were appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and the microbial component evaluated.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed and reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Limited sampling details; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	No confounding variable noted/identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical extraction efficiency and percent recovery were reported; and transformation products were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical analysis was reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable and consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Cheng, H., Wang, Y., Zhu, T., Wang, L., Xie, Z., Hua, Z., Jiang, X. (2019). Effects of hydrodynamic disturbances on biodegradation of tetrabromobisphenol A in water-sediment systems. Environmental Science and Pollution Research 26(30):31392-31400.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5679921

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; other: Experimental; other: TBBPA biodegradation in a water-sediment system under the influence of static (SC), weak (WHC), and strong hydrodynamic conditions (SHC)
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Oxygen and Inoculum	aerobic; natural sediment: sediment from Lake Chaohu which has been seriously polluted by TBBPA
Duration, Parameter, System, and Sampling Frequency	5 weeks; test mat.; racetrack-style flumes simulating hydrodynamic characteristics in water-sediment systems; weekly
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	once a week; sediment and water samples collected; TBBPA loss during water sampling was small (less than 1.0%), thus the dilution effect was neglected.; TBBPA initial concentration: 4.9 µg/L; collected using a cylindrical sampler (5 cm I.D., 50 cm in length); TBBPA initial concentration: 0.62 mg/kg; ultrapure water; 300 mL collected per sampling site using a layered hydrophore; not reported; 8.52 (SC), 8.41 (WHC), 8.16 (SHC)
Control Dark, Control, and Blank Concentration	Not Reported; not reported; sterile control included; mean flow velocity 0 cm/s.
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Not Reported
Results Remarks	UPLC-MS-MS; Agilent 1290 ultra-high performance liquid chromatograph (UPLC; Agilent, Waldbronn, Germany) Agilent 6460 Triple and Quad-liner mass spectrometer (MS) equipped with an electrospray ionization source; recovery: 97±10% (water) and 93±13% (sediment); MDL: 10 ng/mL (water) and 20 ng/g (sediment); 7
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	TBBPA biodegradation was significantly enhanced by water disturbance. SC=Static Conditions; WHC=Weak Hydrodynamic Conditions; SHC=Strong Hydrodynamic Conditions
Results Details	Ave half-life in water and sediment: 40.2±0.1 days (SC), 25.5±0.1 days (WHC), 16.0±0.0 days (SHC); 0.3%–9.4%; sterile control; remaining TBBPA in water and sediment after 5 weeks=95%; 5% loss may be from volatilization and/or sediment aging
Mean Total Recovery Results and Results Per Recovery	first-order rate constant (/day) in water: 0.02 (SC), 0.03 (WHC), 0.04 (SHC); first-order rate constant in sediment: 0.02 (SC), 0.03 (WHC), 0.04 (SHC)
Results Value, Direct Quantum Yield Results, and Transformation Products	not reported; after 5 wks TBBPA concentration in water=2.7 (SC), 3.2 (WHC), and 3.3 (SHC) µg/L, in sediment=0.34 (SC), 0.25 (WHC) and 0.13 (SHC) mg/kg
	Remaining TBBPA in water=55.6%, 31.9% and 21.5% in SC, WHC, and SHC, respectively; in sediment=55.3%, 40.0%, and 22.5% in SC, WHC, and SHC, respectively; Not Reported; not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	High	The test substance was identified by name.
	Metric 2:	Medium	The test substance source and purity were not reported; however, the omissions were not likely to hinder the interpretation of the study results.
Domain 2: Test Design			

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Study Citation:	Cheng, H., Wang, Y., Zhu, T., Wang, L., Xie, Z., Hua, Z., Jiang, X. (2019). Effects of hydrodynamic disturbances on biodegradation of tetrabromobisphenol A in water-sediment systems. Environmental Science and Pollution Research 26(30):31392-31400.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5679921			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 3:	Study Controls	High	Controls were included.
	Metric 4:	Test Substance Stability	N/A	This metric is not applicable to this type of study.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Temperature, pH, synthetic river water composition, and some sediment characteristics were reported; additional detail in supporting information (not available).
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups and samples.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate.
	Metric 12:	Test Substance Purity	Medium	Sampling method details were limited.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variation between replicates was accounted for.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Data reporting was limited; additional detail in supporting information would likely provide more study details.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical analysis was appropriate; kinetic calculation detail was limited.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	de Wit, C. A., Herzke, D., Vorkamp, K. (2010). Brominated flame retardants in the Arctic environment – trends and new candidates. Science of the Total Environment 408(15):2885-2918.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	557738

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; biodegradation; not specified; other: not specified
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Oxygen and Inoculum	anaerobic; sediment (not specified): Anaerobic bacteria in sediments.
Duration, Parameter, System, and Sampling Frequency	NR; NR; NR; NR
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	NR; NR; NR; NR; NR; NR
Control Dark, Control, and Blank Concentration	NR; NR; NR NR NR - NR NR NR
Analytical Method, Analytical Details, and Results Per Degredation Parameter	NR; NR; NR
Results Remarks	The dimethylated derivative (Me-TBBPA) may be formed by anaerobic bacteria in sediments.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	NR; NR; NR; NR
Results Details	NR
Mean Total Recovery Results and Results Per Recovery	NR; NR
Results Value, Direct Quantum Yield Results, and Transformation Products	NR; NR; NR

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Not reported in this secondary source; more details may be in the source cited.
Domain 2: Test Design	Metric 3:	Study Controls	Low	Not reported in this secondary source; more details may be in the source cited.
	Metric 4:	Test Substance Stability	Medium	Not reported in this secondary source; more details may be in the source cited.
Domain 3: Test Conditions				

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Study Citation:	de Wit, C. A., Herzke, D., Vorkamp, K. (2010). Brominated flame retardants in the Arctic environment – trends and new candidates. Science of the Total Environment 408(15):2885-2918.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	557738			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	Low	Not reported in this secondary source; more details may be in the source cited.
	Metric 6:	Testing Conditions	Low	Not reported in this secondary source; more details may be in the source cited.
	Metric 7:	Testing Consistency	Low	Not reported in this secondary source; more details may be in the source cited.
	Metric 8:	System Type and Design	Low	Not reported in this secondary source; more details may be in the source cited.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	Not reported in this secondary source; more details may be in the source cited.
	Metric 10:	Sampling Methods	N/A	This metric does not apply to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Not reported in this secondary source; more details may be in the source cited.
	Metric 12:	Test Substance Purity	Low	Not reported in this secondary source; more details may be in the source cited.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Not reported in this secondary source; more details may be in the source cited.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric does not apply to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Not reported in this secondary source; more details may be in the source cited.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Not reported in this secondary source; more details may be in the source cited.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Not reported in this secondary source; more details may be in the source cited.
	Metric 18:	QSAR Models	N/A	This metric does not apply to this study type.
Overall Quality Determination		Low		

* Related References: cited from Allard et al., 1987 (HERO ID 5518187, not in distiller at the time of extraction.)

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	none; inherent biodegradability; experimental; other: Degradation in aerobic sediment-water system			
Solvent, Reactivity, Storage, Stability	acetone; NR; NR; NR			
Radiolabel, Source, State, Purity	14C-labelled tetrabromobisphenol-A; NR; NR; radiopurity: 96.0% Notes: NR			
Oxygen and Inoculum	DO >6.4 mg/L, aerobic; natural water / sediment: freshwater: Natural river sediment: 6.8% OC, 15.9% field moisture capacity, 92% sand, 6% silt and 2% clay.			
Duration, Parameter, System, and Sampling Frequency	56 days; radiochem. measure; Flasks; periodically			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	0, 4, 7, 10, 14, 21, 28, 42 and 56 days; solid and water phases, volatiles; River sediment 40 mL (ca. 20 g dry weight); River water 135 mL; not reported; sediment pH = 5.5, test vessels pH = 5.2-9.6 (mean 5.7)			
Control Dark, Control, and Blank Concentration	yes; not reported; Sterile control included (HgCl2) = 10 - = 1000 µg/L			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	combustion analysis of radioactivity; Soxhlet extraction of sediment, HPLC analysis and radiometric detection; not reported; radiochem. meas.			
Results Remarks	Incomplete mineralization based on 14-CO2 evolution; 44.7%-64.2% of the radioactivity recovered from the sediment phase was TBBPA.			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Estimated DT50 ca. 48 days (initial concentration 10 µg/L), 69 days (initial concentration 100 µg/L), 84 days (initial concentration 1000 µg/L).; not reported; not reported; not reported			
Results Details	Estimated DT50 ca. of sterile control 1300 days			
Mean Total Recovery Results and Results Per Recovery	not reported; ca 50%			
Results Value, Direct Quantum Yield Results, and Transformation Products	not reported; not reported; not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The purity of the test substance was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Sterile control included.
	Metric 4:	Test Substance Stability	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5238261			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 7:	Testing Consistency	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 8:	System Type and Design	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test inoculum source was reported.
	Metric 10:	Sampling Methods	N/A	Not applicable to this study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Loss also due to sediment bound residue.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Study results were reasonable; additional detail may be in primary literature.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.

Overall Quality Determination

Medium

* Related References: Reference cited (not in HERO at time of extraction): Springborn Life Sciences (1989d). Determination of the biodegradability of tetrabromobisphenol A in soil under anaerobic conditions. Report No 88-11-2849. Springborn Life Sciences, Inc., Wareham, Massachusetts.

Study Citation:	Jiang, Y., Hong, H., Liu, J., Lu, H., Wang, Q., Xia, K., Yan, C., Yang, J. (2020). Effect of mangrove species on removal of tetrabromobisphenol A from contaminated sediments. Chemosphere 244:125385.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	10113618

EXTRACTION

Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other; experimental; other: non-guideline study
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	13C12-labeled TBBPA; NR; NR; NR
Oxygen and Inoculum	aerobic; natural water / sediment: freshwater: Surface sediment (0-20 cm) and mangrove propagules (<i>Kandelia obovata</i> and <i>Avicennia marina</i>) used in the experiment were obtained from a mangrove forest in the Jiulongjiang River Estuary Fujian Province, China. Three healthy <i>A. marina</i> or <i>K. obovata</i> seedlings with similar sizes were planted into each pot with sterile or non-sterile sediment spiked with TBBPA; sediments aged for 7 days prior to study.
Duration, Parameter, System, and Sampling Frequency	14, 35, and 93 days; test mat.; PVC planting pots, 25±5C; weekly
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	day 0, 7, 14, 21, 35, 49, 63, and 93; plants and sediment samples collected; Sediment: sand 4.66%, silt 66.5%, clay 28.84%; salinity 1.34%; 60-80% relative humidity maintained during experiment; sediment moisture 46.6±1.35%; 24-h high tide and 24-h low tide was applied; NR; Sediment pH = 6.69±0.01
Control Dark, Control, and Blank Concentration	no; 12 h daily light exposure; NR; Sterilized sediment TBBPA concentration: 10.83±0.46 mg/kg dw; ~21.6% loss after 93 days
Analytical Method, Analytical Details, and Results Per Degredation Parameter	10.78±0.18 (non-sterilized sediments) - mg/kg dw
Results Remarks	ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS); solid phase extraction; MDL: 0.08, 0.12, 0.33, and 0.25 ng/g for sediment, roots, stems, and leaves, respectively; test mat.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	unplanted nonsterilized sediment: concentration of TBBPA was reduced from 10.83 to 3.12 mg/kg dw by day 21, and 0.35 mg/kg dw by day 93
Results Details	unplanted non-sterilized sediment: half-life = 21.66 days; non-sterilized sediments planted with <i>A. marina</i> : half-life = 20.38 days; non-sterilized sediments planted with <i>K. obovata</i> : half-life = 16.50 days; data: means ± standard deviation were reported; NR; NR
Mean Total Recovery Results and Results Per Recovery	unplanted non-sterilized sediment: rate constant k = 0.032/day; non-sterilized sediments planted with <i>A. marina</i> : rate constant k = 0.034/day; non-sterilized sediments planted with <i>K. obovata</i> : rate constant k = 0.042/day (SI Table S4)
Results Value, Direct Quantum Yield Results, and Transformation Products	analytical recoveries of 13C12-TBBPA from sediment, roots, stems, and leaves ranged from 86 ± 9.7% to 110 ± 6.9%, 52.1 ± 6.8% to 91.7 ± 15.1%, 62.0 ± 10.7% to 97.1 ± 13.9%, and 45.0 ± 2.3% to 120.8 ± 6.5%, respectively; >95% total loss of TBBPA in: unplanted non-sterilized sediment: 61.56%/14 days, 74.57%/35 days, 95.79%/93 days; nonsterilized sediments planted with <i>A. marina</i> : 65.58%/14 days, 83.46%/35 days, 95.67%/93 days; nonsterilized sediments planted with <i>K. obovata</i> : 74.95%/14 days, 88.68%/35 days, 98.01%/93 days (SI Table S8); NR; After 93 days, tribromobisphenol A (TriBBPA), dibromobisphenol A (DiBBPA), monobromobisphenol A (MonoBBPA), and bisphenol A (BPA), were all detected in non-sterilized sediment, but not detected in the sterilized sediment

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	High	The test substance was identified definitively.
	Metric 2:	Medium	The test substance source was not reported; however, the omissions were not likely to have a substantial impact on the study results.

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Study Citation:		Jiang, Y., Hong, H., Liu, J., Lu, H., Wang, Q., Xia, K., Yan, C., Yang, J. (2020). Effect of mangrove species on removal of tetrabromobisphenol A from contaminated sediments. Chemosphere 244:125385.		
OECD Harmonized Template:		Biodegradation in Sediment		
HERO ID:		10113618		
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 2: Test Design	Metric 3:	Study Controls	High	A concurrent negative control or blank group were included.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established. The system type and design were appropriate.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	High	The test organism information or inoculum source were reported.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	High	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

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Study Citation:	Jiang, Y., Hong, H., Liu, J., Lu, H., Wang, Q., Xia, K., Yan, C., Yang, J. (2020). Effect of mangrove species on removal of tetrabromobisphenol A from contaminated sediments. Chemosphere 244:125385.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	10113618

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	Li, L., Liu, S., Zhu, C., Ren, Y., Cen, J. (2014). [Anaerobic degradation and pathways of tetrabromobisphenol A in river sediments]. Huanjing Huaxue / Environmental Chemistry 33(5):837-843.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5758229

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; biodegradability; experimental; other: not specified
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Oxygen and Inoculum	anaerobic; sediment (not specified): River sediments (Xinzao, Qingyuan, and Guiyu Town in Guangdong Province)
Duration, Parameter, System, and Sampling Frequency	NR; NR; serum bottle experiments; NR
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	NR; NR; NR; NR; NR; NR
Control Dark, Control, and Blank Concentration	NR; NR; NR NR 50 - 200 µmol/L
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC/UPLC-MS; NR; NR
Results Remarks	NR
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	16.0, 39.7 and 84.1 days at concentrations of 50, 100, and 200 µmol/L, respectively.; NR; NR; NR
Results Details	NR
Mean Total Recovery Results and Results Per Recovery	NR; NR
Results Value, Direct Quantum Yield Results, and Transformation Products	NR; NR; Products detected 3, 3', 5-tribromobisphenol A, 3-monobromobisphenol A, and bisphenol A.

EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Test Substance		Metric 1: Test Substance Identity	High	The test substance was identified.
		Metric 2: Test Substance Purity	Low	May be reported but unable to verify due to source written in foreign language.
Domain 2: Test Design		Metric 3: Study Controls	Low	May be reported but unable to verify due to source written in foreign language.
		Metric 4: Test Substance Stability	Low	May be reported but unable to verify due to source written in foreign language.
Domain 3: Test Conditions				

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Study Citation:	Li, L., Liu, S., Zhu, C., Ren, Y., Cen, J. (2014). [Anaerobic degradation and pathways of tetrabromobisphenol A in river sediments]. Huanjing Huaxue / Environmental Chemistry 33(5):837-843.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5758229			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	Low	May be reported but unable to verify due to source written in foreign language.
	Metric 6:	Testing Conditions	Low	May be reported but unable to verify due to source written in foreign language.
	Metric 7:	Testing Consistency	Low	May be reported but unable to verify due to source written in foreign language.
	Metric 8:	System Type and Design	Low	May be reported but unable to verify due to source written in foreign language.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum was reported.
	Metric 10:	Sampling Methods	N/A	This metric does not apply to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	May be reported but unable to verify due to source written in foreign language.
	Metric 12:	Test Substance Purity	Low	May be reported but unable to verify due to source written in foreign language.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	May be reported but unable to verify due to source written in foreign language.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric does not apply to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	May be reported but unable to verify due to source written in foreign language.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	May be reported but unable to verify due to source written in foreign language.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	May be reported but unable to verify due to source written in foreign language.
	Metric 18:	QSAR Models	N/A	This metric does not apply to this study type.
Overall Quality Determination		Low		

* Related References: Source written in another language.

Study Citation:	Lin, X., Li, Z., Zhu, Y. Y., Chen, F.,an, Liang, B.,in, Nan, J.,un, Wang, A. (2020). Palladium/iron nanoparticles stimulate tetrabromobisphenol a microbial reductive debromination and further mineralization in sediment. Environment International 135:5353-5353.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	6966583

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol a
Confidentiality, EndPoint, Type, Guideline	No; screening test; Experimental; other: Laboratory batch experiments
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aladdin, China; NR; 98%
Oxygen and Inoculum	anaerobic; natural water: freshwater: Sediment
Duration, Parameter, System, and Sampling Frequency	30 days; test mat.; serum bottles, sealed with rubber stoppers; 4, 8, 12, 16 and 20 days
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	Not Reported; mud-water mixture; Sediment from river around an electronic waste dump in Guangzhou, China; distilled water; Not Reported; Not Reported
Control Dark, Control, and Blank Concentration	yes, covered with aluminum foil; NR; NR 18.38 - uM
Analytical Method, Analytical Details, and Results Per Degredation Parameter	ultra-high-performance liquid chromatography triple quadrupole mass spectrometer/time-of-flight mass spectrometry (UPLC-QTOF-MS); Not Reported; test mat.
Results Remarks	Not Reported
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	NR; NR; NR; NR
Results Details	$k = 0.10 \pm 0.01$, $r^2 = 0.996$
Mean Total Recovery Results and Results Per Recovery	NR; NR
Results Value, Direct Quantum Yield Results, and Transformation Products	removal efficiency = 60.99% at 10 days; NR; TriBBPA, DBBPA, MBBPA and Bisphenol A (BPA), 4-(allene) phenol and 2,2-bis (4-hydroxyphenyl) propanoic acid

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results.

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Study Citation:	Lin, X., Li, Z., Zhu, Y. Y., Chen, F.,an, Liang, B.,in, Nan, J.,un, Wang, A. (2020). Palladium/iron nanoparticles stimulate tetrabromobisphenol a microbial reductive debromination and further mineralization in sediment. Environment International 135:5353-5353.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	6966583			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor deviations or omissions.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups. The conditions of the exposure were documented.
	Metric 8:	System Type and Design	Medium	Equilibrium was not established or reported but this was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test organism information or inoculum source were reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	Outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods of the outcome(s) were not fully reported, however, the omissions were not likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

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Study Citation:	Lin, X., Li, Z., Zhu, Y. Y., Chen, F.,an, Liang, B.,in, Nan, J.,un, Wang, A. (2020). Palladium/iron nanoparticles stimulate tetrabromobisphenol a microbial reductive debromination and further mineralization in sediment. Environment International 135:5353-5353.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	6966583

		EVALUATION	
Domain	Metric	Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	6300802			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Guideline not specified			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Oxygen and Inoculum	aerobic; natural sediment: River sediment collected from southern Taiwan			
Duration, Parameter, System, and Sampling Frequency	Not reported; test mat.; Not reported; Not reported			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	Not reported; Not reported; Not reported; Not reported; Not reported; Not reported			
Control Dark, Control, and Blank Concentration	Not Reported; Not reported; Not reported			
Concentration	50 ug/g^3			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Not reported; Not reported; 7			
Results Remarks	Dominant bacteria identified: Bacillus pumilus and Rhodococcus ruber			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	9.9 - 13.1 days; Not reported; Not reported; Not reported			
Results Details	Not reported			
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	Not reported; Not Reported; Not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 4:	Test Substance Stability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
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Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	6300802			
Domain		Metric	EVALUATION Rating	Comments
	Metric 6:	Testing Conditions	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 7:	Testing Consistency	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	Dominant species and source identified.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 12:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results are reasonable based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.
Overall Quality Determination			Medium	

* Related References: Chang BV et al; Chemosphere 87: 535-541 (2012)

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	6300802			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Guideline not specified			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Oxygen and Inoculum	aerobic; natural water / sediment: freshwater: Not reported			
Duration, Parameter, System, and Sampling Frequency	Not reported; radiochem. meas.; Not reported; Not reported			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	56 d; Not reported; Not reported; Not reported; Not reported; Not reported			
Control Dark, Control, and Blank Concentration	Not Reported; Not reported; Not reported			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	10 - 1000 µg/L			
Results Remarks	Not reported; Not reported; 6			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	44.7, 64.2, and 60.8% of the initial test substance at 10, 100, and 1000 ug/L respectively was remaining after 56 days. Less than 8% of the radioactivity was recovered as 14CO2.			
Results Details	48 - 84 d; Not reported; Not reported; Not reported			
Mean Total Recovery Results and Results Per Recovery	Not reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	Not reported; Not reported			
44.7%, 64.2% and 60.8%; Not Reported; Not reported				
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	The test substance was identified by name.	
Metric 2:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.	
Domain 2: Test Design				
Metric 3:	Study Controls	Medium	Not reported in this secondary source; the primary source likely contains more detail.	
Metric 4:	Test Substance Stability	Medium	Not reported in this secondary source; the primary source likely contains more detail.	
Domain 3: Test Conditions				
Metric 5:	Test Method Suitability	Medium	Not reported in this secondary source; the primary source likely contains more detail.	
Metric 6:	Testing Conditions	Medium	Not reported in this secondary source; the primary source likely contains more detail.	
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Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	6300802			
Domain	Metric	EVALUATION		Comments
	Metric 7:	Testing Consistency	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 12:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium	Limited detail in this secondary source; the primary source likely contains more detail.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The results are reasonable based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.
Overall Quality Determination			Medium	

* Related References: Great Lakes Chem Corp; Determination of the Biodegradability in a Sediment/Soil Microbial System on Tetrabromobisphenol A in Soil Under Anaerobic Conditions; 8/24/89; EPA Document No. 40-8998115; Fiche No. OTS0525505

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	6300802			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; other: Experimental; other: Guideline not specified, primary biodegradation.			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Oxygen and Inoculum	anaerobic; natural sediment: Sediment collected from a wet ephemeral desert stream bed which was contaminated by industrial chemical waste			
Duration, Parameter, System, and Sampling Frequency	Not reported; Not Reported; Not reported; Not reported			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	10 d; Not reported; Not reported; Not reported; Not reported; Not reported			
Control Dark, Control, and Blank Concentration	Not Reported; Not reported; Not reported			
	Not reported			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Not reported; Not reported; 7			
Results Remarks	Not reported			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Not reported; Not reported; Not reported; Not reported			
Results Details	Not reported			
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	80%; Not Reported; Biodehalogenation: from tri-BBPA to di-BBPA, with a final product of BPA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 4:	Test Substance Stability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 6:	Testing Conditions	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 7:	Testing Consistency	Medium	Not reported in this secondary source; the primary source likely contains more detail.
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Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	6300802			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 12:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results are reasonable based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.
Overall Quality Determination		Medium		

* Related References: Ronen Z, Abeliovich A; Applied Environ Microbiol 66: 2372-2377 (2000)

Study Citation: NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.
OECD Harmonized Biodegradation in Sediment
Template:
HERO ID: 6300802

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; other: Experimental; other: Guideline not specified; Primary biodegradation
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Oxygen and Inoculum	anaerobic; natural sediment: brackish: Estuarine sediment
Duration, Parameter, System, and Sampling Frequency	Not reported; not specified; Not reported; Not reported
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	55 d; Not reported; Not reported; Not reported; Not reported; Not reported
Control Dark, Control, and Blank Concentration	Not Reported; Not reported; Not reported Not reported
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Not reported; Not reported; Not Reported
Results Remarks	Primary biodegradation nearly complete after 55 days.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Not reported; Not reported; Not reported; Not reported
Results Details	Not reported
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	Not reported; Not Reported; Bisphenol A (final degradation product) and some 2,6-dibromobisphenol A

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 4: Test Substance Stability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 6: Testing Conditions	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 7: Testing Consistency	Medium	Not reported in this secondary source; the primary source likely contains more detail.

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Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	6300802			
Domain		Metric	EVALUATION Rating	Comments
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 12:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results are reasonable based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.
Overall Quality Determination			Medium	

* Related References: Voordeckers JW et al; Environ Sci Technol 36: 696-701 (2002)

Study Citation:	Ravit, B., Ehrenfeld, J. G., Haggbloom, M. M. (2005). Salt marsh rhizosphere affects microbial biotransformation of the widespread halogenated contaminant tetrabromobisphenol-A (TBBPA). Soil Biology and Biochemistry 37, no. 6(6):1049-1057.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5551899

EXTRACTION	
Parameter	Data
CASRN and Test Material	not reported; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	none; other: biodegradation with transformation products; experimental; other: non-guideline; anaerobic biotransformation in marsh sediment microcosms
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich Chemical Co. (Milwaukee, WI); NR; 97% Notes: NR
Oxygen and Inoculum	anaerobic; anaerobic bacteria: Contaminated and uncontaminated sediment samples were used for microcosms set up in serum bottles using unvegetated intertidal mudflat sediments and sediments with populations of Phragmites australis and Spartina alterniflora.
Duration, Parameter, System, and Sampling Frequency	130 days; test mat.; capped serum bottles; not specified; periodically
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not specified; aqueous samples collected via syringe; contaminated and uncontaminated sediment; brackish marsh waters; salinity 12-18 ppt; not reported; not reported
Control Dark, Control, and Blank Concentration	yes; incubation in the dark at 28C; not reported; sterile control included; no loss observed ca. 55 - ca. 70 µmol/L
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC and GC-MS; GC-MS: LOD 5 µmol/L; test mat.
Results Remarks	Reductive dehalogenation was observed. Mullica sediment: TBBPA concentration was below LOD after 115 days in Spartina sediments. Saw Mill Creek sediment: TBBPA concentration was below LOD after 61 days in Spartina sediments. Phragmites
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not reported; not reported
Results Details	not reported
Mean Total Recovery Results and Results Per Recovery	extraction efficiency 85%; not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	not reported; not reported; transient formation of two intermediates: tribromobisphenol A (TBPA) and dibromobisphenol A (DBPA); BPA was produced in stoichiometrically equivalent amounts in all active cultures as the end product.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified clearly.
	Metric 2:	Test Substance Purity	High	Source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Sterile control was included.
	Metric 4:	Test Substance Stability	High	Preparation and storage conditions were reported.

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Study Citation:	Ravit, B., Ehrenfeld, J. G., Haggblom, M. M. (2005). Salt marsh rhizosphere affects microbial biotransformation of the widespread halogenated contaminant tetrabromobisphenol-A (TBBPA). Soil Biology and Biochemistry 37, no. 6(6):1049-1057.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5551899			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	Inoculum source reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Degradation rates were not reported; however, transformation products were identified.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited detail regarding this metric.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Specific concentrations of the target chemical and transformation products were reported graphically; mass balance not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical analysis methods reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this type of study.
Overall Quality Determination			High	

Study Citation:	Ravit, E. A. (2005). Macrophytes and microbes: <i>Spartina alterniflora</i> and <i>Phragmites australis</i> affect brackish sediment microbial community structure and function.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5489014

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; screening test; Experimental; other: Non-guideline microcosm biodegradation study
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich Chemical Co. (Milwaukee, WI); NR; 97%
Oxygen and Inoculum	anaerobic; natural water / sediment: brackish: <i>Spartina</i> and <i>Phragmites</i> plants added to sediment
Duration, Parameter, System, and Sampling Frequency	up to 130 days; test mat.; 150 ml serum bottles following the methods of Voordeckers et al. 2002; periodically
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	datapoints shown in figure; water; sediment samples from Saw Mill Creek in the Hackensack Meadowlands and Mullica River; 1.3 g KCl, 0.2 g KH ₂ PO ₄ , 1.17 g NaCl, 0.1 g CaCl ₂ ·2H ₂ O, 0.18 g MgCl ₂ ·6H ₂ O per liter; Not reported; Not reported
Control Dark, Control, and Blank Concentration	yes; Not reported; Autoclaved TBBPA sediment, anaerobic medium and a sediment sample for 45 min at 121°C on 3 consecutive days 2.58 nominal 100 uM
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC with UV-VIS; 238 nm wavelength for TBBPA, BPA and secondary metabolites detection; 7
Results Remarks	BPA formation also reported
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Not reported; shown in figures; Control; No/limited loss of TBBPA in 130 days
Results Details	TBBPA loss shown in figures
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	<LOD at 100 days in unvegetated sediment; Not Reported; BPA and other secondary metabolites reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate controls were used in the study.
	Metric 4:	Test Substance Stability	Medium	Some test substance preparation, stability and storage details were reported and the omissions are unlikely to have an impact on the study results.

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Study Citation:	Ravit, E. A. (2005). Macrophytes and microbes: <i>Spartina alterniflora</i> and <i>Phragmites australis</i> affect brackish sediment microbial community structure and function.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5489014			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5: Test Method Suitability	Medium		There were omissions in details for this metric; however, the omissions were not likely to have had a substantial impact on the study results.
	Metric 6: Testing Conditions	Medium		There were omissions in details for this metric; however, the omissions were not likely to have had a substantial impact on the study results.
	Metric 7: Testing Consistency	High		The testing conditions across sample groups were consistent.
	Metric 8: System Type and Design	N/A		The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9: Outcome Assessment Methodology	Medium		The inoculum sources were reported but are not routinely used for similar study types.
	Metric 10: Sampling Methods	N/A		The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11: Test Substance Identity	High		The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12: Test Substance Purity	Medium		There were omissions in details for this metric; however, the omissions were not likely to have had a substantial impact on the study results.
Domain 6: Confounding/Variable Control				
	Metric 13: Confounding Variables	High		Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation and all reported variability or uncertainty was not likely to influence the outcome assessment.
	Metric 14: Health Outcomes Unrelated to Exposure	N/A		The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15: Data Reporting	Medium		There were omissions in details for this metric; however, the omissions were not likely to have had a substantial impact on the study results.
	Metric 16: Statistical Methods and Kinetic Calculations	Medium		There were omissions in details for this metric; however, the omissions were not likely to have had a substantial impact on the study results.
Domain 8: Other				
	Metric 17: Verification or Plausibility of Results	High		The study results are reasonable.
	Metric 18: QSAR Models	N/A		The metric is not applicable to the study type.

Overall Quality Determination**High**

Study Citation:	Ronen, Z., Abeliovich, A. (2000). Anaerobic-aerobic process for microbial degradation of tetrabromobisphenol A. Applied and Environmental Microbiology 66(6):2372-2377.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1443854

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	none; screening test; experimental; other: anaerobic-aerobic degradation
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	None; Aldrich (Milwaukee, Wis.); NR; NR Notes: used as received
Oxygen and Inoculum	anaerobic; natural water / sediment: water-sediments from a Hovav stream bed, Israel; water: pH 8.27; conductivity 20 mS; DOC 105.9 mg/L; chloride 7350 mg/L; bromide 3372 mg/L; sulfate 1132 mg/L; sediment: pH 8.30; conductivity 38 mS; DOC 159.2 mg/kg; % OC 3.73; chloride 21060 mg/kg; bromide 5791 mg/kg; sulfate 7127 mg/kg
Duration, Parameter, System, and Sampling Frequency	45 days; test material; 94% N2–6% H2 atmosphere; incubated at 30°C; not reported
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; Not Reported; 10 g (wet weight) of sediment; 7 g (dry weight); sterilized medium: NaCl, K2HPO4, MgSO4, peptone, tryptone, glucose and yeast extract.; not reported; 7.7
Control Dark, Control, and Blank Concentration	yes; not reported; autoclaved control 100 mg/L
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC; Calibration was linear at concentrations between 0.1 and 100 mg/L, and R2 value was >0.98.; test mat.
Results Remarks	Not Reported
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not applicable; Not Reported
Results Details	Not Reported
Mean Total Recovery Results and Results Per Recovery	recovery: 101.2%±10.2%; based on 10 values.; 88%
Results Value, Direct Quantum Yield Results, and Transformation Products	complete dehalogenated in 45 days; Not Reported; tri and dibrominated BPA; 161 uM BPA

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by name and structure.
	Metric 2: Test Substance Purity	High	The source of the test substance was reported.
Domain 2: Test Design	Metric 3: Study Controls	High	A concurrent blank control was included.

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Study Citation:	Ronen, Z., Abeliovich, A. (2000). Anaerobic-aerobic process for microbial degradation of tetrabromobisphenol A. Applied and Environmental Microbiology 66(6):2372-2377.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1443854			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types and appropriate for the study method.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
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Study Citation:	Ronen, Z., Abeliovich, A. (2000). Anaerobic-aerobic process for microbial degradation of tetrabromobisphenol A. Applied and Environmental Microbiology 66(6):2372-2377.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1443854

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	Voordeckers, J. W., Fennell, D. E., Jones, K., Häggblom, M. M. (2002). Anaerobic biotransformation of tetrabromobisphenol A, tetrachlorobisphenol A, and bisphenol A in estuarine sediments. Environmental Science & Technology 36(4):696-701.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5230666

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; experimental; other: Anaerobic biotransformation in estuarine sediments.
Solvent, Reactivity, Storage, Stability	hexane; NR; NR; NR
Radiolabel, Source, State, Purity	None; Aldrich Chemical Co. (Milwaukee, WI); NR; >=97% Notes: TBBPA
Oxygen and Inoculum	anaerobic; natural sediment: marine: Sediment grab samples were collected from the Arthur Kill tidal strait located between Staten Island and New Jersey.
Duration, Parameter, System, and Sampling Frequency	112 days (from figure); test mat.; 60 mL serum bottles; 28°C; methanogenic; every 14 days (from figure)
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; enrichment slurry containing: KCl; KH ₂ PO ₄ ; NaCl; CaCl ₂ ·2H ₂ O; MgCl ₂ ·6H ₂ O (boiled, cooled, purged). Then NaHCO ₃ ; resazurin; vitamin solution; FeCl ₂ ·4H ₂ O; trace metals were added.; Arthur Kill sediment added to bring medium to volume.; not reported; not reported; not reported
Control Dark, Control, and Blank Concentration	yes; not reported; Sterile controls were autoclaved at 121 °C for 30 min on two consecutive days after the addition of TBBPA.
Analytical Method, Analytical Details, and Results Per Degredation Parameter	2.58 mM
Results Remarks	HPLC/UV-Vis; GC-MS; Concentrations were calculated by comparison to either three or four point external standard curves.; test mat.
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Initial loss was observed within 14 days. Near complete loss was seen within 55 days.
Results Details	not reported; not reported; Sterile controls.; No loss of TBBPA was observed.
Mean Total Recovery Results and Results Per Recovery	TBBPA was dehalogenated nearly concomitantly to a stoichiometrically equivalent amount of BPA
Results Value, Direct Quantum Yield Results, and Transformation Products	>85%; not reported
	not reported; Not Reported; BPA

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High The test substance was identified by name.
	Metric 2:	Test Substance Purity	High The source and purity of the test substance was reported.
Domain 2: Test Design			
	Metric 3:	Study Controls	Medium Concurrent controls were included.

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Study Citation:	Voordeckers, J. W., Fennell, D. E., Jones, K., Häggblom, M. M. (2002). Anaerobic biotransformation of tetrabromobisphenol A, tetrachlorobisphenol A, and bisphenol A in estuarine sediments. Environmental Science & Technology 36(4):696-701.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5230666			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Nominal estimates of media concentrations were provided, but, the levels were not measured; these deviations were not likely to have a substantial impact on study results.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types and appropriate.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.

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Study Citation:	Voordeckers, J. W., Fennell, D. E., Jones, K., Häggblom, M. M. (2002). Anaerobic biotransformation of tetrabromobisphenol A, tetrachlorobisphenol A, and bisphenol A in estuarine sediments. Environmental Science & Technology 36(4):696-701.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5230666

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18: QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination	High
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Study Citation:	Voordeckers, J. W., Fennell, D. E., Jones, K., Häggblom, M. M. (2002). Anaerobic biotransformation of tetrabromobisphenol A, tetrachlorobisphenol A, and bisphenol A in estuarine sediments. Environmental Science & Technology 36(4):696-701.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5230666

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; experimental; other: Anaerobic biotransformation in estuarine sediments.
Solvent, Reactivity, Storage, Stability	hexane; NR; NR; NR
Radiolabel, Source, State, Purity	None; Aldrich Chemical Co. (Milwaukee, WI); NR; $\geq 97\%$ Notes: TBBPA
Oxygen and Inoculum	anaerobic; natural sediment: marine: Sediment grab samples were collected from the Arthur Kill tidal strait located between Staten Island and New Jersey.
Duration, Parameter, System, and Sampling Frequency	112 days (from figure); test mat.; 60 mL serum bottles; 28°C; sulfate reducing; every 14 days (from figure)
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; enrichment slurry containing: KCl; KH ₂ PO ₄ ; NaCl; CaCl ₂ ·2H ₂ O; MgCl ₂ ·6H ₂ O; Na ₂ SO ₄ (boiled, cooled, purged). Then NaHCO ₃ ; resazurin; vitamin solution; FeCl ₂ ·4H ₂ O; trace metals were added.; Arthur Kill sediment added to bring medium to volume.; not reported; not reported
Control Dark, Control, and Blank Concentration	yes; not reported; Sterile controls were autoclaved at 121 °C for 30 min on two consecutive days after the addition of TBBPA. 2.58 mM
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC/UV-Vis; GC-MS; Concentrations were calculated by comparison to either three or four point external standard curves.; test mat.
Results Remarks	Lag period of 28 days. Near complete loss was seen within 112 days.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; Sterile controls.; No loss of TBBPA was observed.
Results Details	The final molar concentration of BPA was approximately equivalent to the amount of TBBPA depleted.
Mean Total Recovery Results and Results Per Recovery	$>85\%$; not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	not reported; Not Reported; BPA

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance was reported.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Concurrent controls were included.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Study Citation:	Voordeckers, J. W., Fennell, D. E., Jones, K., Häggblom, M. M. (2002). Anaerobic biotransformation of tetrabromobisphenol A, tetrachlorobisphenol A, and bisphenol A in estuarine sediments. Environmental Science & Technology 36(4):696-701.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5230666			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Nominal estimates of media concentrations were provided, but, the levels were not measured; these deviations were not likely to have a substantial impact on study results.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types and appropriate.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**High**

Study Citation:	Wang, L., Li, Y., Fan, C., Wang, P., Niu, L., Wang, L. (2019). Nitrate addition promotes the nitrogen cycling processes under the co-contaminated tetrabromobisphenol A and copper condition in river sediment. Environmental Pollution 251:659-667.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5637902

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other
Solvent, Reactivity, Storage, Stability	stock solution in acetone; NR; NR; NR
Radiolabel, Source, State, Purity	No; Sigma-Aldrich (St. Louis, MO, USA); NR; 99.0%
Oxygen and Inoculum	aerobic; natural sediment: freshwater: surface river sediments collected from Zhushan Bay Taihu Lake, China, October 2017
Duration, Parameter, System, and Sampling Frequency	90 days; test mat.; not reported; not reported
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	days 0, 15, 45, and 90; not reported; domesticated (aged) surface river sediments sediment (200 g); filtered river water (20 mL); not reported; not reported
Control Dark, Control, and Blank Concentration	yes; not reported; no additions 1.0 mg/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	not reported; not reported; 7
Results Remarks	not reported
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not reported; not reported
Results Details	not reported
Mean Total Recovery Results and Results Per Recovery	not reported; not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	34.7%/90 days; Not Reported; not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	Source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Controls were reported.
	Metric 4:	Test Substance Stability	Low	Test substance preparation and storage conditions were not reported and appropriate.
Domain 3: Test Conditions				

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Study Citation:	Wang, L., Li, Y., Fan, C., Wang, P., Niu, L., Wang, L. (2019). Nitrate addition promotes the nitrogen cycling processes under the co-contaminated tetrabromobisphenol A and copper condition in river sediment. Environmental Pollution 251:659-667.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5637902			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Testing conditions were reported with minor omissions.
	Metric 7:	Testing Consistency	High	Testing was consistent across study groups.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum type was reported and appropriate for the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Some details regarding the sampling methods were not reported but their omission is unlikely to impact the study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was accounted for in the measurements and was not likely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Percent recoveries and MDLs were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Wildlife International Ltd, (2006). Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1443979

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; 14C-tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; screening test; experimental; OECD Guideline 308 (Aerobic and Anaerobic Transformation in Aquatic Sediment Systems)
Solvent, Reactivity, Storage, Stability	ethanol; total radioactivity of 1.0 mCi in a total volume of 1.0 mL; frozen conditions; not reported
Radiolabel, Source, State, Purity	56 mCi/mmol; uniformly labeled with 14C in both phenyl ring positions; Amersham Biosciences-UK; solution; 99.6% Notes: Product Code CFQ14174; Batch/Lot B
Oxygen and Inoculum	anaerobic; natural water / sediment: freshwater: sediment and water collected from the Choptank River (Caroline County, Maryland) collected on May 26, 2005
Duration, Parameter, System, and Sampling Frequency	up to 102 days; 14C gases; incubated for 14 days prior to test start; 18.6-22.8°C; headspace purged with N2; Not Reported
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	14, 28, 42, 56, 77, 98, 102 days; water/sediment; 96% sand; 3% silt; 1% clay; bulk density 1.31 gm/cc; dissolved oxygen 1.8-2.7 mg/L; TOC 8.9-9.9 mg/L; 4.0; water 6.0-6.9; sediment 6.1-6.8
Control Dark, Control, and Blank Concentration	yes; not reported; untreated characterization test chambers. 21 water; 50 dry sediment ug/L water; ug/kg dry sediment
Analytical Method, Analytical Details, and Results Per Degredation Parameter	liquid scintillation counting (LCS); triplicate aliquots were analyzed.; 14CO2 + 14VOCs
Results Remarks	Not Reported
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not reported; not reported
Results Details	total radioactivity remaining in sediment solids 9.9%
Mean Total Recovery Results and Results Per Recovery	99.0% mass balance; Not Reported
Results Value, Direct Quantum Yield Results, and Transformation Products	0.8%; Not Reported; Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Some concurrent control details were not included; however, the lack of data was not likely to have a substantial impact on study results.

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Study Citation:	Wildlife International Ltd, (2006). Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1443979			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	This metric is not applicable to this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and routinely used for similar study types and appropriate for the study method or route.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were reported in the study and were considered or accounted for in data evaluation with minor deviations or omissions; the minor deviations or omissions were not likely to have a substantial impact on study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described; however, these differences were not likely to have a substantial impact on study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.

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Study Citation:	Wildlife International Ltd, (2006). Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.		
OECD Harmonized Template:	Biodegradation in Sediment		
HERO ID:	1443979		
		EVALUATION	
Domain	Metric	Rating	Comments
Overall Quality Determination		High	

Study Citation:	Wildlife International Ltd, (2006). Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	1443979

EXTRACTION				
Parameter		Data		
CASRN and Test Material		Not Reported; 14C-tetrabromobisphenol A		
Confidentiality, EndPoint, Type, Guideline		None; screening test; experimental; OECD Guideline 308 (Aerobic and Anaerobic Transformation in Aquatic Sediment Systems)		
Solvent, Reactivity, Storage, Stability		ethanol; total radioactivity of 1.0 mCi in a total volume of 1.0 mL; frozen conditions; NR		
Radiolabel, Source, State, Purity		56 mCi/mmol; uniformly labeled with 14C in both phenyl ring positions; Amersham Biosciences-UK; solution; 99.6% Notes: Product Code CFQ14174; Batch/Lot B		
Oxygen and Inoculum		anaerobic; natural water / sediment: freshwater: sediment samples were collected from the Turkey Creek (Talbot County, Maryland) on May 10, 2005, and water samples were collected on May 27, 2005		
Duration, Parameter, System, and Sampling Frequency		up to 102 days; 14C gases; incubated for 14 days prior to test start; 18.6-22.8°C; headspace purged with N2; Not Reported		
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH		14, 28, 42, 56, 77, 98, 102 days; water/sediment; 43% sand; 30% silt; 27% clay; bulk density 0.73 gm/cc; dissolved oxygen 0.5-1.8 mg/L; TOC 7.4-11.3 mg/L; 18.8; 6.4-6.8		
Control Dark, Control, and Blank Concentration		yes; not reported; untreated characterization test chambers. 4.7 water; 51 dry sediment ug/L water; ug/kg dry sediment		
Analytical Method, Analytical Details, and Results Per Degredation Parameter		liquid scintillation counting (LCS); triplicate aliquots were analyzed.; 14CO2 + 14VOCs		
Results Remarks		Not Reported		
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results		not reported; not reported; not reported; Not Reported		
Results Details		total radioactivity remaining in sediment solids 10.3%		
Mean Total Recovery Results and Results Per Recovery		99.9% mass balance; Not Reported		
Results Value, Direct Quantum Yield Results, and Transformation Products		3.9%; Not Reported; Not Reported		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Some concurrent control details were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
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Study Citation:	Wildlife International Ltd, (2006). Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1443979			
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	This metric is not applicable to this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and routinely used for similar study types and appropriate for the study method or route.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were reported in the study and were considered or accounted for in data evaluation with minor deviations or omissions;the minor deviations or omissions were not likely to have a substantial impact on study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described; however, these differences were not likely to have a substantial impact on study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.

Overall Quality Determination**High**

Study Citation:	Wildlife International Ltd, (2006). Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1443979			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	Not Reported; 14C-tetrabromobisphenol A			
Confidentiality, EndPoint, Type, Guideline	None; screening test; experimental; OECD Guideline 308 (Aerobic and Anaerobic Transformation in Aquatic Sediment Systems)			
Solvent, Reactivity, Storage, Stability	ethanol; total radioactivity of 1.0 mCi in a total volume of 1.0 mL; frozen conditions; not reported			
Radiolabel, Source, State, Purity	56 mCi/mmol; uniformly labeled with 14C in both phenyl ring positions; Amersham Biosciences-UK; solution; 99.6% Notes: Product Code CFQ14174; Batch/Lot B			
Oxygen and Inoculum	anaerobic; natural water / sediment: freshwater: sediment and water collected from the Choptank River (Caroline County, Maryland) collected on May 26, 2005			
Duration, Parameter, System, and Sampling Frequency	up to 102 days; test mat; transformation products; incubated for 14 days prior to test start; 19.2-20.2°C; purged anaerobic growth mix gasses (80% N2 : 10% CO2 : 10% CH4); Not Reported			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	0, 14, 28, 42, 56, 102 days; water/sediment; 96% sand; 3% silt; 1% clay; bulk density 1.31 gm/cc; dissolved oxygen 1.8-2.7 mg/L; TOC 8.9-9.9 mg/L; 4.0; water 6.0-6.9; sediment 6.1-6.8			
Control Dark, Control, and Blank Concentration	yes; not reported; untreated characterization test chambers. 21 water; 50 dry sediment ug/L water; ug/kg dry sediment			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	liquid scintillation counting (LCS); HPLC/UV/beta-RAM; triplicate aliquots were analyzed.; radiochem meas.			
Results Remarks	degradation rates: total system 0.0292/day; water layer 0.0484/day; sediment layer 0.0244/day			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	23.7 days; not reported; not reported; Not Reported			
Results Details	Not Reported			
Mean Total Recovery Results and Results Per Recovery	76.3-104.1% mass balance; not reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	95.7% disappearance in 102 days; Not Reported; major product bisphenol A; other unknown products were reported.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Some concurrent control details were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
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Study Citation:	Wildlife International Ltd, (2006). Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1443979			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	This metric is not applicable to this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and routinely used for similar study types and appropriate for the study method or route.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were reported in the study and were considered or accounted for in data evaluation with minor deviations or omissions; the minor deviations or omissions were not likely to have a substantial impact on study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described; however, these differences were not likely to have a substantial impact on study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.

Overall Quality Determination**High**

Study Citation:	Wildlife International Ltd, (2006). Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1443979			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	Not Reported; 14C-tetrabromobisphenol A			
Confidentiality, EndPoint, Type, Guideline	None; screening test; experimental; OECD Guideline 308 (Aerobic and Anaerobic Transformation in Aquatic Sediment Systems)			
Solvent, Reactivity, Storage, Stability	ethanol; total radioactivity of 1.0 mCi in a total volume of 1.0 mL; frozen conditions; NR			
Radiolabel, Source, State, Purity	56 mCi/mmol; uniformly labeled with 14C in both phenyl ring positions; Amersham Biosciences-UK; solution; 99.6% Notes: Product Code CFQ14174; Batch/Lot B			
Oxygen and Inoculum	anaerobic; natural water / sediment: freshwater: sediment samples were collected from the Turkey Creek (Talbot County, Maryland) on May 10, 2005, and water samples were collected on May 27, 2005			
Duration, Parameter, System, and Sampling Frequency	up to 102 days; test mat; transformation products; incubated for 14 days prior to test start; 19.2-20.2°C; purged anaerobic growth mix gasses (80% N2 : 10% CO2 : 10% CH4); Not Reported			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	0, 14, 28, 42, 56, 102 days; water/sediment; 43% sand; 30% silt; 27% clay; bulk density 0.73 gm/cc; dissolved oxygen 0.5-1.8 mg/L; TOC 7.4-11.3 mg/L; 18.8; 6.4-6.8			
Control Dark, Control, and Blank	yes; not reported; untreated characterization test chambers.			
Concentration	4.7 water; 51 dry sediment ug/L water; ug/kg dry sediment			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	liquid scintillation counting (LCS); HPLC/UV/beta-RAM; triplicate aliquots were analyzed.; radiochem meas.			
Results Remarks	degradation rates: total system 0.0252/day; water layer 0.0424/day; sediment layer 0.0165/day			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	27.5 days; not reported; not reported; Not Reported			
Results Details	Not Reported			
Mean Total Recovery Results and Results Per Recovery	88.1-97.2% mass balance; Not Reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	92.9% disappearance in 102 days; Not Reported; Not Reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Some concurrent control details were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
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Study Citation:	Wildlife International Ltd, (2006). Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	1443979			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	This metric is not applicable to this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and routinely used for similar study types and appropriate for the study method or route.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were reported in the study and were considered or accounted for in data evaluation with minor deviations or omissions; the minor deviations or omissions were not likely to have a substantial impact on study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described; however, these differences were not likely to have a substantial impact on study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.

Overall Quality Determination**High**

Study Citation:	Wildlife International Ltd, (2006). Non-GLP addendum letter report on the screening/identification investigation for potential degradants of tetrabromobisphenol-A by HPLC/MS and HPLC/MS/MS in support of the following study: Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	7415548

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other: transformation products; experimental; other: not specified; A non-GLP screening investigation
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	14C-TBBPA; NR; NR; NR Notes: NR
Oxygen and Inoculum	anaerobic; sediment (not specified): Inoculum was from previous anaerobic sediment and water study (Wildlife 439E-110). Samples extracts stored under ambient conditions prior to analysis.
Duration, Parameter, System, and Sampling Frequency	NR; test material; using samples from previous water and sediment study (Wildlife 439E-110) to determine transformation products; NR
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	for sediment: day 14, day 56, day 100; Water: day 0, day 56, day 100; water compartment and sediment compartment; sediment; extracted with acetonitrile; water; extracted with dichloromethane; NR; NR
Control Dark, Control, and Blank Concentration	NR; NR; NR NR NR - NR 50 µg/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC/MS and HPLC/MS/MS analytical screening method; LOD estimated: BPA 739 µg/L; Br2-BPA 8.16 µg/L; Br3-BPA 0.146 µg/L; TBBPA 0.0569 µg/L; MME 0.126 µg/L, DME 1.92 µg/L; NR
Results Remarks	Authors not the results should be considered suggestive rather than definitive due to the background noise, extremely low concentrations, and very small available extract volumes.
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Not Reported; Not Reported; Not Reported; Not Reported
Results Details	Not Reported
Mean Total Recovery Results and Results Per Recovery	Not Reported; Not Reported
Results Value, Direct Quantum Yield Results, and Transformation Products	Not Reported; Not Reported; In water at day 0: BPA, Br1BPA, Br2BPA, MME, and DME were not likely in the compartment, Br3BPA was likely in the compartment, and TBBPA was likely and possibly in the compartment but can't be verified; In water at day 56: BPA, Br1BPA, and Br2BPA, were not likely in the compartment and Br3BPA, TBBPA, MME, and DME was likely and possibly in the compartment but can't be verified; In water at day 100: BPA, Br1BPA, and DME were not likely in the compartment, Br2BPA was likely in the compartment and Br3BPA, TBBPA, and MME were likely and possibly in the compartment but can't be verified. In sediment at day 14: BPA, Br1BPA, Br2BPA, MME, and DME were not likely in the compartment, Br3BPA was likely in the compartment, and TBBPA was likely and possibly in the compartment but can't be verified; In sediment at day 56: BPA, Br1BPA, MME, and DME were not likely in the compartment, Br2BPA was likely in the compartment and Br3BPA and TBBPA were likely and possibly in the compartment but can't be verified; In sediment at day 100: BPA, Br1BPA, MME, and DME were not likely in the compartment, Br2BPA and Br3BPA were likely in the compartment, and TBBPA was likely and possibly in the compartment but can't be verified.

EVALUATION

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Study Citation:	Wildlife International Ltd, (2006). Non-GLP addendum letter report on the screening/identification investigation for potential degradants of tetrabromobisphenol-A by HPLC/MS and HPLC/MS/MS in support of the following study: Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	7415548			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	Test material was identified.
	Metric 2:	Test Substance Purity	Medium	Test material source and purity were not reported but analytical standards were used.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	Test substance stability, homogeneity and preparation not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	Medium	Some testing conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Inoculum details not reported; more details may be in the previous study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling method details were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Uncertainties in the analytical method were addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Analytical method was explained.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The study results were reasonable; however they were qualitative, not quantitative.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

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Study Citation:	Wildlife International Ltd, (2006). Non-GLP addendum letter report on the screening/identification investigation for potential degradants of tetrabromobisphenol-A by HPLC/MS and HPLC/MS/MS in support of the following study: Anaerobic transformation of radiolabeled (14C) tetrabromobisphenol-A in freshwater aquatic sediment systems.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	7415548

		EVALUATION	
Domain	Metric	Rating	Comments
Overall Quality Determination		Medium	

* Related References: references previous biodegradation study (Wildlife 439E-110)

Study Citation:	Wildlife International Ltd, (2006). Non-GLP addendum letter report on the screening/identification investigation for potential degradants of tetrabromobisphenol-A by HPLC/MS and HPLC/MS/MS in support of the following study: Mineralization and transformation of radiolabeled (14C) tetrabromobisphenol-A in anaerobic digester sludge.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	7415558

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other: transformation products; experimental; other: not specified; A non-GLP screening investigation
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	14C-TBBPA; NR; NR; NR Notes: NR
Oxygen and Inoculum	anaerobic; digested sludge: Inoculum was from previous anaerobic digester sludge mineralization and transformation study (Wildlife 439E-111). Samples extracts stored under ambient conditions prior to analysis.
Duration, Parameter, System, and Sampling Frequency	Not Reported; Test material; using samples from anaerobic digester sludge mineralization and transformation study (Wildlife 439E-111) to determine transformation products; NR
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	day 0, day 14, and day 56; digester sludge; digester sludge; extracted with acetonitrile; NR; NR; NR
Control Dark, Control, and Blank Concentration	NR; NR; NR NR NR - NR 50 µg/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC/MS and HPLC/MS/MS analytical screening method; LOD estimated: BPA 739 µg/L; Br2-BPA 8.16 µg/L; Br3-BPA 0.146 µg/L; TBBPA 0.0569 µg/L; MME 0.126 µg/L, DME 1.92 µg/L; NR
Results Remarks	Author notes results should be considered suggestive rather than definitive due to the background noise, extremely low concentrations, and very small available extract volumes.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	NR; NR; NR; NR
Results Details	NR
Mean Total Recovery Results and Results Per Recovery	NR; NR
Results Value, Direct Quantum Yield Results, and Transformation Products	NR; NR; At day 0: BPA, Br1BPA, Br2BPA, MME, and DME were not likely in the compartment, Br3BPA was likely in the compartment (potential degradation product), and TBBPA was likely and possibly in the compartment but can't be verified; At day 14: BPA, Br1BPA, MME, and DME were not likely in the compartment, and Br2BPA, Br3BPA (potential degradation products), and TBBPA likely and possibly in the compartment but can't be verified; At day 56 BPA and Br1BPA were not likely in the compartment, Br2BPA, Br3BPA, MME, and DME were likely in the compartment (potential degradation products), and TBBPA was likely and possibly in the compartment but can't be verified.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	Test material was identified.
	Metric 2:	Test Substance Purity	Medium	Test material source and purity were not reported but analytical standards were used.

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Study Citation:	Wildlife International Ltd, (2006). Non-GLP addendum letter report on the screening/identification investigation for potential degradants of tetrabromobisphenol-A by HPLC/MS and HPLC/MS/MS in support of the following study: Mineralization and transformation of radiolabeled (14C) tetrabromobisphenol-A in anaerobic digester sludge.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	7415558			
Domain	Metric	EVALUATION Rating		Comments
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	Test substance stability, homogeneity and preparation not reported.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	Medium	Some testing conditions were reported; additional details likely reported in study cited.
	Metric 7:	Testing Consistency	High	Test conditions were consistent; additional details likely reported in study cited.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	Medium	Inoculum details not reported; more details may be in the previous study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling method details were appropriate.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium	Uncertainties in the analytical method were addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	High	Analytical method was explained.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	Low	The study results were reasonable; however they were qualitative, not quantitative.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination**Medium**

* Related References: References previous biodegradation study (Wildlife 439E-111)

Study Citation:	Wildlife International Ltd, (2006). Mineralization and transformation of radiolabeled (14C) tetrabromobisphenol-A in anaerobic digester sludge.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	7415559			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	Not Reported; (14C)Tetrabromobisphenol-A			
Confidentiality, EndPoint, Type, Guideline	None; abiotic mineralization; experimental; OECD Guideline 308 (Aerobic and Anaerobic Transformation in Aquatic Sediment Systems): and procedures described by Federle and Itrich			
Solvent, Reactivity, Storage, Stability	ethanol; 56 mCi/mmol; total radioactivity of 1.0 mCi in a total volume of 1.0 mL; frozen conditions; NR			
Radiolabel, Source, State, Purity	uniformly labeled with 14C in both phenyl ring positions; Amersham Biosciences-UK; liquid; 99.6% Notes: Product Code CFQ14174; Batch/Lot Bi			
Oxygen and Inoculum	anaerobic; anaerobic sludge: collected on July 5, 2005, from the municipal wastewater treatment plant located in Federalsburg, Caroline County, Maryland, USA.			
Duration, Parameter, System, and Sampling Frequency	up to 120 days; radiochem measure; 35±2°C; anaerobic testing chambers; nitrogen head space; 14C-gas traps; 7, 14, 28, 42, 56, 70, 84, 98, 112, 120 days			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	Not Reported; mineral salts/digester sludge; digester sludge; mineral salts solution; KH2PO4, K2HPO4, NaHPO4*7H2O, NH4Cl, MgSO4*7H2O, CaCl2, FeCl2*4-hydrate, resazurin; not reported; 7.1			
Control Dark, Control, and Blank Concentration	yes; not reported; sterile digester sludge 50 ug/L			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	liquid scintillation counting (LCS);; triplicate aliquots were analyzed; 14CO2 + 14VOCs			
Results Remarks	0.4% CO2; 0.5% other VOCs			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not applicable; Not Reported			
Results Details	Not Reported			
Mean Total Recovery Results and Results Per Recovery	103.7% material balance; 9.9% water layer; 85.8% sludge extract; 7.2% sludge solids; 0.9% total gases; Not Reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	0.9%; Not Reported; Not Reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by common name.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance was reported were verified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	High	Concurrent controls were included.
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Study Citation:	Wildlife International Ltd, (2006). Mineralization and transformation of radiolabeled (14C) tetrabromobisphenol-A in anaerobic digester sludge.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	7415559			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported, and were appropriate for the study
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and routinely used for similar study types and appropriate for the study method or route.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	kinetic calculations were not clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were expected.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Wildlife International Ltd, (2006). Mineralization and transformation of radiolabeled (14C) tetrabromobisphenol-A in anaerobic digester sludge.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	7415559			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	Not Reported; (14C)Tetrabromobisphenol-A			
Confidentiality, EndPoint, Type, Guideline	None; biotic mineralization; experimental; OECD Guideline 308 (Aerobic and Anaerobic Transformation in Aquatic Sediment Systems): and procedures described by Federle and Itrich			
Solvent, Reactivity, Storage, Stability	ethanol; 56 mCi/mmol; total radioactivity of 1.0 mCi in a total volume of 1.0 mL; frozen conditions; NR			
Radiolabel, Source, State, Purity	uniformly labeled with 14C in both phenyl ring positions; Amersham Biosciences-UK; liquid; 99.6% Notes: Product Code CFQ14174; Batch/Lot Bi			
Oxygen and Inoculum	anaerobic; anaerobic sludge: collected on July 5, 2005, from the municipal wastewater treatment plant located in Federalsburg, Caroline County, Maryland, USA.			
Duration, Parameter, System, and Sampling Frequency	up to 120 days; radiochem measure; 35±2°C; anaerobic testing chambers; nitrogen head space; 14C-gas traps; 7, 14, 28, 42, 56, 70, 84, 98, 112, 120 days			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	Not Reported; mineral salts/digester sludge; digester sludge; mineral salts solution; KH2PO4, K2HPO4, NaHPO4*7H2O, NH4Cl, MgSO4*7H2O, CaCl2, FeCl2*4-hydrate, resazurin; not reported; 7.1			
Control Dark, Control, and Blank	yes; not reported; sterile digester sludge			
Concentration	50 ug/L			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	liquid scintillation counting (LCS);; triplicate aliquots were analyzed; 14CO2 + 14VOCs			
Results Remarks	0.6% CO2; 0.5% other VOCs			
Halfife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	not reported; not reported; not applicable; Not Reported			
Results Details	50% degradation = 19 days; 90% degradation = 68 days			
Mean Total Recovery Results and Results Per Recovery	110.8% material balance; 19.1% water layer; 85.0% sludge extract; 5.6% sludge solids; 1.1% total gases; Not Reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	1.1%; Not Reported; bisphenol A and 3 unknown products			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by common name.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance was reported were verified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	High	Concurrent controls were included.
	Metric 4:	Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported, and were appropriate for the study
Domain 3: Test Conditions				
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Study Citation:	Wildlife International Ltd, (2006). Mineralization and transformation of radiolabeled (14C) tetrabromobisphenol-A in anaerobic digester sludge.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	7415559			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and routinely used for similar study types and appropriate for the study method or route.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	kinetic calculations were not clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were expected.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Yang, C., Liao, C., Ku, H.,is, Chang, B. (2019). Biodegradation of tetrabromobisphenol-a in mangrove sediments. Sustainability 11(1):151.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5622360

EXTRACTION	
Parameter	Data
CASRN and Test Material	not reported; Tetrabromobisphenol-A (TBBPA)
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; other: Non-guideline: batch experiment in sediments
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; contaminated sediments; NR; NR Notes: NR
Oxygen and Inoculum	aerobic; natural sediment: Mangrove sediment samples with TBBPA contamination; Guandu sediment (contained TBBPA concentrations of 0.10 mg/kg in the spring and 0.22 mg/kg in the fall) and Bali sediment (contained TBBPA concentrations 0.14 mg/kg in the spring and 0.14 mg/kg in the fall).
Duration, Parameter, System, and Sampling Frequency	75d; test mat.; 125 mL serum bottles; not reported
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; not reported; mangrove sediments; Aerobic mineral medium; not reported; not reported
Control Dark, Control, and Blank Concentration	yes; not reported; Autoclaved controls with medium and sediment included; 90.8-97.9% TBBPA remained in sterile controls 2 - mg/L
Analytical Method, Analytical Details, and Results Per Degredation Parameter	GC-ECD; bromide monitored via ion chromatograms; R-squared 0.911-0.979; test mat.
Results Remarks	not reported
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Degradation half-lives in aerobic batch experiments: Guandu sediment = 73.3 days (spring) and 90.9 days (fall); Bali sediment = 34.7 days (spring) and 51.6 days (fall).; not reported; not reported; not reported
Results Details	not reported
Mean Total Recovery Results and Results Per Recovery	not reported; not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	not reported; not reported; Proposed transformation pathway: TBBPA ->-> dibromobisphenol-A ->-> BPA

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	Medium
Domain 2: Test Design	Metric 3:	Study Controls	Medium
	Metric 4:	Test Substance Stability	N/A

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Study Citation:	Yang, C., Liao, C., Ku, H.,is, Chang, B. (2019). Biodegradation of tetrabromobisphenol-a in mangrove sediments. Sustainability 11(1):151.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5622360			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	Low	Limited detail regarding testing conditions.
	Metric 7:	Testing Consistency	High	Reported test conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test organism information was reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology addressed or reported the intended outcome of interest; however, a previously contaminated sediment was used for testing.
	Metric 12:	Test Substance Purity	Medium	Limited detail regarding this metric.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some analytical details were omitted.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Calculations were clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Yang, C., Liao, C., Ku, H.,is, Chang, B. (2019). Biodegradation of tetrabromobisphenol-a in mangrove sediments. Sustainability 11(1):151.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	5622360

EXTRACTION	
Parameter	Data
CASRN and Test Material	not reported; Tetrabromobisphenol-A (TBBPA)
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; other: Non-guideline: continuous experiments in sediments
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; contaminated sediments; NR; NR Notes: NR
Oxygen and Inoculum	anaerobic; natural sediment: Mangrove sediment samples with TBBPA contamination; Bali sediment (contained TBBPA concentrations 0.14 mg/kg in the spring and 0.14 mg/kg in the fall); TBBPA added three times (2 mg/L each addition). 75d; test mat.; 125 mL serum bottles with anaerobic glove box; not reported
Duration, Parameter, System, and Sampling Frequency	
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; not reported; mangrove sediments; Anaerobic mineral medium; not reported; not reported
Control Dark, Control, and Blank Concentration	yes; not reported; Autoclaved controls with medium and sediment included; 90.8-97.9% TBBPA remained in sterile controls 2 - mg/L
Analytical Method, Analytical Details, and Results Per Degredation Parameter	GC-ECD; bromide monitored via ion chromatograms; R-squared 0.911-0.979; test mat.
Results Remarks	Degradation in anaerobic continuous experiments using Bali sediments = 3.2% (first addition of TBBPA at day 42), 2.1%/84 days (second addition of TBBPA at day 49), 100%/126 days (third addition of TBBPA at day 91). Half-lives were = 9.7, 6.8, and 5.1 days by first, second, and third additions, respectively.; not reported; not reported; not reported
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	
Results Details	not reported
Mean Total Recovery Results and Results Per Recovery	not reported; not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	not reported; not reported; Proposed transformation pathway: TBBPA ->-> dibromobisphenol-A ->-> BPA

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified clearly.
	Metric 2:	Test Substance Purity	Medium	Contaminated sediments used for experiment; analytical standards not reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions				

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Study Citation:	Yang, C., Liao, C., Ku, H.,is, Chang, B. (2019). Biodegradation of tetrabromobisphenol-a in mangrove sediments. Sustainability 11(1):151.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5622360			
Domain		Metric	EVALUATION Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	Low	Limited detail regarding testing conditions.
	Metric 7:	Testing Consistency	High	Reported test conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test organism information was reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology addressed or reported the intended outcome of interest; however, a previously contaminated sediment was used for testing.
	Metric 12:	Test Substance Purity	Medium	Limited detail regarding this metric.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some analytical details were omitted.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Calculations were clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Yang, C., Liao, C., Ku, H.,is, Chang, B. (2019). Biodegradation of tetrabromobisphenol-a in mangrove sediments. Sustainability 11(1):151.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5622360			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	not reported; Tetrabromobisphenol-A (TBBPA)			
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; other: Non-guideline: continuous experiments in sediments			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; contaminated sediments; NR; NR Notes: NR			
Oxygen and Inoculum	aerobic; natural sediment: Mangrove sediment samples with TBBPA contamination; Bali sediment (contained TBBPA concentrations 0.14 mg/kg in the spring and 0.14 mg/kg in the fall); TBBPA added three times (2 mg/L each addition).			
Duration, Parameter, System, and Sampling Frequency	75d; test mat.; 125 mL serum bottles; not reported			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; not reported; mangrove sediments; Aerobic mineral medium; not reported; not reported			
Control Dark, Control, and Blank Concentration	yes; not reported; Autoclaved controls with medium and sediment included; 90.8-97.9% TBBPA remained in sterile controls 2 - mg/L			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	GC-ECD; bromide monitored via ion chromatograms; R-squared 0.911-0.979; test mat.			
Results Remarks	Degradation in aerobic continuous experiments using Bali sediments = 96.1%/63 days (first addition of TBBPA at day 0), 98.3%/105 days (second addition of TBBPA at day 70), 100%/147 days (third addition of TBBPA at day 112).			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Half-lives were = 12.1, 7.8, and 6.1 days by first, second, and third additions, respectively.; not reported; not reported; not reported			
Results Details	not reported			
Mean Total Recovery Results and Results Per Recovery	not reported; not reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	not reported; not reported; Proposed transformation pathway: TBBPA ->-> dibromobisphenol-A ->-> BPA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified clearly.
	Metric 2:	Test Substance Purity	Medium	Contaminated sediments used for experiment; analytical standards not reported.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions				
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Study Citation:	Yang, C., Liao, C., Ku, H.,is, Chang, B. (2019). Biodegradation of tetrabromobisphenol-a in mangrove sediments. Sustainability 11(1):151.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5622360			
Domain		Metric	EVALUATION Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	Low	Limited detail regarding testing conditions.
	Metric 7:	Testing Consistency	High	Reported test conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test organism information was reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology addressed or reported the intended outcome of interest; however, a previously contaminated sediment was used for testing.
	Metric 12:	Test Substance Purity	Medium	Limited detail regarding this metric.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some analytical details were omitted.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Calculations were clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Yang, C., Liao, C., Ku, H.,is, Chang, B. (2019). Biodegradation of tetrabromobisphenol-a in mangrove sediments. Sustainability 11(1):151.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5622360			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	not reported; Tetrabromobisphenol-A (TBBPA)			
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; other: Non-guideline: batch experiment in sediments			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; contaminated sediments; NR; NR Notes: NR			
Oxygen and Inoculum	anaerobic; natural sediment: Mangrove sediment samples with TBBPA contamination; Guandu sediment (contained TBBPA concentrations of 0.10 mg/kg in the spring and 0.22 mg/kg in the fall) and Bali sediment (contained TBBPA concentrations 0.14 mg/kg in the spring and 0.14 mg/kg in the fall).			
Duration, Parameter, System, and Sampling Frequency	75d; test mat.; 125 mL serum bottles and anaerobic glove box; not reported			
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	not reported; not reported; mangrove sediments; Anaerobic mineral medium; not reported; not reported			
Control Dark, Control, and Blank Concentration	yes; not reported; Autoclaved controls with medium and sediment included; 90.8-97.9% TBBPA remained in sterile controls 2 - mg/L			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	GC-ECD; bromide monitored via ion chromatograms; R-squared 0.911-0.979; test mat.			
Results Remarks	not reported			
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Degradation half-lives in anaerobic batch experiments: Guandu sediment = 41.1 days (spring) and 65.4 days (fall); Bali sediment = 31.4 days (spring) and 42.9 days (fall).; not reported; not reported; not reported			
Results Details	not reported			
Mean Total Recovery Results and Results Per Recovery	not reported; not reported			
Results Value, Direct Quantum Yield Results, and Transformation Products	not reported; not reported; Proposed transformation pathway: TBBPA ->-> dibromobisphenol-A ->-> BPA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified clearly.
	Metric 2:	Test Substance Purity	Medium	Contaminated sediments used for experiment; analytical standards not reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions				
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Study Citation:	Yang, C., Liao, C., Ku, H.,is, Chang, B. (2019). Biodegradation of tetrabromobisphenol-a in mangrove sediments. Sustainability 11(1):151.			
OECD Harmonized Template:	Biodegradation in Sediment			
HERO ID:	5622360			
Domain		Metric	EVALUATION Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	Low	Limited detail regarding testing conditions.
	Metric 7:	Testing Consistency	High	Reported test conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test organism information was reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology addressed or reported the intended outcome of interest; however, a previously contaminated sediment was used for testing.
	Metric 12:	Test Substance Purity	Medium	Limited detail regarding this metric.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some analytical details were omitted.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Calculations were clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Chen, X., Gu, X., Zhao, X., Wang, Y., Pan, Y., Ma, X., Wang, X., Ji, R. (2019). Species-dependent effects of earthworms on the fates and bioavailability of tetrabromobisphenol A and cadmium coexisted in soils. Science of the Total Environment 658:1416-1422.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5114358

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Not reported
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR
Radiolabel, Source, State, Purity	14C-ring-labeled, 7.4E8 Bq/mmol specific radioactivity; Synthesized in study laboratory; Liquid; 99%
Oxygen, pH, and CEC	aerobic; Not reported; Not reported
Test Type, Test Temperature, and Test Details	laboratory; 20°C; 30 g dw native soil (paddy field in Wujin, Jiangsu Province, China) amended with or without Cd and 14-C TBBPA, in the presence or absence of Metaphire guillelmi or Eisenia fetida
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; Not reported; Not reported
Soil Classification, Microbial Biomass, and Humidity	Not reported; Not reported; 24% soil moisture content
Duration, Parameter, System, and Sampling Frequency	14 d; radiochem. meas.; 250 mL glass jars stopped with rubber stopper with NaOH trap for 14CO ₂ ; Approx. 0, 1, 2, 3, 4, 6, 8, 11, 14 d
Control and Blank	Not included; Not included
Concentration	45 kBq
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Liquid scintillation counter; Freeze-dried homogenized soil samples extracted with methanol; bound residues determined by combustion in a biological oxidizer; radioactive liquid solutions mixed with scintillation cocktail; 14CO ₂
Results Remarks	Value reported for study group without earthworms and Cd. < 0.4% initially applied 14C mineralized after 14 days.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	Approx. 0.275% (w/Metaphire guillelmi), 0.35% (w/Eisenia fetida); Not reported; 14 d; Not reported; Not reported
Results Details	Mineralization increased linearly (R ² =0.99) Lower rate (native soil): 0.020%/day Highest rate (with 1 mg/kg dw Cd and E. fetida): 0.026%/day
Mean Total Recovery Results and Results Per Recovery	Not reported; 95-101% (mineralization products, residues in soils and/or in earthworms)

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity was reported.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Sterile controls were not included.
	Metric 4:	Test Substance Stability	High	The test substance preparation was reported.

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Study Citation:	Chen, X., Gu, X., Zhao, X., Wang, Y., Pan, Y., Ma, X., Wang, X., Ji, R. (2019). Species-dependent effects of earthworms on the fates and bioavailability of tetrabromobisphenol A and cadmium coexisted in soils. Science of the Total Environment 658:1416-1422.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5114358			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Test temperature and soil moisture were reported, other details may be included in supplemental material.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	N/A	This metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is commonly used for similar study types.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was able to determine rate of mineralization.
	Metric 12:	Test Substance Purity	Medium	Sampling methods addressed the outcomes of interest and samples were collected with appropriate frequency. Extraction methods were reported in greater detail in supplemental information.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Groups without earthworms and Cd were included. Variability between replicates was addressed by statistical techniques.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; sufficient evidence was presented to support loss of parent due to biodegradation. Data primarily reported graphically, biodegradation rates for all groups not reported but may be included in supplemental information.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistics were described (linear fitting by least-squares method in software OriginPpo 2015) and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The result was reasonable based on the method and was lower than a previous study due to fast formation of bound residues. The study's primary focus was on organism and Cd effects to mineralization, which may explain why a biodegradation negative control was not included.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to the study type.

Overall Quality Determination**High**

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; other: Biodegradation in 3 different natural soil types			
Solvent, Reactivity, Storage, Stability	acetone; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; 99.06% Notes: 14C-labelled tetrabromobisphenol-A mixed with unlabelled tetrabromobisphenol-A			
Oxygen, pH, and CEC	aerobic; sandy loam pH = 7.0, clay loam pH = 7.6, and a silty loam pH = 6.2; sandy loam = 10.8 meq/100g, clay loam = 19.6 meq/100g, and a silty loam = 6.0 meq/100g			
Test Type, Test Temperature, and Test Details	Not Reported; 21.5°C; Not Reported			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	Not Reported; sandy loam: 83% sand, 13% silt, 4% clay, 4.4% OC; clay loam: 43% sand, 24% silt, 33% clay, 1.8% OC; silty loam 16% sand, 58% silt, 26% clay, 0.8% OC; not reported			
Soil Classification, Microbial Biomass, and Humidity	sandy loam, clay loam and a silty loam; not reported: Field moisture capacity: sandy loam 74.8%, clay loam 75.9%, silty loam 43.9%			
Duration, Parameter, System, and Sampling Frequency	64 days; CO2 evolution; 250 mL flasks; not specified			
Control and Blank	no controls reported; no controls reported			
Concentration	= 10 - mg/kg dry weight			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	TLC analysis of radioactivity; Soxhlet extraction method; % recovered radioactivity from TLC plates after Soxhlet extraction			
Results Remarks	Little or no mineralization was observed based on CO2 evolution; products included a polar compounds, 3 unknown compounds, a less polar product compared to TBBPA, and dimethyl and diethyl tetrabromobisphenol-A derivatives.			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	74.3-81.9% (sandy loam), 35.9-40.1% (silty loam), 41.1-43.2% (clay soil); not reported; 64 days; not reported; not reported			
Results Details	not reported			
Mean Total Recovery Results and Results Per Recovery	Recovery ca. 80% in sandy loam and clay loam, and ca. 60% in silty loam; Total mean recovery as % of that initially applied = 78.5% (sandy loam), 59.6% (silty loam), and 81.2% (clay loam)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 2: Test Design	Metric 3:	Study Controls	Low	Controls were not reported.
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Study Citation:		ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).		
OECD Harmonized Template:		Biodegradation in Soil		
HERO ID:		5238261		
Domain	Metric	EVALUATION		Comments
	Metric 4:	Test Substance Stability	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 6:	Testing Conditions	High	Details reported in the secondary source were acceptable.
	Metric 7:	Testing Consistency	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 8:	System Type and Design	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	Details reported in the secondary source were acceptable.
	Metric 12:	Test Substance Purity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Limited details reported in this secondary source; additional detail may be in primary literature. Low total recoveries were not discussed.
	Metric 18:	QSAR Models	N/A	Not applicable.

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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).
OECD Harmonized	Biodegradation in Soil
Template:	
HERO ID:	5238261

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

* Related References: Value entered under HERO ID 1443918. Springborn Life Sciences (1989e). Determination of the biodegradability of tetrabromobisphenol A in soil under aerobic conditions. Report No 88-11-2848. Springborn Life Sciences, Inc., Wareham, Massachusetts. Not in HERO at time of extraction.

Study Citation:	ECB, (2008). Risk assessment of 2,2’,6,6’-tetrabromo-4,4’-isopropylidene diphenol (tetrabromobisphenol-A).		
OECD Harmonized Template:	Biodegradation in Soil		
HERO ID:	5238261		
EXTRACTION			
Parameter	Data		
CASRN and Test Material	79-94-7; TBBPA		
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; OECD Guideline 307 (Aerobic and Anaerobic Transformation in Soil)		
Solvent, Reactivity, Storage, Stability	ethanol; NR; NR; NR		
Radiolabel, Source, State, Purity	uniformly ring labelled 14C-tetrabromobisphenol-A; NR; NR; radiochemical purity 99.6% Notes: NR		
Oxygen, pH, and CEC	aerobic conditions; soil a pH = 7.0, soil b pH = 6.8, soil c pH = 7.5, soil d pH = 5.7; soil a = 11.4 meq/100g, soil b = 19.0 meq/100g, soil c = 26.6 meq/100g, soil d = 25.4 meq/100g		
Test Type, Test Temperature, and Test Details	laboratory; 20°C; 100 g of dry soil in glass test bottles		
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; Soil a: 88.1% sand, 1.0% silt, 10.9% clay, 1.2% OC; soil b: 61.9% sand, 15.5% silt, 22.6% clay, 2.1% OC; soil c: 9.5% sand, 63.9% silt, 26.3% clay, 5.5% OC; soil d: 14.9% sand, 51.2% silt, 33.9% clay, 2.2% OC; not reported		
Soil Classification, Microbial Biomass, and Humidity	soil a: loamy sand; soil b: sandy clay loam; soil c: silt loam; soil d: silty clay loam; Soil a: 110 µg/g, soil b 254 µg/g, soil c: 696 µg/g, soil d: 131 µg/g; Field moisture capacity: sandy loam 74.8%, clay loam 75.9%, silty loam 43.9%		
Duration, Parameter, System, and Sampling Frequency	up to 6 months; test mat.; 500 mL wide-mouth amber glass bottles; not specified		
Control and Blank	not reported; solvent control included		
Concentration	= 50 - µg/kg dry weight		
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC and TLC analysis of radioactivity; soil extracted using acidified methanol; % 14-CO2 recovery (% mineralization)		
Results Remarks	Recovery of 14C-labelled in soil extract: 8.7% [2.0% TBBPA] (soil a), 6.1% [1.7% TBBPA] (soil b), 6.6% [1.7% TBBPA] (soil c), 8.0% [2.4% TBBPA] (soil d); recovery of 14C-labelled that was soil bound: 56.0% (soil a), 63.7% (soil b), 75.8% (soil c), 61.7% (soil d). %14-CO2 recovery: 17.5% (soil a), 21.3% (soil b), 21.6% (soil c), 21.2% (soil d); not reported; 6 months; not reported; not reported		
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	DT50 = 5.3-7.7 days (may represent an adsorption process rather than a degradation process); mineralization half-life >6 months.		
Results Details	not reported; Total mean recovery after 6 months % of radioactivity initially applied = 82.2% (soil a), 91.1% (soil b), 104.0% (soil c), 90.9% (soil d)		
Mean Total Recovery Results and Results Per Recovery			
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified.
Metric 2:	Test Substance Purity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 2: Test Design			
Metric 3:	Study Controls	Medium	Controls were reported; additional detail may be in primary source.
Metric 4:	Test Substance Stability	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5238261			
Domain		Metric	EVALUATION	
			Rating	Comments
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	High	Details reported in the secondary source were acceptable.
	Metric 7:	Testing Consistency	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 8:	System Type and Design	High	The system and design were acceptable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Microbial biomass was reported.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	Details reported in the secondary source were acceptable.
	Metric 12:	Test Substance Purity	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Details reported in secondary source were acceptable; additional detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details were reported in this secondary source; additional detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable. Soil bound residue may influence results.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination			High	

* Related References: Source (not in HERO at time of extraction): Wildlife International (2006c). Tetrabromobisphenol-A: Aerobic and anaerobic transformation in soil. Wildlife International Ltd., Project Number 493E-112.

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; other: Biodegradation in 3 different soil types			
Solvent, Reactivity, Storage, Stability	acetone; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; 99.06% Notes: 14C-labelled tetrabromobisphenol-A mixed with unlabelled tetrabromobisphenol-A			
Oxygen, pH, and CEC	anaerobic; sandy loam pH = 7.0, clay loam pH = 7.6, and a silty loam pH = 6.2; sandy loam = 10.8 meq/100g, clay loam = 19.6 meq/100g, and a silty loam = 6.0 meq/100g			
Test Type, Test Temperature, and Test Details	laboratory; 21.5°C; Not Reported			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	Not Reported; sandy loam: 83% sand, 13% silt, 4% clay, 4.4% OC; clay loam: 43% sand, 24% silt, 33% clay, 1.8% OC; silty loam 16% sand, 58% silt, 26% clay, 0.8% OC; not reported			
Soil Classification, Microbial Biomass, and Humidity	sandy loam, clay loam and a silty loam; not reported: Field moisture capacity: sandy loam 74.8%, clay loam 75.9%, silty loam 43.9%			
Duration, Parameter, System, and Sampling Frequency	64 days; CO2 evolution; 250 mL flasks; not specified			
Control and Blank	no controls reported; no controls reported			
Concentration	= 10 - mg/kg dry weight			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	TLC analysis of radioactivity; Soxhlet extraction method; % recovered radioactivity (as TBBPA) from TLC plates after Soxhlet extraction			
Results Remarks	Little or no mineralization was observed; products included a polar compounds, 3 unknown compounds, a less polar product compared to TBBPA, and dimethyl and diethyl tetrabromobisphenol-A derivatives.			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Referencs Substance Compartment Results	43.7-57% (sandy loam), 53.4-65% (silty loam), 89.5-90.6% (clay soil); not reported; 64 days; not reported; not reported			
Results Details	not reported			
Mean Total Recovery Results and Results Per Recovery	Recovery ca. 87.5% in sandy loam and ca. 104.7% clay loam, and ca. 48% in silty loam; not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design				
	Metric 3:	Study Controls	Low	Controls were not reported.
	Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5238261			
Domain		Metric	EVALUATION Rating	Comments
	Metric 6:	Testing Conditions	High	Details reported in the secondary source were acceptable.
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	Details reported in the secondary source were acceptable.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Limited details reported in this secondary source; detail may be in primary literature. Low total recoveries were not discussed.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination			Medium	

* Related References: Value entered under HERO ID 5547109 and 6391021. Springborn Life Sciences (1989d). Determination of the biodegradability of tetrabromobisphenol A in soil under anaerobic conditions. Report No 88-11-2849. Springborn Life Sciences, Inc., Wareham, Massachusetts.

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; OECD Guideline 307 (Aerobic and Anaerobic Transformation in Soil)			
Solvent, Reactivity, Storage, Stability	ethanol; NR; NR; NR			
Radiolabel, Source, State, Purity	uniformly ring labelled 14C-tetrabromobisphenol-A; NR; NR; radiochemical purity 99.6% Notes: NR			
Oxygen, pH, and CEC	anaerobic conditions; soil a pH = 7.0, soil b pH = 6.8, soil c pH = 7.5, soil d pH = 5.7; soil a = 11.4 meq/100g, soil b = 19.0 meq/100g, soil c = 26.6 meq/100g, soil d = 25.4 meq/100g			
Test Type, Test Temperature, and Test Details	laboratory; 20°C; parallel experiments run in either 500 mL short, wide, amber glass test bottles and the other in 500mL culture bottles.			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; Soil a: 88.1% sand, 1.0% silt, 10.9% clay, 1.2% OC; soil b: 61.9% sand, 15.5% silt, 22.6% clay, 2.1% OC; soil c: 9.5% sand, 63.9% silt, 26.3% clay, 5.5% OC; soil d: 14.9% sand, 51.2% silt, 33.9% clay, 2.2% OC; not reported			
Soil Classification, Microbial Biomass, and Humidity	soil a: loamy sand; soil b: sandy clay loam; soil c: silt loam; soil d: silty clay loam; Soil a: 110 µg/g, soil b 254 µg/g, soil c: 696 µg/g, soil d: 131 µg/g; Field moisture capacity: sandy loam 74.8%, clay loam 75.9%, silty loam 43.9%			
Duration, Parameter, System, and Sampling Frequency	up to 6 months; test mat.; 500 mL wide-mouth amber glass bottles; monthly			
Control and Blank	not reported; solvent control included			
Concentration	= 50 - µg/kg dry weight			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC and TLC analysis of radioactivity; soil extracted using acidified methanol; % 14-CO2 recovery (% mineralization)			
Results Remarks	Recovery of 14C-labelled in soil extract (amber bottles): 15.2% (soil a) 10.1% (soil b) 9.8% (soil c) 12.4% (soil d); soil-bound radioactivity (could be strongly-bound but unchanged tetrabromobisphenol-A): 76.9% (soil a) 74.5% (soil b) 72.0% (soil c) 61.7% (soil d). Recovery of 14C-labelled in soil extract (culture bottles): 30% (soil a) 24.3% (soil b) 20.8% (soil c) 18.5% (soil d); soil-bound radioactivity (could be strongly-bound but unchanged tetrabromobisphenol-A): 59.1% (soil a) 58.2% (soil b) 65.6% (soil c) 59.2% (soil d).			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Referencs Substance Compartment Results	%14-CO2 recovery: 12.0% (soil a), 10.6% (soil b), 13.3% (soil c), 17.7% (soil d); not reported; 4 months (amber bottles) 6 months (culture bottles); not reported; not reported			
Results Details	not reported			
Mean Total Recovery Results and Results Per Recovery	not reported; not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1: Metric 2:	Test Substance Identity Test Substance Purity	High Medium	The test substance was identified. Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design	Metric 3: Metric 4:	Study Controls Test Substance Stability	Medium Medium	Controls were reported; additional detail may be in primary source. Limited details reported in this secondary source; detail may be in primary literature.
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5238261			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	High	Details reported in the secondary source were acceptable.
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	Low	The system and design did not maintain fully anaerobic conditions.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Microbial biomass was reported.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	Details reported in the secondary source were acceptable.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Details reported in secondary source were acceptable; additional detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable. Soil bound residue may influence results.
	Metric 18:	QSAR Models	N/A	Not applicable.

Overall Quality Determination

Medium

* Related References: Source (not in HERO at time of extraction): Wildlife International (2006c). Tetrabromobisphenol-A: Aerobic and anaerobic transformation in soil. Wildlife International Ltd., Project Number 493E-112.

Study Citation:	Feng, M., Li, H., You, S., Zhang, J., Lin, H., Wang, M., Zhou, J. (2019). Effect of hexavalent chromium on the biodegradation of tetrabromobisphenol A (TBBPA) by <i>Pycnoporus sanguineus</i> . <i>Chemosphere</i> 235:995-1006.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5881934

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	No; Screening study; Experimental; other: Fungal culture study
Solvent, Reactivity, Storage, Stability	0.01M sodium hydroxide solution; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aladdin Industrial Co.; solid; 98%
Oxygen, pH, and CEC	not specified, aerobic assumed; Not Reported; NR
Test Type, Test Temperature, and Test Details	laboratory; 30 °C; Not performed in soil however this form used since the fungus grows on decaying wood of broad-leaved trees and pine
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; NA; NA
Soil Classification, Microbial Biomass, and Humidity	NA; white rot fungi, <i>P. sanguineus</i> (CGMCC 5.00815) was obtained from China General Microbiological Culture Collection Center: NA
Duration, Parameter, System, and Sampling Frequency	96 hours; test mat.; fungal culture (in flasks containing 4% (v/v) spore suspension) combined with 5 mg/L TBBPA and then placed on rotary shaker at 30 °C and 160 r/min in darkness; 12 hour intervals
Control and Blank	NR; culture medium containing 5 mg/L TBBPA without inoculation of fungal spore
Concentration	5 - mg/L
Analytical Method, Analytical Details, and Results Per Degredation Parameter	high performance liquid chromatography (HPLC); detection was performed at the wavelength of 290 nm; Degradation efficiency (%) = $(C_0 - C_t)/C_0 \times 100$
Results Remarks	The TBBPA degradation efficiency ascended gradually from 0 to 72 hours, and then stabilized after 84 hours. Results from <i>P. sanguineus</i> extracellular and intracellular enzyme also reported; TBBPA degradation efficiency of 50% and 40% in 24 hours, respectively.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	80.02%/84 hours, 81%/96 hours (approx); shown in figure 1, approximately 5%; 84 hours; control without fungus; 2%/96 hours, approximately (based on figure 1a)
Results Details	Cr(VI) reduced rate of degradation efficiency, results from 12 hour sampling available in figures
Mean Total Recovery Results and Results Per Recovery	NR; NR

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	High	A concurrent blank group were included.

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Study Citation:	Feng, M., Li, H., You, S., Zhang, J., Lin, H., Wang, M., Zhou, J. (2019). Effect of hexavalent chromium on the biodegradation of tetrabromobisphenol A (TBBPA) by <i>Pycnoporus sanguineus</i> . Chemosphere 235:995-1006.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5881934			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor deviations these deviations or omissions were not likely to have a substantial impact on study results.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups. The conditions of the exposure were documented.
	Metric 8:	System Type and Design	Medium	Equilibrium was not established or reported but this was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test organism information or inoculum source were reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome assessment.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, were considered and accounted for in data evaluation. All reported variability or uncertainty was not likely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were clearly described and address the dataset(s).
Domain 8: Other				
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Study Citation:	Feng, M., Li, H., You, S., Zhang, J., Lin, H., Wang, M., Zhou, J. (2019). Effect of hexavalent chromium on the biodegradation of tetrabromobisphenol A (TBBPA) by Pycnoporus sanguineus. Chemosphere 235:995-1006.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5881934

		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 17: Verification or Plausibility of Results	High	The study results were reasonable.	
	Metric 18: QSAR Models	N/A	A QSAR model was not reported.	

Overall Quality Determination	High
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Study Citation:	Li, F., Wang, J., Jiang, B., Yang, X., Nastold, P., Kolvenbach, B., Wang, L., Ma, Y., Corvini, P. F., Ji, R. (2015). Fate of tetrabromobisphenol a (TBBPA) and formation of ester- and ether-linked bound residues in an oxic sandy soil. Environmental Science & Technology 49(21):12758-12765.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5226975

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Biodegradation in topsoil (0 - 20 cm) collected from agricultural field near Lalden, Switzerland
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR
Radiolabel, Source, State, Purity	Uniformly 14C-ring-labeled; Synthesized in lab; NR; 97% (LC-MS); 99% radiochemical purity (HPLC radio flow detector)
Oxygen, pH, and CEC	aerobic; 7.0; Not reported
Test Type, Test Temperature, and Test Details	laboratory; 20±1°C; 0.2 g dry wt spiked soil added to 2.3 g soil dry wt, incubated in the dark. Flasks opened everyday for 30 s to allow oxygen in headspace.
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	loamy sand; 1.4% total organic carbon/ 4.2% clay/ 19.5% silt/ 76.3% sand; Not reported
Soil Classification, Microbial Biomass, and Humidity	Not reported; Not reported: 70% maximal water holding capacity
Duration, Parameter, System, and Sampling Frequency	143 d; test mat.; Flask, closed with a polytetrafluoroethylene-wrapped rubber stopped. 6 mL vial of 1.0 mL 1M NaOH used as 14CO2 trap, suspended from bottom of stopper; est. 5, 15, 25, 35, 55, 100, and 143 d
Control and Blank	Not reported; Autoclaved soil sample
Concentration	5.0 mg/kg dw
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Liquid scintillation counting; Test substance in soil extracted with methanol and ethyl acetate; % Initially applied 14C recovered as 14CO2
Results Remarks	No lag period for transformation in soil observed.Half-life: 14.7±1.25 dEight metabolites detected with TBBPA methyl ethers accumulating. 66.5% of radioactivity bound to soil after 143 days.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	19.6%; ± 0.2%; 143 d; Autoclaved soil sample; Mineralization negligible. No metabolites detected in soil.
Results Details	Mineralization linear rate: 0.16±0.01 %/dFirst order constant for transformation in soil: 0.047±0.004%/day
Mean Total Recovery Results and Results Per Recovery	Not reported; 98±2.0%, n=3

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance synthesis was described and purity was determined analytically.
Domain 2: Test Design	Metric 3:	Study Controls	High	An autoclaved sediment sample was included and tested valid.
	Metric 4:	Test Substance Stability	High	The test substance preparation was reported and appropriate for the method.

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Study Citation:	Li, F., Wang, J., Jiang, B., Yang, X., Nastold, P., Kolvenbach, B., Wang, L., Ma, Y., Corvini, P. F., Ji, R. (2015). Fate of tetrabromobisphenol a (TBBPA) and formation of ester- and ether-linked bound residues in an oxic sandy soil. Environmental Science & Technology 49(21):12758-12765.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5226975			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Appropriate test conditions were reported for the study.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment addressed the intended outcomes of interest.
	Metric 12:	Test Substance Purity	High	The study used acceptable sampling methods that addressed the outcomes of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability was addressed between samples.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Target chemical depletion and metabolite formation and percent recovery were reported; sufficient evidence was provided to confirm the parent disappearance was not due to another process.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical and kinetic calculations were conducted appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

* Related References: Data cited in HSDB PubMed profile

Study Citation:	Li, F., Wang, J., Nastold, P., Jiang, B., Sun, F., Zenker, A., Kolvenbach, B. A., Ji, R., Corvini, P. F. X. (2014). Fate and metabolism of tetrabromobisphenol A in soil slurries without and with the amendment with the alkylphenol degrading bacterium <i>Sphingomonas</i> sp. strain TTNP3. <i>Environmental Pollution</i> 193:181-188.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5519963

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Transformation in an oxic soil slurry
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	14C-ring-labelled TBBPA (14C-TBBPA) specific radioactivity = 1.48E9 Bq/mmol; NR; NR; chemical purity: 97%; radiochemical purity: 99% Notes: Chemical purity analyzed by LC-MS and radiochemical purity analyzed by HPLC coupled to a radio flow detector.
Oxygen, pH, and CEC	aerobic; 7.0 (0.01 M CaCl ₂); Not reported
Test Type, Test Temperature, and Test Details	laboratory; Room temperature; Sandy soil from Switzerland
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	sand; 4.2% clay, 19.5% silt, 76.3% sand; 1.4%TOC; Not reported
Soil Classification, Microbial Biomass, and Humidity	Sandy soil; Not reported: Not reported
Duration, Parameter, System, and Sampling Frequency	20 days; CO ₂ evolution; Constantly aerated flow-through flask systems; Not reported
Control and Blank	Not reported; Abiotic controls with sterilized soil prepared via autoclave at 120 C for 30 min 2x/day
Concentration	Not Reported
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC UV (270 nm) for purification of metabolites; GC-MS: analysis of metabolites; scintillation counting to determine radioactivity of 14C-CO ₂ ; Not reported; Half-life based on rate constant (w/o amendment)=0.017±0.003%/day from organic extract recovery; based on rate constant=0.050±0.008%/day from total recovery (calculated by SRC).
Results Remarks	Mineralization of radiolabeled TBBPA in soil amended with <i>Sphingomonas</i> sp. Strain TTNP3 was significantly more rapid (based on statistical significance).
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results Details	ca. 40.8±10.4 days; ca. 13.9 days; Not reported; Not reported; Sterile control; No degradation was observed in the sterile control
Mean Total Recovery Results and Results Per Recovery	First order kinetics; mineralization rate constant in the soil slurry without amendments=0.050±0.008%/day (based on radioactivity recovered from organic extracts and bound residues); degradation rate constant=0.017±0.003%/day, half-life=40.8±10.4 days (based on radioactivity recovered from organic extracts)
	Not reported; Total radioactivity recovered ranged from 97-102%

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High The test substance source and purity were reported.

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Study Citation:	Li, F., Wang, J., Nastold, P., Jiang, B., Sun, F., Zenker, A., Kolvenbach, B. A., Ji, R., Corvini, P. F. X. (2014). Fate and metabolism of tetrabromobisphenol A in soil slurries without and with the amendment with the alkylphenol degrading bacterium Sphingomonas sp. strain TTNP3. Environmental Pollution 193:181-188.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5519963			
EVALUATION				
Domain		Metric	Rating	Comments
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Controls were included.
	Metric 4:	Test Substance Stability	High	Details regarding this metric were appropriate.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some testing conditions were not provided; however, the omissions were not likely to have had a substantial impact on the study results.
	Metric 7:	Testing Consistency	High	The metric is not applicable to this study type.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The microbial activity was explicitly validated.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment was appropriate for this study.
	Metric 12:	Test Substance Purity	Medium	The sampling methods were reported with minimal detail.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No confounding variables were evaluated.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Analytical details were limited.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Mcavoy, D. C., Pittinger, C. A., Willis, A. M. (2016). Biotransformation of tetrabromobisphenol A (TBBPA) in anaerobic digester sludge, soils, and freshwater sediments. Ecotoxicology and Environmental Safety 131:143-150.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5556627

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; other: aerobic transformation
Solvent, Reactivity, Storage, Stability	ethanol; 56 mCi/mmol; NR; NR
Radiolabel, Source, State, Purity	uniform ring-labeled 14C-TBBPA; Amersham Biosciences, UK; NR; 99.65
Oxygen, pH, and CEC	aerobic; loamy sand: 7.0; sandy clay loam: 6.8; silty clay loam: 5.7; silt loam 7.5; not reported
Test Type, Test Temperature, and Test Details	laboratory; 21±4°C; Not Reported
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; organic carbon: loamy sand: 1.2%; sandy clay loam: 2.1%; silty clay loam: 2.2%; silt loam 5.5%; not reported
Soil Classification, Microbial Biomass, and Humidity	loamy sand; sandy clay loam; silty clay loam; silt loam; Microbial biomass: loamy sand(ug/g): 110; sandy clay loam: 254; silty clay loam: 131; silt loam 696: adjusted to 1/3 bar at initiation and every 2 weeks
Duration, Parameter, System, and Sampling Frequency	6 months; radiochem measurement; glass media bottles; 14CO2 trap; 0, 1, 2, 4, 5, 6 months
Control and Blank	not reported; not reported
Concentration	50 ug/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	LSC/reverse-phase TLC; Not Reported; % 14CO2 evolution
Results Remarks	half-life 5.3-7.7 days
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	17.5-21.6%; Not Reported; 6 months; not reported; Not Reported
Results Details	Not Reported
Mean Total Recovery Results and Results Per Recovery	Not Reported; Not Reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
Domain 2: Test Design	Metric 3:	Study Controls	Medium

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Study Citation:	Mcavoy, D. C., Pittinger, C. A., Willis, A. M. (2016). Biotransformation of tetrabromobisphenol A (TBBPA) in anaerobic digester sludge, soils, and freshwater sediments. Ecotoxicology and Environmental Safety 131:143-150.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5556627			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types and appropriate for the study method or route.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variability and uncertainty in the measurements were not likely to have a substantial impact on study results..
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were expected.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

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Study Citation:	Mcavoy, D. C., Pittinger, C. A., Willis, A. M. (2016). Biotransformation of tetrabromobisphenol A (TBBPA) in anaerobic digester sludge, soils, and freshwater sediments. Ecotoxicology and Environmental Safety 131:143-150.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5556627

		EVALUATION	
Domain	Metric	Rating	Comments

Overall Quality Determination

High

* Related References: original source: Wildlife International, 2005. Tetrabromobisphenol-A: Aerobic and AnaerobicTransformation in Soil. Wildlife International Ltd. Project Number: 439E-112.

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6300802			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Guideline not specified			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Oxygen, pH, and CEC	aerobic; Not reported; Not reported			
Test Type, Test Temperature, and Test Details	not specified; Not reported; Not reported			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; Not reported; Not reported			
Soil Classification, Microbial Biomass, and Humidity	Chinese sandy soil; Not reported: Not reported			
Duration, Parameter, System, and Sampling Frequency	143 d; radiochem. meas.; Not reported; Not reported			
Control and Blank	Not reported; Not reported			
Concentration	Not reported			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Not reported; Not reported; Not reported			
Results Remarks	Not reported			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	Not reported; Not reported; Not reported; Not reported; Not reported			
Results Details	Half-life: 14.7 days			
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 4:	Test Substance Stability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 3: Test Conditions				
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Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6300802			
Domain		Metric	EVALUATION Rating	Comments
	Metric 5:	Test Method Suitability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 6:	Testing Conditions	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 7:	Testing Consistency	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 10:	Sampling Methods	N/A	Rating of this factor is not applicable to this kind of information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 12:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results are reasonable based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.

Overall Quality Determination**Medium**

* Related References: HERO ID 5226975: Li F et al; Environ Sci Technol 49: 12758-12765 (2015)

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6300802			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Guideline not specified			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Oxygen, pH, and CEC	aerobic; Not reported; Not reported			
Test Type, Test Temperature, and Test Details	not specified; Not reported; Not reported			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; Not reported; Not reported			
Soil Classification, Microbial Biomass, and Humidity	Not reported; Not reported: Not reported			
Duration, Parameter, System, and Sampling Frequency	Not reported; not specified; Not reported; Not reported			
Control and Blank	Not reported; Not reported			
Concentration	Not reported			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Not reported; Not reported; Not reported			
Results Remarks	Not reported			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	Not reported; Not reported; Not reported; Not reported; Not reported			
Results Details	Half-life: 9 - 93 days			
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 4:	Test Substance Stability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 6:	Testing Conditions	Medium	Not reported in this secondary source; the primary source likely contains more detail.
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Study Citation:		NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.		
OECD Harmonized Template:		Biodegradation in Soil		
HERO ID:		6300802		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 10:	Sampling Methods	N/A	Rating of this factor is not applicable to this kind of information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 12:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Not reported in this secondary source; the primary source likely contains more detail. Appears to be a summary of several studies.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results are reasonable based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.

Overall Quality Determination

Medium

* Related References: Liu J et al; Environ Sci Technol 47: 8348-8354 (2013)

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6300802			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Guideline not specified.			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Oxygen, pH, and CEC	anaerobic; Not reported; Not reported			
Test Type, Test Temperature, and Test Details	laboratory; Not reported; Test substance applied to 10 mg/kg soil samples of 3 different soils			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	Not Reported; Not reported; Not reported			
Soil Classification, Microbial Biomass, and Humidity	Not reported; Not reported: Not reported			
Duration, Parameter, System, and Sampling Frequency	Not reported; radiochem. meas.; Not reported; Not reported			
Control and Blank	Not reported; Not reported			
Concentration	Not reported			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Not reported; Not reported; Radiochem. Meas.			
Results Remarks	Degradation ranges reported for 3 different soils (soil types unspecified). Percent recovered as 14CO2: 0.35, 0.10, and 0.03% per soil type respectively, after 64 days.Primary degradation may occur fairly quickly in some soils.			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	only 0.35, 0.10, and 0.03% of the initially applied radioactivity was recovered as CO2 in 64 days indicating that this compound is slowly mineralized; Not reported; 64 d; Not reported; Not reported			
Results Details	After 64 days, 43.7 to 57.0%, 53.4 to 65.0% and 89.5 to 90.6% of the parent was still present in the three soils.			
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 4:	Test Substance Stability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 6:	Testing Conditions	Medium	Not reported in this secondary source; the primary source likely contains more detail.
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Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6300802			
Domain	Metric	EVALUATION Rating	Comments	
	Metric 7:	Testing Consistency	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 10:	Sampling Methods	N/A	Rating of this factor is not applicable to this kind of information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 12:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results are reasonable based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.

Overall Quality Determination

Medium

* Related References: Great Lakes Chem Corp; Determination of the Biodegradability of Tetrabromobisphenol A in Soil Under Anaerobic Conditions; 2/6/89; EPA Document No. 40-8998097; Fiche No. OTS0525513

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6300802			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Guideline not specified			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Oxygen, pH, and CEC	anaerobic; Not reported; Not reported			
Test Type, Test Temperature, and Test Details	laboratory; Not reported; Not reported			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; Not reported; Not reported			
Soil Classification, Microbial Biomass, and Humidity	Chinese rice paddy soil; Not reported: Not reported			
Duration, Parameter, System, and Sampling Frequency	195 d; not specified; Not reported; Not reported			
Control and Blank	Not reported; Not reported			
Concentration	Not reported			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Radiochem. meas.; Not reported; Not reported			
Results Remarks	Metabolites detected: bisphenol A, mono-, di- and tribrominated BPA.			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Referencs Substance Compartment Results	Not reported; Not reported; Not reported; Not reported; Not reported			
Results Details	Half-life: 36 d			
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 4:	Test Substance Stability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 6:	Testing Conditions	Medium	Not reported in this secondary source; the primary source likely contains more detail.
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Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6300802			
Domain	Metric	EVALUATION		Comments
	Metric 7:	Testing Consistency	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 10:	Sampling Methods	N/A	Rating of this factor is not applicable to this kind of information.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 12:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium	Limited detail reported in this secondary source; the primary source likely contains more detail.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The results are reasonable based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.
Overall Quality Determination			Medium	

* Related References: Liu J et al; Environ Sci Technol 47: 8348-8354 (2013)

Study Citation:	Nyholm, J. R., Lundberg, C., Andersson, P. L. (2010). Biodegradation kinetics of selected brominated flame retardants in aerobic and anaerobic soil. Environmental Pollution 158(6):2235-2240.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	832717

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Aerobic biodegradation in soil-sludge mixtures
Solvent, Reactivity, Storage, Stability	Acetone, allowed to evaporate after addition to sludge; NR; NR; NR
Radiolabel, Source, State, Purity	NA; Promochem Wesel; NR; Technical grade
Oxygen, pH, and CEC	aerobic; Not reported; Not reported
Test Type, Test Temperature, and Test Details	laboratory; 20°C; 50 g dw soil and 0.5% activated sludge (group 1), 50 g dw soil and 0.5% digested sludge (dw/dw)(group 2)
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	clay; Not reported; Not reported
Soil Classification, Microbial Biomass, and Humidity	Heavy clay agricultural Nordic reference soil (Lanna, Sweden); Not reported: approx. 25% (w/w)
Duration, Parameter, System, and Sampling Frequency	120 d; test mat.; Amber glass bottles containing the test soil-sludge mixtures, capped but not sealed.; 0, 7, 14, 30, 60, 90, and 120 d (group 1); 0, 4, 7, 14, 30, 60, 90, and 120 d (group 2)
Control and Blank	Not Reported; Autoclaved soil
Concentration	40 - 70 ng/g dw
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Gas chromatograph-mass spectrometer; Run in electron capture negative ionization mode, in helium at flow rate of 1.5 mL/min.; Test material
Results Remarks	Results reported for aerobic soil (group not specified). The compound did not fulfill REACH or UNEP P criteria.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	70%; Not reported; 120 d; Sterilized autoclave sample; No or little degradation observed
Results Details	Soil and 0.5% activated sludge half-life: 65 (58 - 75) dSoil and 0.5% digested sludge half-life: 93 (78-110) dKinetic details reported in supplementary data
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The test substance source and qualitative information on purity was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	A sterilized sediment negative control was included and tested valid.
	Metric 4:	Test Substance Stability	High	The test substance preparation was reported and appropriate for the study.

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Study Citation:	Nyholm, J. R., Lundberg, C., Andersson, P. L. (2010). Biodegradation kinetics of selected brominated flame retardants in aerobic and anaerobic soil. Environmental Pollution 158(6):2235-2240.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	832717			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Testing conditions were reportedly monitored (pH) but soil characteristics were not reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups and replicates.
	Metric 8:	System Type and Design	Medium	There were some omissions in system type and design; however, the omissions were not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test inoculum source was reported and is routinely used for similar study types.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods and frequency were appropriate to address the outcomes of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty were accounted for and not likely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Target chemical concentrations were reported, the analytical method used was suitable for detection and quantification of the target chemical, and sufficient evidence was provided to confirm disappearance was not due to some other process.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Kinetic calculations were reported in supplemental material and could not be assessed.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Nyholm, J. R., Lundberg, C., Andersson, P. L. (2010). Biodegradation kinetics of selected brominated flame retardants in aerobic and anaerobic soil. Environmental Pollution 158(6):2235-2240.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	832717

Parameter		EXTRACTION		
CASRN and Test Material		79-94-7; TBBPA		
Confidentiality, EndPoint, Type, Guideline		None; inherent biodegradability; Experimental; other: Anaerobic biodegradation in soil-sludge mixtures		
Solvent, Reactivity, Storage, Stability		Acetone, allowed to evaporate after addition to sludge; NR; NR; NR		
Radiolabel, Source, State, Purity		NA; Promochem Wesel; NR; Technical grade		
Oxygen, pH, and CEC		anaerobic; Not reported; Not reported		
Test Type, Test Temperature, and Test Details		laboratory; 20°C; 50 g dw soil and 0.5% activated sludge		
Soil Type, Clay Silts and Organic Carbon, and Bulk Density		clay; Not reported; Not reported		
Soil Classification, Microbial Biomass, and Humidity		Heavy clay agricultural Nordic reference soil (Lanna, Sweden); Not reported: approx. 25% (w/w)		
Duration, Parameter, System, and Sampling Frequency		160 d; test mat.; Amber glass bottles containing the test soil-sludge mixtures, capped but not sealed.; 0, 7, 10, 30, 70, 120, and 160 d		
Control and Blank		Not Reported; Autoclaved soil		
Concentration		40 - 70 ng/g dw		
Analytical Method, Analytical Details, and Results Per Degredation Parameter		Gas chromatograph-mass spectrometer; Run in electron capture negative ionization mode, in helium at flow rate of 1.5 mL/min.; Test material		
Results Remarks		Results reported for anaerobic soil (group not specified). The compound fulfilled REACH vP criteria		
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results		15%; Not reported; 160 d; Sterilized autoclave sample; No or little degradation observed		
Results Details		Half-life: 430 (340 - 600) dKinetic details reported in supplementary data		
Mean Total Recovery Results and Results Per Recovery		Internal standards, 13C-labelled; 80±35%		
Domain		EVALUATION		
		Metric	Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The test substance source and qualitative information on purity was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	A sterilized sediment negative control was included and tested valid.
	Metric 4:	Test Substance Stability	High	The test substance preparation was reported and appropriate for the study.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
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Study Citation:	Nyholm, J. R., Lundberg, C., Andersson, P. L. (2010). Biodegradation kinetics of selected brominated flame retardants in aerobic and anaerobic soil. Environmental Pollution 158(6):2235-2240.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	832717			
Domain		Metric	EVALUATION Rating	Comments
	Metric 6:	Testing Conditions	Medium	Testing conditions were reportedly monitored (pH) but soil characteristics were not reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups and replicates.
	Metric 8:	System Type and Design	Medium	There were some omissions in system type and design; however, the omissions were not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test inoculum source was reported and is routinely used for similar study types.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods and frequency were appropriate to address the outcomes of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty were accounted for and not likely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Target chemical concentrations were reported, the analytical method used was suitable for detection and quantification of the target chemical, and sufficient evidence was provided to confirm disappearance was not due to some other process.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Kinetic calculations were reported in supplemental material and could not be assessed.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Springborn Laboratories, (1989). Determination of the biodegradability of tetrabromobisphenol a in soil under anaerobic conditions (final report) with attachments and cover letter dated 013189.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5547109

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: "Protocol for Determining the Inherent Biodegradability in Soil under Anaerobic Conditions"
Solvent, Reactivity, Storage, Stability	Acetone; NR; stored at -10°C (radiolabeled); room temperature in the dark (unlabeled); NR
Radiolabel, Source, State, Purity	14C-TBBPA, specific activity 12.9 mCi/mol, radioactivity in acetone 1.045 µCi/100 µL; Chemsyn Science Laboratories, Lenexa, Kansas (radiolabeled), Great Lakes Chemical Corporation (unlabeled); NR; 99.06% (unlabeled) Notes: Mixture of labelled and unlabeled compound (unlabeled stock 0.5 mg/100 µL
Oxygen, pH, and CEC	anaerobic; 7.6 (soil); 19.6
Test Type, Test Temperature, and Test Details	laboratory; 21.4±1.1°C; 50 g dry soil, amended with 100 uL test solution and filled with tap water to depth of 2-3 cm over the soil; Flasks purged daily with nitrogen to maintain anaerobic conditions
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	clay loam; 43% sand, 24% silt, 33% clay, 1.8% organic carbon; Not reported
Soil Classification, Microbial Biomass, and Humidity	California Clay Loam; Not reported: Field moisture capacity=75.9%
Duration, Parameter, System, and Sampling Frequency	64 d; test mat.; 250 mL Erlenmeyer flask attached to series of backflow, methane, and CO2 traps, flushed with nitrogen daily, for 5 min; 1, 2, 4, 8, 11, 16, 32, and 64 d
Control and Blank	Not reported; Not reported
Concentration	10 mg/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Liquid scintillation counting; Packard Model 306 Tri-carb Oxidizer (soil); Analysis of traps by LCS; water analyzed by LCS at test termination, extracted 3x with DCM; soil combusted at test termination, 14CO2 trapped in carbosorb-scintillation cocktail mixture; % radioactivity recovered in volatile traps
Results Remarks	Incomplete conversion to CO2 and other volatile products observed.Recovered in water: 2.1±0.8%Recovered in soil: 89.5 - 90.6%2 unknown biodegradation products were detected in soil
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	0.10%; 0.003%; 64 d; Not reported; Not reported
Results Details	Not reported
Mean Total Recovery Results and Results Per Recovery	Not reported; 85±1.8%

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	High	The test substance was identified by name.
	Metric 2:	High	The test substance source and purity was reported.
Domain 2: Test Design			

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Study Citation:	Springborn Laboratories, (1989). Determination of the biodegradability of tetrabromobisphenol a in soil under anaerobic conditions (final report) with attachments and cover letter dated 013189.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5547109			
Domain		EVALUATION		Comments
Metric		Rating		
	Metric 3:	Study Controls	Medium	Controls were not explicitly included.
	Metric 4:	Test Substance Stability	High	Test substance preparation and storage was reported and appropriate.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Appropriate test conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is used for similar study types.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining inherent biodegradation.
	Metric 12:	Test Substance Purity	High	Sampling methods were reported and appropriate, sampling frequency was appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Degradation kinetics not reported, percent degradation not reported clearly, only percent radioactivity recovered.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate. Limited raw data was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical and kinetic calculations were not applied.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method but were not compared to previous studies, and full degradation kinetics were not reported.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination			High	

Study Citation:	Springborn Laboratories, (1989). Determination of the biodegradability of tetrabromobisphenol a in soil under anaerobic conditions (final report) with attachments and cover letter dated 013189.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5547109			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: "Protocol for Determining the Inherent Biodegradability in Soil under Anaerobic Conditions"			
Solvent, Reactivity, Storage, Stability	Acetone; NR; stored at -10°C (radiolabeled); room temperature in the dark (unlabeled); NR			
Radiolabel, Source, State, Purity	14C-TBBPA, specific activity 12.9 mCi/mol, radioactivity in acetone 1.045 µCi/100 µL; Chemsyn Science Laboratories, Lenexa, Kansas (radiolabeled), Great Lakes Chemical Corporation (unlabeled); NR; 99.06% (unlabeled) Notes: Mixture of labelled and unlabeled compound (unlabeled stock 0.5 mg/100 µL			
Oxygen, pH, and CEC	anaerobic; 7.0 (soil); 10.8			
Test Type, Test Temperature, and Test Details	laboratory; 21.4±1.1°C; 50 g dry soil, amended with 100 uL test solution and filled with tap water to depth of 2-3 cm over the soil; Flasks purged daily with nitrogen to maintain anerobic conditions			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	sandy loam; 83% sand, 13% silt, 4% clay, 4.4% organic carbon; Not reported			
Soil Classification, Microbial Biomass, and Humidity	Massachusetts Sandy Loam; Not reported: Field moisture capacity=74.8%			
Duration, Parameter, System, and Sampling Frequency	64 d; test mat.; 250 mL Erlenmeyer flask attached to series of backflow, methane, and CO2 traps, flushed with nitrogen daily, for 5 min; 1, 2, 4, 8, 11, 16, 32, and 64 d			
Control and Blank	Not reported; Not reported			
Concentration	10 mg/kg			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Liquid scintillation counting; Packard Model 306 Tri-carb Oxidizer (soil); Analysis of traps by LCS; water analyzed by LCS at test termination, extracted 3x with DCM; soil combusted at test termination, 14CO2 trapped in carbosorb-scintillation cocktail mixture; % radioactivity recovered in volatile traps			
Results Remarks	Incomplete conversion to CO2 and other volatile products observed.Recovered in water: 0.50±0.10%Recovered in soil: 43.7 - 57.0%3 unknown biodegradation products detected in soil			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Referencs Substance Compartment Results	0.03%; 0.01%; 64 d; Not reported; Not reported			
Results Details	Not reported			
Mean Total Recovery Results and Results Per Recovery	Not reported; 101.0±13.3%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Controls were not explicitly included.
	Metric 4:	Test Substance Stability	High	Test substance preparation and storage was reported and appropriate.
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Study Citation:	Springborn Laboratories, (1989). Determination of the biodegradability of tetrabromobisphenol a in soil under anaerobic conditions (final report) with attachments and cover letter dated 013189.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5547109			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Appropriate test conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is used for similar study types.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining inherent biodegradation.
	Metric 12:	Test Substance Purity	High	Sampling methods were reported and appropriate, sampling frequency was appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Degradation kinetics not reported, percent degradation not reported clearly, only percent radioactivity recovered.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate. Limited raw data was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical and kinetic calculations were not applied.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method but were not compared to previous studies, and full degradation kinetics were not reported.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination		High		

Study Citation:	Springborn Laboratories, (1989). Determination of the biodegradability of tetrabromobisphenol a in soil under anaerobic conditions (final report) with attachments and cover letter dated 013189.		
OECD Harmonized Template:	Biodegradation in Soil		
HERO ID:	5547109		
EXTRACTION			
Parameter	Data		
CASRN and Test Material	79-94-7; TBBPA		
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: "Protocol for Determining the Inherent Biodegradability in Soil under Anaerobic Conditions"		
Solvent, Reactivity, Storage, Stability	Acetone; NR; stored at -10°C (radiolabeled); room temperature in the dark (unlabeled); NR		
Radiolabel, Source, State, Purity	14C-TBBPA, specific activity 12.9 mCi/mol, radioactivity in acetone 1.045 µCi/100 µL; Chemsyn Science Laboratories, Lenexa, Kansas (radiolabeled), Great Lakes Chemical Corporation (unlabeled); NR; 99.06% (unlabeled) Notes: Mixture of labelled and unlabeled compound (unlabeled stock 0.5 mg/100 µL		
Oxygen, pH, and CEC	anaerobic; 6.2 (soil); 6.0		
Test Type, Test Temperature, and Test Details	laboratory; 21.4±1.1°C; 50 g dry soil, amended with 100 uL test solution and filled with tap water to depth of 2-3 cm over the soil; Flasks purged daily with nitrogen to maintain anerobic conditions		
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	silt loam; 16% sand, 58% silt,26% clay, 0.8% organic carbon; Not reported		
Soil Classification, Microbial Biomass, and Humidity	Arkansas Silty Loam; Not reported: Field moisture capacity=43.9%		
Duration, Parameter, System, and Sampling Frequency	64 d; test mat.; 250 mL Erlenmeyer flask attached to series of backflow, methane, and CO2 traps, flushed with nitrogen daily, for 5 min; 1, 2, 4, 8, 11, 16, 32, and 64 d		
Control and Blank	Not reported; Not reported		
Concentration	10 mg/kg		
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Liquid scintillation counting; Packard Model 306 Tri-carb Oxidizer (soil); Analysis of traps by LCS; water analyzed by LCS at test termination, extracted 3x with DCM; soil combusted at test termination, 14CO2 trapped in carbosorb-scintillation cocktail mixture; % radioactivity recovered in volatile traps		
Results Remarks	Incomplete conversion to CO2 and other volatile products observed.Recovered in water: 2.50±0.6%Recovered in soil: 53.4 - 65.0%2 unknown biodegradation products were detected in soil		
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Referencs Substance Compartment Results	0.35%; 0.07%; 64 d; Not reported; Not reported		
Results Details	Not reported		
Mean Total Recovery Results and Results Per Recovery	Not reported; 85.8±3.0%		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified by name.
Metric 2:	Test Substance Purity	High	The test substance source and purity was reported.
Domain 2: Test Design			
Metric 3:	Study Controls	Medium	Controls were not explicitly included.
Metric 4:	Test Substance Stability	High	Test substance preparation and storage was reported and appropriate.
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Study Citation:	Springborn Laboratories, (1989). Determination of the biodegradability of tetrabromobisphenol a in soil under anaerobic conditions (final report) with attachments and cover letter dated 013189.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5547109			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Appropriate test conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is used for similar study types.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining inherent biodegradation.
	Metric 12:	Test Substance Purity	High	Sampling methods were reported and appropriate, sampling frequency was appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Degradation kinetics not reported, percent degradation not reported clearly, only percent radioactivity recovered.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate. Limited raw data was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical and kinetic calculations were not applied.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method but were not compared to previous studies, and full degradation kinetics were not reported.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination		High		

Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under aerobic conditions.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	1443918

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Springborn Life Sciences Inc. Protocol for Determining the Inherent Biodegradability in Soil under aerobic Conditions
Solvent, Reactivity, Storage, Stability	Acetone; NR; -10°C (radiolabeled); room temperature in the dark (non-radiolabeled); NR
Radiolabel, Source, State, Purity	14C-TBBPA, specific activity 12.9 mCi/mmol; Chemsyn Science Laboratories, Lenexa, Kansas (radiolabeled); Great Lakes Chemical Corporation (non-radiolabeled); NR; 99.06% (non-radiolabeled) Notes: Mix of radiolabeled and non-radiolabeled
Oxygen, pH, and CEC	aerobic; 7.0; 10.8
Test Type, Test Temperature, and Test Details	laboratory; 21.5±1.0°C; 50 g dry wt. soil, 10.0 mL 1.0 N KOH used in tide tube as trap.
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	sandy loam; 4.4% organic carbon, 83% sand, 13% silt, 4% clay; Not reported
Soil Classification, Microbial Biomass, and Humidity	Not reported; Massachusetts Sandy Loam: Field moisture capacity: 74.8%
Duration, Parameter, System, and Sampling Frequency	64 d; test mat.; 250 mL glass Erlenmeyer flask with a fused 50 mL round bottom glass tube; flask closed with rubber stopper with an ascarite filter; the side tube was closed with a stopper pierced by a needle for sampling purposes. Foam plug used for volatile trap.; 1, 2, 4, 8, 16, 32, and 64 d
Control and Blank	Not reported; Not reported
Concentration	100 µL
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Liquid scintillation counting; KOH samples analyzed by LSC; Soxhlet extraction used for metabolite determination; soil combusted at test termination and trapped 14CO ₂ analyzed by LSC; 14CO ₂ evolution
Results Remarks	Temperature deviated from protocol 22±2°C. 14CO ₂ and 14C-volatile products were not reported.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	2.4; 1.0; 64 d; Not reported; Not reported
Results Details	74.3 - 81.9% TBBPA remained in soil at test termination. No lag period observed. Approx. 0%/1d, 0.1%/2d, 0.3%/4d, 0.5-0.7%/8d, 1.0-1.7%/16d, 1.3-2.5%/32d, 1.4-3.6%/64d
Mean Total Recovery Results and Results Per Recovery	Not reported; Average total recovery of radioactivity 78.5± 12.3%

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified by name.
Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design			
Metric 3:	Study Controls	Medium	Controls were not explicitly included.
Metric 4:	Test Substance Stability	High	Test substance preparation and storage were reported.

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Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under aerobic conditions.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	1443918			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was appropriate for the test substance.
	Metric 6:	Testing Conditions	High	Appropriate test conditions (soil characteristics, temperature, duration) were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups.
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is commonly used for similar study types.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining biodegradation.
	Metric 12:	Test Substance Purity	High	Sampling methods focused on the correct media and sampling frequency was acceptable.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	It's unclear if results were blank-corrected. Other deviations in test protocol did not impact study result interpretation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	¹⁴ CO ₂ evolution was reported graphically for all days except test termination and values were approximated by the reviewer. The analytical methods were appropriate and mass balance was acceptable.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical and kinetic calculations were not performed.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method but were not compared to other studies.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination			High	

* Related References: Same as HERO ID 6391021

Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under aerobic conditions.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	1443918

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Springborn Life Sciences Inc. Protocol for Determining the Inherent Biodegradability in Soil under aerobic Conditions
Solvent, Reactivity, Storage, Stability	Acetone; NR; -10°C (radiolabeled); room temperature in the dark (non-radiolabeled); NR
Radiolabel, Source, State, Purity	14C-TBBPA, specific activity 12.9 mCi/mmol; Chemsyn Science Laboratories, Lenexa, Kansas (radiolabeled); Great Lakes Chemical Corporation (non-radiolabeled); NR; 99.06% (non-radiolabeled) Notes: Mix of radiolabeled and non-radiolabeled
Oxygen, pH, and CEC	aerobic; 7.6; 19.6
Test Type, Test Temperature, and Test Details	laboratory; 21.5±1.0°C; 50 g dry wt. soil, 10.0 mL 1.0 N KOH used in tide tube as trap.
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	clay loam; 1.8% organic carbon, 43% sand, 24% silt, 33% clay; Not reported
Soil Classification, Microbial Biomass, and Humidity	Not reported; Clay loam from Fresno County, California: Field moisture capacity: 75.9%
Duration, Parameter, System, and Sampling Frequency	64 d; test mat.; 250 mL glass Erlenmeyer flask with a fused 50 mL round bottom glass tube; flask closed with rubber stopper with an ascarite filter; the side tube was closed with a stopper pierced by a needle for sampling purposes. Foam plug used for volatile trap.; 1, 2, 4, 8, 16, 32, and 64 d
Control and Blank	Not reported; Not reported
Concentration	100 µL
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Liquid scintillation counting; KOH samples analyzed by LSC; Soxhlet extraction used for metabolite determination; soil combusted at test termination and trapped 14CO ₂ analyzed by LSC; 14CO ₂ evolution
Results Remarks	Temperature deviated from protocol 22±2°C. 14CO ₂ and 14C-volatile products were not reported.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	5.5; 0.3; 64 d; Not reported; Not reported
Results Details	41.1 - 43.2% of TBBPA remained in soil at test termination. No lag period observed. Approx. 0%/1d, 0.3%/2d, 0.7%/4d, 1.1-1.5%/8d, 2.0-2.6%/16d, 3.5-4.0%/32d, 5.0-5.8%/64d
Mean Total Recovery Results and Results Per Recovery	Not reported; Average total recovery radioactivity 81.2± 13.3%

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Controls were not explicitly included.
	Metric 4: Test Substance Stability	High	Test substance preparation and storage were reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was appropriate for the test substance.

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Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under aerobic conditions.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	1443918			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	High	Appropriate test conditions (soil characteristics, temperature, duration) were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups.
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is commonly used for similar study types.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining biodegradation.
	Metric 12:	Test Substance Purity	High	Sampling methods focused on the correct media and sampling frequency was acceptable.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	It's unclear if results were blank-corrected. Other deviations in test protocol did not impact study result interpretation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	¹⁴ CO ₂ evolution was reported graphically for all days except test termination and values were approximated by the reviewer. The analytical methods were appropriate and mass balance was acceptable.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical and kinetic calculations were not performed.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method but were not compared to other studies.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination		High		

* Related References: Same as HERO ID 6391021

Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under aerobic conditions.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	1443918			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Springborn Life Sciences Inc. Protocol for Determining the Inherent Biodegradability in Soil under aerobic Conditions			
Solvent, Reactivity, Storage, Stability	Acetone; NR; -10°C (radiolabeled); room temperature in the dark (non-radiolabeled); NR			
Radiolabel, Source, State, Purity	14C-TBBPA, specific activity 12.9 mCi/mmol; Chemsyn Science Laboratories, Lenexa, Kansas (radiolabeled); Great Lakes Chemical Corporation (non-radiolabeled); NR; 99.06% (non-radiolabeled) Notes: Mix of radiolabeled and non-radiolabeled			
Oxygen, pH, and CEC	aerobic; 6.2; 6.0			
Test Type, Test Temperature, and Test Details	laboratory; 21.5±1.0°C; 50 g dry wt. soil, 10.0 mL 1.0 N KOH used in tide tube as trap.			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	silt loam; 0.8% organic carbon, 16% sand, 58% silt, 26% clay; Not reported			
Soil Classification, Microbial Biomass, and Humidity	Not reported; Silty loam collected from Phillips County, Arkansas: Field moisture capacity: 43.9%			
Duration, Parameter, System, and Sampling Frequency	64 d; test mat.; 250 mL glass Erlenmeyer flask with a fused 50 mL round bottom glass tube; flask closed with rubber stopper with an ascarite filter; the side tube was closed with a stopper pierced by a needle for sampling purposes. Foam plug used for volatile trap.; 1, 2, 4, 8, 16, 32, and 64 d			
Control and Blank	Not reported; Not reported			
Concentration	100 µL			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Liquid scintillation counting; KOH samples analyzed by LSC; Soxhlet extraction used for metabolite determination; soil combusted at test termination and trapped 14CO2 analyzed by LSC; 14CO2 evolution			
Results Remarks	Temperature deviated from protocol 22±2°C. 14CO2 and 14C-volatile products were not reported.			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	4.4; 0.6; 64 d; Not reported; Not reported			
Results Details	35.9 - 40.1% of TBBPA remained in soil at test termination. No lag period observed. Approx. 0%/1d, 0.3%/2d, 0.6%/4d, 0.7-1.3%/8d, 1.3-1.8%/16d, 1.7-3.0%/32d, 3.3-4.8%/64d			
Mean Total Recovery Results and Results Per Recovery	Not reported; Average total recovery of radioactivity 59.5± 5.5%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Controls were not explicitly included.
	Metric 4:	Test Substance Stability	High	Test substance preparation and storage were reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was appropriate for the test substance.
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Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under aerobic conditions.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	1443918			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	High	Appropriate test conditions (soil characteristics, temperature, duration) were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups.
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is commonly used for similar study types.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining biodegradation.
	Metric 12:	Test Substance Purity	High	Sampling methods focused on the correct media and sampling frequency was acceptable.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	It's unclear if results were blank-corrected. Other deviations in test protocol did not impact study result interpretation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	¹⁴ CO ₂ evolution was reported graphically for all days except test termination and values were approximated by the reviewer. The analytical methods were appropriate and mass balance was acceptable.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical and kinetic calculations were not performed.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method but were not compared to other studies.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination		High		

* Related References: Same as HERO ID 6391021

Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under anaerobic conditions.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	6391021

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Biodegradation in soil
Solvent, Reactivity, Storage, Stability	Radiolabeled stock solution in acetone: 1.045 $\mu\text{Ci}/100\text{ }\mu\text{L}$; NR; Room temperature in the dark; Radiolabeled material stored at -10°C ; NR
Radiolabel, Source, State, Purity	14C-TBBPA; specific activity 12.9 mCi/mmol; Great Lakes Chemical Corporation; Radiolabeled: Chemsyn Science Laboratories, Lenexa, Kansas; NR; 99.06%
Oxygen, pH, and CEC	anaerobic; 6.2; 6.0 meq/100 g
Test Type, Test Temperature, and Test Details	laboratory; Range: $19\text{-}25^{\circ}\text{C}$, mean: $21.4\pm 1.1^{\circ}\text{C}$; 10 mg TBBPA/kg soil
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	silty clay loam; 4.4% OC, 16% sand, 58% silty, 26% clay; Not reported
Soil Classification, Microbial Biomass, and Humidity	Arkansas Silty Loam (ARSTLM); Not reported; Field moisture capacity: 43.9%
Duration, Parameter, System, and Sampling Frequency	64 days; radiochem. meas.; 250 mL Erlenmeyer flasks; backflow, methane and CO ₂ traps; 1, 2, 4, 8, 11, 16, 32, 64 days
Control and Blank	Not reported; Not reported
Concentration	0.5 mg/ μL
Analytical Method, Analytical Details, and Results Per Degredation Parameter	LSC and TLC; Soxhlet extraction; mass balance by cumulative DPM; % remaining in soil
Results Remarks	2 unidentified degradation products were observed
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	53.4-65.0%; Not reported; 64 days; Not reported; Not reported
Results Details	Not reported
Mean Total Recovery Results and Results Per Recovery	48.3% (mean); Mean recovery: $85.8\pm 3.0\%$; in soil: 78.9-86.8%, in water: 1.8-3.2%, in volatile traps: 0.26-0.43%; mass balance: 82-90% ($85.8\pm 3.3\%$)

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design	Metric 3:	Study Controls	Low	The study did not include control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under anaerobic conditions.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6391021			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	High	Test conditions were appropriate.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	Microbial viability was not evaluated.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	None identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Target chemical concentrations, extraction efficiency, percent recovery, and mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.

Overall Quality Determination**High**

* Related References: Same as HERO ID 5547109

Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under anaerobic conditions.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6391021			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; Tetrabromobisphenol A			
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Biodegradation in soil			
Solvent, Reactivity, Storage, Stability	Radiolabeled stock solution in acetone: 1.045 µCi/100 µL; NR; Room temperature in the dark; Radiolabeled material stored at -10°C; NR			
Radiolabel, Source, State, Purity	14C-TBBPA; specific activity 12.9 mCi/mmol; Great Lakes Chemical Corporation; Radiolabeled: Chemsyn Science Laboratories, Lenexa, Kansas; NR; 99.06%			
Oxygen, pH, and CEC	anaerobic; 7.0; 10.8 meq/100 g			
Test Type, Test Temperature, and Test Details	laboratory; Range: 19-25°C, mean: 21.4±1.1°C; 10 mg TBBPA/kg soil			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	sandy loam; 4.4% OC, 83% sand, 13% silty, 4% clay; Not reported			
Soil Classification, Microbial Biomass, and Humidity	Massachusetts Sandy Loam (MASDLM); Not reported: Field moisture capacity: 74.8%			
Duration, Parameter, System, and Sampling Frequency	64 days; radiochem. meas.; 250 mL Erlenmeyer flasks; backflow, methane and CO2 traps; 1, 2, 4, 8, 11, 16, 32, 64 days			
Control and Blank	Not reported; Not reported			
Concentration	0.5 mg/µL			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	LSC and TLC; Soxhlet extraction; mass balance by cumulative DPM; % remaining in soil			
Results Remarks	3 unidentified degradation products were observed			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Referencs Substance Compartment Results	43.7-57.0%; Not reported; 64 days; Not reported; Not reported			
Results Details	Not reported			
Mean Total Recovery Results and Results Per Recovery	87.5% (mean); Mean recovery: 101.0±13.3%; in soil: 84.0-116.4%, in water: 0.4-0.6%, in volatile traps: 0.02-0.04%; mass balance: 85-117% (101±13%)			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Low	The study did not include control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
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Study Citation:		Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under anaerobic conditions.		
OECD Harmonized Template:		Biodegradation in Soil		
HERO ID:		6391021		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	High	Test conditions were appropriate.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	Microbial viability was not evaluated.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	None identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Target chemical concentrations, extraction efficiency, percent recovery, and mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		High		

* Related References: Same as HERO ID 5547109

Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under anaerobic conditions.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6391021			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; Tetrabromobisphenol A			
Confidentiality, EndPoint, Type, Guideline	None; inherent biodegradability; Experimental; other: Biodegradation in soil			
Solvent, Reactivity, Storage, Stability	Radiolabeled stock solution in acetone: 1.045 µCi/100 µL; NR; Room temperature in the dark; Radiolabeled material stored at -10°C; NR			
Radiolabel, Source, State, Purity	14C-TBBPA; specific activity 12.9 mCi/mmol; Great Lakes Chemical Corporation; Radiolabeled: Chemsyn Science Laboratories, Lenexa, Kansas; NR; 99.06%			
Oxygen, pH, and CEC	anaerobic; 7.6; 19.6 meq/100 g			
Test Type, Test Temperature, and Test Details	laboratory; Range: 19-25°C, mean: 21.4±1.1°C; 10 mg TBBPA/kg soil			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	clay loam; 1.8% OC, 43% sand, 24% silty, 33% clay; Not reported			
Soil Classification, Microbial Biomass, and Humidity	California Clay Loam (CACY); Not reported: Field moisture capacity: 75.9%			
Duration, Parameter, System, and Sampling Frequency	64 days; radiochem. meas.; 250 mL Erlenmeyer flasks; backflow, methane and CO2 traps; 1, 2, 4, 8, 11, 16, 32, 64 days			
Control and Blank	Not reported; Not reported			
Concentration	0.5 mg/µL			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	LSC and TLC; Soxhlet extraction; mass balance by cumulative DPM; % remaining in soil			
Results Remarks	3 unidentified degradation products were observed			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Referencs Substance Compartment Results	89.5-90.6%; Not reported; 64 days; Not reported; Not reported			
Results Details	Not reported			
Mean Total Recovery Results and Results Per Recovery	104.7% (mean); Mean recovery: 85.1±11.8%; in soil: 81.2-85.8%, in water: 1.4-3.2%, in volatile traps: 0.05-0.13%; mass balance: 83-87% (85±1.8%)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Low	The study did not include control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
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Study Citation:	Springborn Life Sciences, (1989). Determination of the biodegradability of tetrabromobisphenol A in soil under anaerobic conditions.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	6391021			
		EVALUATION		
Domain		Metric	Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	High	Test conditions were appropriate.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	Microbial viability was not evaluated.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	None identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Target chemical concentrations, extraction efficiency, percent recovery, and mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination			High	

* Related References: Same as HERO ID 5547109

Study Citation:	Sun, F., Kolvenbach, B. A., Nastold, P., Jiang, B., Ji, R., Corvini, P. F. (2014). Degradation and metabolism of tetrabromobisphenol A (TBBPA) in submerged soil and soil-plant systems. Environmental Science & Technology 48(24):14291-9. [Environmental science & technology].
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5552044

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Dissipation in soil
Solvent, Reactivity, Storage, Stability	methanol; NR; NR; NR
Radiolabel, Source, State, Purity	Uniformly 14C-ring-labeled TBBPA (14C-TBBPA); specific activity: 1.48E9 Bq/mmol; Sigma-Aldrich (Switzerland); NR; Radiochemical purity = 99% Notes: TBBPA
Oxygen, pH, and CEC	aerobic/anaerobic; Soil: 8.3; 46.2 cmol(+)/kg
Test Type, Test Temperature, and Test Details	laboratory; 34C/26C; Flow-through system mimicking field condition: 16h light at 34C, 8hr dark at 26C; 20 g soil placed in flasks with 1 cm of water maintained above soil during incubation allowing formation of an oxic-anoxic interface; TBBPA=5 mg/kg (3 MBq/kg) dry soil
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	silty clay loam; 6.7% organic matter; Not reported
Soil Classification, Microbial Biomass, and Humidity	collected from a paddy rice field in Jiangning, Nanjing, China; Not reported: Not reported
Duration, Parameter, System, and Sampling Frequency	66 days; radiochem. meas.; Flow-through incubation system with flasks placed in beakers connected successively to bottles containing ethylene glycol (200 mL, to trap radioactive volatile organic compounds) and NaOH (2 M, 200 mL, to trap 14CO2) and to a vacuum pump; days 0, 10, 22, 35, 48, and 66
Control and Blank	Not reported; Not reported
Concentration	5 mg/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	liquid scintillation counting and HPLC-UV at 254 nm; purified metabolites: GC/MS; detection limits not reported; flow rate for radio detector: 2 mL/min; mineralization of initial TBBPA
Results Remarks	TBBPA dissipation after 66 days incubation in soil was greater than 90% which resulted in a calculated half-life=20.8 days; 11.5% was mineralized while 60.8% TBBPA was detected as bound residues; organic-solvent-extractable radioactivity insoil decreased to 20.2±3.3%. Stable O-methylated metabolites accumulated in soil.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Referencs Substance Compartment Results	11.5%; ±0.4; 66 days; Not reported; Not reported
Results Details	first-order kinetics
Mean Total Recovery Results and Results Per Recovery	96.2±0.4% from soil samples; recovery from soil fractions ranged between 93-103%

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High The test substance source and purity were reported.
Domain 2: Test Design			

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Study Citation:	Sun, F., Kolvenbach, B. A., Nastold, P., Jiang, B., Ji, R., Corvini, P. F. (2014). Degradation and metabolism of tetrabromobisphenol A (TBBPA) in submerged soil and soil-plant systems. Environmental Science & Technology 48(24):14291-9. [Environmental science & technology].			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5552044			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 3:	Study Controls	Medium	Controls were not included; however, this was not likely to substantially hinder the interpretation of the results.
	Metric 4:	Test Substance Stability	High	Details regarding this metric were appropriate.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some testing conditions were not provided; however, the omissions were not likely to have had a substantial impact on the study results.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to this study type.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Soil was stored in the dark for 1 week to activate resident soil microorganisms; microbial biomass validation not reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment was appropriate for this study.
	Metric 12:	Test Substance Purity	Medium	The sampling methods were reported with minimal detail.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	No confounding variables were evaluated.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical details were limited.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination

High

* Related References: Cited in ECHA

Study Citation:	U.S. EPA, (2015). Flame retardants in printed circuit boards. Final report.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	7500050

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; other
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported
Oxygen, pH, and CEC	Not Reported; Not Reported; Not Reported
Test Type, Test Temperature, and Test Details	laboratory; Not Reported; Not Reported
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	Not Reported; Not Reported; Not Reported
Soil Classification, Microbial Biomass, and Humidity	Not Reported; Not Reported: Not Reported
Duration, Parameter, System, and Sampling Frequency	6 months; Not Reported; Not Reported; Not Reported
Control and Blank	Not Reported; Not Reported
Concentration	Not Reported
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Not Reported; Not Reported; Not Reported
Results Remarks	The disappearance appears to be predominantly due to binding to soil and not due to biodegradation. Insufficient material was extracted to identify the transformation products. After 6 months, 17.5-21.6% of the dose was mineralized in the aerobic soils.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	17.5%; Not Reported; 6 months; Not Reported; Not Reported
Results Details	DT50 of 5.3-7.7 days
Mean Total Recovery Results and Results Per Recovery	Not Reported; Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions				

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Study Citation:	U.S. EPA, (2015). Flame retardants in printed circuit boards. Final report.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	7500050			
Domain		Metric	EVALUATION Rating	Comments
	Metric 5:	Test Method Suitability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 6:	Testing Conditions	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 10:	Sampling Methods	N/A	Not applicable to this study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.

Overall Quality Determination

Medium

* Related References: Source (not in HERO at time of extraction): Schaefer E and Stenzel J (2006c) Tetrabromobisphenol A: Aerobic and anaerobic transformation in soil. Easton, MD: Wildlife International, Ltd. Also entered under HERO ID 5238261.

Study Citation:	U.S. EPA, (2015). Flame retardants in printed circuit boards. Final report.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	7500050			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	none; other; experimental; other			
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported			
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported			
Oxygen, pH, and CEC	Not Reported; Not Reported; Not Reported			
Test Type, Test Temperature, and Test Details	laboratory; Not Reported; Not Reported			
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	Not Reported; Not Reported; Not Reported			
Soil Classification, Microbial Biomass, and Humidity	Not Reported; Not Reported: Not Reported			
Duration, Parameter, System, and Sampling Frequency	6 months; Not Reported; Not Reported; Not Reported			
Control and Blank	Not Reported; Not Reported			
Concentration	Not Reported			
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Not Reported; Not Reported; Not Reported			
Results Remarks	12-18% complete mineralization of TBBPA in different soil types observed after 4 months and 3-9% complete mineralization observed after six months in two separate series of anaerobic biodegradation experiments			
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	17.5%; Not Reported; 6 months; Not Reported; Not Reported			
Results Details	Not Reported			
Mean Total Recovery Results and Results Per Recovery	Not Reported; Not Reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 6:	Testing Conditions	Medium	Limited details reported in this secondary source; detail may be in primary literature.
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Study Citation:	U.S. EPA, (2015). Flame retardants in printed circuit boards. Final report.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	7500050			
Domain	Metric	EVALUATION		Comments
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 10:	Sampling Methods	N/A	Not applicable to this study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.
Overall Quality Determination			Medium	

* Related References: Source (not in HERO at time of extraction): Schaefer E and Stenzel J (2006c) Tetrabromobisphenol A: Aerobic and anaerobic transformation in soil. Easton, MD: Wildlife International, Ltd. Also entered under HERO ID 5238261.

Study Citation:	Wang, S., Ling, X., Wu, X., Wang, L., Li, G., Corvini, P. F., Sun, F., Ji, R. (2019). Release of tetrabromobisphenol A (TBBPA)-derived non-extractable residues in oxic soil and the effects of the TBBPA-degrading bacterium Ochrobactrum sp. strain T. Journal of Hazardous Materials 378:120666.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5680120

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: transformation of non-extractable residues (NER) in soil
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	Uniformly 14C-ring-labeled TBBPA (14C-TBBPA); synthesized in laboratory; NR; radiochemical purity 99% Notes: TBBPA
Oxygen, pH, and CEC	aerobic; soil pH 7.4 (0.01 M CaCl ₂); 46.2 cmol(+)/kg
Test Type, Test Temperature, and Test Details	laboratory; 25±1°C; distilled water and soil
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	silty clay; 6.7% organic matter, 41.9% clay, 7.0% sand, and 51.1% silt; not reported
Soil Classification, Microbial Biomass, and Humidity	silty clay; fresh soil from prior study mixed with TBBPA-NER containing soil to recover microbial activity and final radioactivity of 2.1 kBq/g; test run without cell suspension added: 60%
Duration, Parameter, System, and Sampling Frequency	214 days; CO ₂ evolution; 50-mL flasks closed with a polytetrafluoroethylene-wrapped rubber stopper; days 18, 42, 65, 91, 127, and 214
Control and Blank	not reported; Pure culture study; test run without cell suspension added
Concentration	Not Reported
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC-14C-LSC; not reported; may be in supplemental information; mineralization (14-CO ₂)
Results Remarks	TBBPA-NER is relatively stable in oxic soil
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	3.9%; ±0.1; 214 days; Not reported; Not reported
Results Details	not reported
Mean Total Recovery Results and Results Per Recovery	not reported; 93.7-101.2%

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3: Study Controls	High	Some concurrent control groups were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4: Test Substance Stability	Medium	Limited detail; the test substance preparation was reported.

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Study Citation:	Wang, S., Ling, X., Wu, X., Wang, L., Li, G., Corvini, P. F., Sun, F., Ji, R. (2019). Release of tetrabromobisphenol A (TBBPA)-derived non-extractable residues in oxic soil and the effects of the TBBPA-degrading bacterium Ochrobactrum sp. strain T. Journal of Hazardous Materials 378:120666.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5680120			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing condition were reported.
	Metric 7:	Testing Consistency	High	Test conditions across samples or study groups were consistent.
	Metric 8:	System Type and Design	High	The test system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods were not fully reported, but the omissions were not likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and were considered.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not fully reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Details regarding statistical methods were reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Wang, S., Sun, F., Wang, Y., Wang, L., Ma, Y., Kolvenbach, B. A., Corvini, P. F., Ji, R. (2017). Formation, characterization, and mineralization of bound residues of tetrabromobisphenol A (TBBPA) in silty clay soil under oxic conditions. Science of the Total Environment 599-600:332-339.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5622538

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Mineralization of bound residues of TBBPA under oxic conditions in paddy rice soil from Jiangning, Nanjing, China
Solvent, Reactivity, Storage, Stability	14C-TBBPA dissolved in ethyl acetate (0.2 mL); NR; NR; NR
Radiolabel, Source, State, Purity	Uniformly 14C-ring-labeled TBBPA (14C-TBBPA) synthesized from uniformly 14C-ring-labeled phenol via BPA with a specific activity of 1.48 GBq mmol ⁻¹ and a radiochemical purity of 99%; Sigma-Aldrich (Switzerland); NR; 97% Notes: TBBPA; 4,4'-isopropylidenebis(2,6-dibromophenol)
Oxygen, pH, and CEC	aerobic; Not reported; 46.2 cmol(+)/kg
Test Type, Test Temperature, and Test Details	laboratory; 25°C; Test concentration and radioactivity of TBBPA in the soil 10.0 µg/g and 7.5 kBq/g, respectively; incubated in the dark
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	silty clay; 6.7% organic matter, 7.0% sand, 51.1% silt, 41.9% clay; Not reported
Soil Classification, Microbial Biomass, and Humidity	silty clay rice paddy soil - classified as haplic stagnic anthrosols; Activated soil inoculum: incubated at 25°C in the dark for one week to activate soil microorganisms: 60%
Duration, Parameter, System, and Sampling Frequency	93 days; radiochem. meas.; flask; day 0, 6, 14, 23, 37, 51, 65, and 93
Control and Blank	Not reported; Not reported
Concentration	Not Reported
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC-14C-LSC (high-performance liquid chromatography coupled to an online LSC radioactivity detector); GC/MS (for metabolites); Not reported; 14CO ₂ evolution (mineralization); % transformation of initial amount due to dissipation, mineralization, and bound-residue formation of TBBPA in the soil
Results Remarks	Four major metabolites were detected; two were identified by GC/MS: TBBPA monomethyl ether and TBBPA dimethyl ether
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	9.2%; 80.1%; ±0.2; ±3.6; 93 days; Not reported; Not reported
Results Details	TBBPA mineralization rate constant= 0.0011±0.00002/day (r-squared=0.99); TBBPA dissipation first-order kinetic constant=0.0474±0.0017/day corresponding to a half-life=14.6±0.3 days
Mean Total Recovery Results and Results Per Recovery	TBBPA from soil extraction recovery 99.5±3.6%; total radioactivity recovery 93 to 103%

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:		High	The test substance was identified definitively.
	Metric 2:		High	The source and purity of the test substance were reported.
Domain 2: Test Design				

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Study Citation:	Wang, S., Sun, F., Wang, Y., Wang, L., Ma, Y., Kolvenbach, B. A., Corvini, P. F., Ji, R. (2017). Formation, characterization, and mineralization of bound residues of tetrabromobisphenol A (TBBPA) in silty clay soil under oxic conditions. Science of the Total Environment 599-600:332-339.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5622538			
Domain		Metric	EVALUATION Rating	Comments
	Metric 3:	Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4:	Test Substance Stability	Medium	Limited detail; the test substance preparation was reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing condition were reported.
	Metric 7:	Testing Consistency	High	Test conditions across samples were consistent.
	Metric 8:	System Type and Design	Medium	The system type and design details were limited.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	Activated soil was described.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods were not fully reported, but the omissions were not likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Details on sources of variability and uncertainty in the measurements were not reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery were reported. Analytical details were omitted but may be in the supporting information, however this was not available.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Wang, S., Wu, X., Guo, R., Wang, Q., Guo, H., Corvini, P. F. X., Sun, F., Ji, R. (2021). Long-term field study on fate, transformation, and vertical transport of tetrabromobisphenol A in soil–plant systems. <i>Environmental Science & Technology</i> 55(8):4607-4615.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	10113630

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other; experimental; other: non-guideline study field study
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich (Shanghai, China); NR; 97%
Oxygen, pH, and CEC	aerobic; soil pH = 7.4 (0-20 cm), 6.6 (20-40 cm), 6.7 (40-80cm); 46.2, 45.9, 42.3, and 47.5 cmol (+)/kg at 0-20 cm, 20-40 cm, 40-60 cm, and 60-80 cm, respectively
Test Type, Test Temperature, and Test Details	field trial; 15.4°C (annual mean temp); surface soil organic carbon (SOC) content = 5.5% (60-80 cm) - 6.7% (0-20 cm)
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; upper (0-20 cm) silt clay soil, contained 7.0% sand, 51.1% silt, and 41.9% clay; lower soil (20-40 cm to 60-80 cm) contained 11.3-20.6% sand, 42.7-47.7% silt, and 36.7-41.0% clay; NR
Soil Classification, Microbial Biomass, and Humidity	haplic stagnic anthrosol; NR: annual mean precipitation 1106.5 mm
Duration, Parameter, System, and Sampling Frequency	June 2012 to May 2013 (~365 days); test mat.; experimental field in China planted with seeds of rice (<i>Oryza sativa</i>), wheat (<i>Themeda australis</i>), and common reed (<i>Phragmites australis</i>) obtained from Nanjing Agriculture University, China; sampling time of each treatments was according to the growth period of rice/wheat
Control and Blank	NR; unspiked soils evaluated
Concentration	initial concentrations of TBBPA in the topsoil of unplanted, rice–wheat rotationally planted, and reed-planted plots (three plots each) were 99.7 ± 3.3 , 96.5 ± 5.6 , and 96.6 ± 2.7 mg/kg, respectively - mg/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC for soil analysis of TBBPA; TBBPA metabolites were detected by gas chromatography–mass spectrometry (GC–Ms); LQD of TBBPA was 500 ng/g.; Dissipation of TBBPA unplanted, rice–wheat rotation, and reed–growing soils
Results Remarks	metabolites (SI table S3): Tribromobisphenol A (triBPA) observed on sampling days 61, 220, and 342 in unplanted, rice–wheat planted, and reed-planted soils; Bisphenol A (BPA) observed on sampling days 342 in unplanted soils, day 220 in rice-wheat planted soils, and days 220 and 342 in reed planted soils; Tetrabromobisphenol A dimethylether (diMeO-TBBPA) observed on sampling days 342 in unplanted and rice-wheat planted soils, and days 220 and 342 in reed planted soils; 1,3-Dibromo-5-isopropyl-2-methoxybenzeneo observed on sampling days 61, 220, and 342 in unplanted, rice–wheat planted, and reed-planted soils; 2,6-Dibromo-4-(2-propyl)-phenol observed on sampling days 220 in unplanted soils, day 342 in rice-wheat planted soils, and days 220 and 342 in reed planted soils.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results Details	Half-life (/day) = 105 ± 3 in unplanted soil, 88 ± 3 in rice–wheat planted soil, 84 ± 3 in and reed-planted soil; reported with values; based on first-order kinetics during 0-130 days; NR; NR
Mean Total Recovery Results and Results Per Recovery	dissipation rate constants (10-3/day) = 6.5 ± 0.2 in unplanted soil, 8.0 ± 0.3 in rice–wheat planted soil, 8.3 ± 0.3 in and reed-planted soil (based on first-order kinetics during 0-130 days) soil extraction efficiency ($96.9 \pm 2.7\%$); NR

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			

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Study Citation:	Wang, S., Wu, X., Guo, R., Wang, Q., Guo, H., Corvini, P. F. X., Sun, F., Ji, R. (2021). Long-term field study on fate, transformation, and vertical transport of tetrabromobisphenol A in soil–plant systems. Environmental Science & Technology 55(8):4607-4615.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	10113630			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	A positive control was not included.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor deviations.
	Metric 6:	Testing Conditions	High	Testing conditions were reported and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	Equilibrium assumed in field study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source were reported.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Attrition or health outcomes were not reported; however, this omission was not likely to have a substantial impact on study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product(s) concentrations (if required), extraction efficiency, percent recovery, or mass balance were reported and analytical methods used were suitable for detection and quantification of the target chemical and transformation product(s).
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				

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Study Citation:	Wang, S., Wu, X., Guo, R., Wang, Q., Guo, H., Corvini, P. F. X., Sun, F., Ji, R. (2021). Long-term field study on fate, transformation, and vertical transport of tetrabromobisphenol A in soil–plant systems. Environmental Science & Technology 55(8):4607-4615.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	10113630			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 17: Verification or Plausibility of Results	High	The study results were reasonable.	
	Metric 18: QSAR Models	N/A	A QSAR model was not reported.	
Overall Quality Determination		High		

Study Citation:	Wei, G., Zhao, H., Huang, D., Hou, M. (2018). Degradation of tetrabromobisphenol A in a paddy soil during sequential anoxic-oxic incubation: Kinetics, metabolites, and potential pathways. Scientific Reports 8(1):13435.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5607922

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Degradation in paddy soil
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; AccuStandard (New Haven, CT, USA); NR; >98%
Oxygen, pH, and CEC	anaerobic; soil pH 6.1; 17.6 cmol(+)/kg
Test Type, Test Temperature, and Test Details	laboratory; 25±1°C; 2 g soil and 20 mL oxygen free medium
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; 3.24% organic matter; Not reported
Soil Classification, Microbial Biomass, and Humidity	soil was collected from a rice field in the Longtang area of South China, a main e-waste recycling area extensively polluted by TBBPA and BPA; Not reported: Not reported
Duration, Parameter, System, and Sampling Frequency	150 days; test mat.; Glass serum bottles; Periodically
Control and Blank	Not reported; Sterilized soil samples used
Concentration	20 mg/L
Analytical Method, Analytical Details, and Results Per Degredation Parameter	GC/MS; previously described; half-life; reduction of test material
Results Remarks	transformation products detected: tri-BBPA, di-BBPA, mono-BBPA, and BPA; tri-BBPA, di-BBPA, and mono-BBPA were temporarily detectable at 1.07–7.06%, 1.02–8.21% and 1.25–5.78% of the initially applied TBBPA, respectively, through days 20 to 110 (with max concentrations at 90 days), and were undetectable at 130 days; BPA increased to 70.1% of initial TBBPA concentrations after 130 days.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	60.8 days; 22.8%/10 days, 94.0%/130 days; Not reported; Not reported; Sterile soils; TBBPA reduced by 22.4%; no metabolites detected through 150 days of incubation
Results Details	Rate constant under anoxic conditions: 0.0371/day
Mean Total Recovery Results and Results Per Recovery	Recoveries of added TBBPA and BPA in the extraction and determination process were 83.4±6.85% and 86.3±8.19%, respectively; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
Domain 2: Test Design	Metric 3:	Study Controls	High
	Metric 4:	Test Substance Stability	Medium

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Study Citation:	Wei, G., Zhao, H., Huang, D., Hou, M. (2018). Degradation of tetrabromobisphenol A in a paddy soil during sequential anoxic-oxic incubation: Kinetics, metabolites, and potential pathways. Scientific Reports 8(1):13435.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5607922			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some testing conditions and soil characteristics were not provided; however, the omissions were not likely to have had a substantial impact on the study results.
	Metric 7:	Testing Consistency	High	No inconsistencies were reported or identified.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The inoculum was described and was appropriate. The microbial activity was not reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment was appropriate for this study.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods were not fully reported, but the omissions were not likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Loss due to abiotic process and/or volatilization were not addressed in the biotic results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical details not reported; based on the results of the abiotic control there was insufficient evidence presented to confirm that parent compound disappearance was not at least partially due to abiotic processes.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis was not reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Xu, S., Wu, C., Guo, W. B., Yang, L., Ji, R., Pan, K., Miao, A. J. (2021). Polystyrene Nanoplastics Inhibit the Transformation of Tetrabromobisphenol A by the Bacterium <i>Rhodococcus jostii</i> .
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	10116610

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; TBBPA
Confidentiality, EndPoint, Type, Guideline	No; screening test; Experimental; other
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	14C-ring-labeled TBBPA (14C-TBBPA); Nonlabeled TBBPA was purchased from Sigma-Aldrich (Merk KGaA, Germany); radiolabeled TBBPA from 14C-ring-labeled phenol; NR; NR
Oxygen, pH, and CEC	aerobic assumed; 7.0; Not Reported
Test Type, Test Temperature, and Test Details	laboratory; 30 °C; soil microorganism in a lab study with nutrient medium
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; NA; NA
Soil Classification, Microbial Biomass, and Humidity	NA; Gram-positive bacterium <i>Rhodococcus jostii</i> ; NA
Duration, Parameter, System, and Sampling Frequency	7 days; test mat.; mineral medium; samples collected at 0, 0.5, 1, 2, 3, 5, and 7 days
Control and Blank	NR; NA <i>jostii</i> cells without Nanoplastics Inhibit the exposure served as the control
Concentration	100 - µg/L
Analytical Method, Analytical Details, and Results Per Degredation Parameter	HPLC 14C-liquid scintillation counter (LSC); percentage of radioactive TBBPA, MeO-TBBPA, and diMeO-TBBPA at time t; test substance
Results Remarks	Transformation from TBBPA to MeO-TBBPA and diMeO-TBBPA. Data from intra and extracellular compartments presented in Supplementary info file.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	94.8–96.0%; 3; 7 days; Not Reported; NA
Results Details	reaction rate: K1 = 3.74/day ±0.42, 3.64/day ±0.34, k2 = 0.58/day ±0.03, 0.52/day ±0.02
Mean Total Recovery Results and Results Per Recovery	NR; NR

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means (chemical analysis, etc.).
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results.

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Study Citation:	Xu, S., Wu, C., Guo, W. B., Yang, L., Ji, R., Pan, K., Miao, A. J. (2021). Polystyrene Nanoplastics Inhibit the Transformation of Tetrabromobisphenol A by the Bacterium <i>Rhodococcus jostii</i> .			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	10116610			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor omissions.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	Medium	Some test conditions across samples or study groups were not reported, but these discrepancies were not likely to have a substantial impact on study results.
	Metric 8:	System Type and Design	Medium	It is not clear if the system type and design were not capable of appropriately maintaining substance concentrations or not described but the deviation was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The test organism, species, or inoculum source were reported, but are not routinely used for similar study types; however, the deviation was not likely to have a substantial impact on study results.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods of the outcome(s) were not fully reported but, and the omissions were not likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
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Study Citation:	Xu, S., Wu, C., Guo, W. B., Yang, L., Ji, R., Pan, K., Miao, A. J. (2021). Polystyrene Nanoplastics Inhibit the Transformation of Tetrabromobisphenol A by the Bacterium Rhodococcus jostii.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	10116610

		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination

High

Study Citation:	Yang, C. W., Chen, W. Z., Chang, B. V. (2016). Biodegradation of tetrabromobisphenol-A in sludge-amended soil. Ecological Engineering 91:143-147.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5547020

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Shake flask batch biodegradation experiments and bioreactor experiments in soil/sludge
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich Chemical Co. (Milwaukee, WI); NR; NR Notes: TBBPA
Oxygen, pH, and CEC	aerobic; Not reported; Not reported
Test Type, Test Temperature, and Test Details	laboratory; 30C; Batch 1 - 40 mL of medium, 5 g sludge, 100 mg/kg TBBPA; 2 - 35 mL of medium, 5 g sludge, 5 g soil, 100 mg/kg TBBPA; Bioreactor A was filled with 800 mL of medium, 100 g of sludge, and 100 g of soil
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	Not Reported; Not reported; Not reported
Soil Classification, Microbial Biomass, and Humidity	Inoculum: sludge from a semi-solid slurry produced as a sewage sludge from a WWTP in Taiwan; Bacterial community evaluated in detail: Not reported
Duration, Parameter, System, and Sampling Frequency	36 days; test mat.; Batch: serum bottles; Bioreactors; periodically
Control and Blank	Not reported; Controls autoclaved at 121C for 30 min on two days
Concentration	100 mg/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	GC with electron capture detector; Recovery 91.5%; LOD: 0.02 mg/L; % TBBPA remaining after
Results Remarks	degradation in batch experiments using sludge resulted in 62.1% TBBPA remaining after 35 days; using soil-sludge resulted in 41.6% TBBPA remaining after 35 days; removal in the bioreactor experiments with first addition of 100 mg/kg TBBPA concentration decreased to 3.3%/20days; second addition of 100 mg/kg TBBPA at 21 days concentration decreased to 14.1%/28days; third addition of 100 mg/kg TBBPA at 23 days concentration decreased to 5.0%/36days
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and References Substance Compartment Results	Batch tests: 41.6-62.1% after 35 days; bioreactor: 3.3-14.1% TBBPA remaining; Not reported; Not reported; sterile controls; remaining percentage of TBBPA in sludge 94.5-96.3%/35days, in soil-sludge + 95.1-97.1%/28days
Results Details	Not reported
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Control group details were included.

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Study Citation:	Yang, C. W., Chen, W. Z., Chang, B. V. (2016). Biodegradation of tetrabromobisphenol-A in sludge-amended soil. Ecological Engineering 91:143-147.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	5547020			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation, and storage conditions were not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing condition reporting but the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	Medium	Test conditions across samples or study groups were not reported.
	Metric 8:	System Type and Design	High	The system type and design were appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	Inoculum was reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods were not fully reported, but the omissions were not likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty in the measurements and were not considered or accounted for in data evaluation resulting in some uncertainty.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Details regarding statistical methods were not fully reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Achenbach, J. C., H, J. P. M., Berrue (2022). Evaluation of the uptake, metabolism, and secretion of toxicants by zebrafish larvae. Toxicological Sciences 190(2):133-145.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	11148981			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; 3,3,5,5'-Tetrabromobisphenol A			
Confidentiality, Type, and Guideline	no; experimental; other: Study evaluated the toxicokinetic profile of chemicals in OECD 236 uptake and biotransformation in zebrafish larvae/ZET assay conditions			
Solvent, Reactivity, Storage, Stability	DMSO (final exposure concentration 0.5% v/v); Not Reported; stock solutions stored at -20°C; stable in “control” media samples assessed prior to testing			
Radiolabel, Source, State, Purity	Not Reported; Sigma-Aldrich (Oakville, Ontario, Canada); Not Reported; 97%			
Test Organism and Test Organism Details	zebrafish larvae; obtained from breeding of wildtype AB/Tub hybrids			
Lipid Content, Test Temperature, pH, and Depuration Time	NR; 28.5 ± 0.5°C; NR; NR			
Media Type, TOC, and Salinity	HEPES buffered E3 media; NR; NR			
Dissolved Oxygen, Conductivity, and Hardness	NR; NR; NR			
Exposure Route, Elimination, and Nominal Measurements	embryo absorption from aquatic environment; larval metabolite levels compared to corresponding media levels peak area values and normalized using the initial volumes of the extracted sources; nominal			
Test Type, Test Temperature, and Test Condition	static; 28.5 ± 0.5°C; 14:10 light:dark cycle; polystyrene microwell plates			
Comments				
Duration, Parameter, and Sampling Frequency	chemical exposure was 6 to 120 hours post fertilization; other; 0, 2, 18, 42, 66, 114 hours of exposure			
Concentration	1.45 µmol/L			
Analytical Method and Analytical Details	liquid chromatography-high resolution mass spectrometry (LC-HRMS); detection levels determined empirically by generating standard curves;			
Rate Constant and Results per Recovery	not reported; NR; values were corrected by the result of the percent recovery experiment			
Statistics, Basis, and Calculation Basis	All data points were mean of triplicate exposures with error bars denoting standard deviation.; other; whole larvae; Not Reported			
Results Value and Results Details	Max internal concentration factor = 57.4; Larval internal concentration factor (ICF) = [internal larvae concentration at max uptake]/[exposure media concentration in uM at time 0] = 57.4 at maximal uptake (observed at 18 hours)internal larvae TBBPA concentration = pmol per embryo/volume of embryo in uLConcentrations of TBBPA were undetectable by 66 hours of exposure; at the end of exposure four metabolites were detected in the larvae of which only one was detected in the media.			
Metabolites, Reference, and Results Reference Substance	Larval TBBPA concentration decreased over time to undetectable levels by the end of exposure; lack of abiotic degradation in controls indicated biotransformation or excretion of TBBPA; metabolites identified included a TBBPA-sulfate, a TBBPA-glucuronide, a TBBPA-sulfate-glucuronide, and a TBBPA diglucuronide metabolite. Metabolite concentrations peaked at 66h of exposure and were reduced by 114h with the only readily detectable metabolite in the larval media TBBPA-sulfate-glucuronide.; NR; NR			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance was reported.
Domain 2: Test Design				
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Study Citation:	Achenbach, J. C., H, J. P. M., Berrue (2022). Evaluation of the uptake, metabolism, and secretion of toxicants by zebrafish larvae. Toxicological Sciences 190(2):133-145.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	11148981			
Domain		EVALUATION		Comments
		Metric	Rating	
	Metric 3:	Study Controls	High	Controls were included.
	Metric 4:	Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples.
	Metric 8:	System Type and Design	Medium	Equilibrium was not established or reported but this was not likely to have a substantial impact on study results
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	Low	Test organism embryos are not routinely used for bioconcentration or bioaccumulation study types, typically juvenile or adult fish are studied.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome assessment; standard bioconcentration factor not reported, however, toxicokinetics (uptake and biotransformation) were evaluated.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Attrition or health outcomes were not reported; however, this omission was not likely to have a substantial impact on study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	All calculations were clearly described and address the dataset(s).
Domain 8: Other				

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Study Citation:	Achenbach, J. C., H, J. P. M., Berrue (2022). Evaluation of the uptake, metabolism, and secretion of toxicants by zebrafish larvae. Toxicological Sciences 190(2):133-145.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	11148981

		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 17: Verification or Plausibility of Results	High	The study results were reasonable.	
	Metric 18: QSAR Models	N/A	A QSAR model was not reported.	

Overall Quality Determination	Medium
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Study Citation:	Choo, G., Lee, I. S., Oh, J. E. (2019). Species and habitat-dependent accumulation and biomagnification of brominated flame retardants and PBDE metabolites. Journal of Hazardous Materials 371:175-182.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5546563

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, and Guideline	None; Experimental; other: Monitoring in marine environments (sediment and seawater) and 20 biota species in food web in the southern part of Korea
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	13C12-TBBPA; Monitoring samples; Internal standards from Wellington Laboratories (Guelph, Canada); NR; NR Notes: TBBPA
Test Organism and Test Organism Details	Biota samples of 20 species; pelagic fish, demersal fish, benthic invertebrates; collected in the southern part of South Korea from January 26 to February 10, 2016
Lipid Content, Test Temperature, pH, and Depuration Time	Ranged from 1.08-27.6; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	natural water: marine; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Not reported; Not reported; Measured
Test Type, Test Temperature, and Test Condition	Not reported; Not reported; concentrations in sediment and seawater ranged from N.D. to 2794 pg/L; pelagic fish concentrations: 1.31-11.3 ng/g lw; demersal fish: N.D. - 4.45 ng/g lw; benthic invertebrates: N.D. - 8.11 ng/g lw
Comments	Not reported; Not Reported; Not reported
Duration, Parameter, and Sampling Frequency	Not Reported
Analytical Method and Analytical Details	solid phase extraction system (SPE-DEX; Horizon Technology, Salem, NH, USA); extracted samples analyzed via LC-MS/MS; LOD: 0.014-0.093 ng/g or ng/L;
Rate Constant and Results per Recovery	Not reported; average recoveries: 47-83%
Statistics, Basis, and Calculation Basis	Not reported; Not Reported; steady state
Results Value and Results Details	Median values: BCF (L/kg)=4.39E3; BSAF=0.312; TMF=0.545; Overall distribution of TBBPA was higher in pelagic fish (9%) than in demersal fish (less than 1%) and benthic invertebrates (2%)
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	Source and purity of analytical standard reported.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	This metric does not apply to field studies.
	Metric 4:	Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Choo, G., Lee, I. S., Oh, J. E. (2019). Species and habitat-dependent accumulation and biomagnification of brominated flame retardants and PBDE metabolites. Journal of Hazardous Materials 371:175-182.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5546563			
Domain		Metric	EVALUATION Rating	Comments
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6:	Testing Conditions	Medium	Limited sediment, water, and test organism characteristics were reported.
	Metric 7:	Testing Consistency	High	Exposure conditions were reported and comparable across groups; sampling and analytical methods were consistent across all groups.
	Metric 8:	System Type and Design	High	Field studies are assumed to be at equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate for the study type.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Reported variability was not likely to influence the outcome of the assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	BAF values were not explicitly reported for the phthalate studies and actual concentrations measured throughout the study were not reported; however, these details were not likely to have a substantial impact on the study result interpretation.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Some statistical calculation details were omitted; however, these details were not likely to have a substantial impact on the study result interpretation.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, and Guideline	Not Reported; Not Reported; other: Non-guideline: flow-through system			
Solvent, Reactivity, Storage, Stability	ethanol; NR; NR; NR			
Radiolabel, Source, State, Purity	14C-labelled tetrabromobisphenol-A; NR; NR; NR Notes: NR			
Test Organism and Test Organism Details	bluegill sunfish (Lepomis macrochirus); 275 fish; weight 0.5-2 grams			
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; not reported; not reported; 14-day depuration period			
Media Type, TOC, and Salinity	not reported; not reported; not reported			
Dissolved Oxygen, Conductivity, and Hardness	not reported; not reported; not reported			
Exposure Route, Elimination, and Nominal Measurements	not reported; not reported; not reported			
Test Type, Test Temperature, and Test Condition	flow-through; not reported; not reported			
Comments				
Duration, Parameter, and Sampling Frequency	28-day uptake period; 14-day depuration period; other: 1, 3, 7,10, 14, 21 and 28 days (uptake); 1, 3, 7, 10 and 14 days (depuration)			
Concentration	not reported = 10 µg/L			
Analytical Method and Analytical Details	radiochemical analysis; MDL = 2 µg/L (water), 10 µg/kg (fish);			
Rate Constant and Results per Recovery	elimination half-life <1 day; not reported			
Statistics, Basis, and Calculation Basis	± standard deviation of concentrations reported; edible tissues and visceral tissues; steady-state			
Results Value and Results Details	BCF = 20 (edible tissues); BCF = 172 (visceral tissues); a slime bacteria (Sphaerotilus sp.) grew in both the treatment and control test system on days 3-5; mortality observed in the treatment (7 deaths) and control (25 deaths) groups			
Metabolites, Reference, and Results Reference Substance	not reported; not reported; not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	The test substance was identified definitively.	
Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.	
Domain 2: Test Design				
Metric 3:	Study Controls	Low	Controls were included; significant deaths and slime bacteria were observed.	
Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.	
Domain 3: Test Conditions				
Metric 5:	Test Method Suitability	Medium	Limited details reported in this secondary source; detail may be in primary literature.	
Metric 6:	Testing Conditions	Medium	Limited details reported in this secondary source; detail may be in primary literature.	
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5238261			
Domain	Metric	EVALUATION		Comments
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	High	Steady-state was established.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable to this study.
	Metric 10:	Sampling Methods	Medium	The test organism or species is routinely used; however, limited details reported in this secondary source and mortality was observed; detail may be in primary literature.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium	Sources of uncertainty were noted; additional detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	Medium	In treatment and control systems deaths and slime bacteria were observed indicating deficiencies in the system.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.
Overall Quality Determination			Medium	

* Related References: Source (not in HERO at time of extraction): Stoner Laboratories (1978). The bioaccumulation of tetrabromobisphenol A in the bluegill sunfish. Project 780241. Stoner Laboratories, Inc., Santa Clara, California. Massachusetts.

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).		
OECD Harmonized Template:	Aquatic Bioconcentration		
HERO ID:	5238261		
EXTRACTION			
Parameter	Data		
CASRN and Test Material	79-94-7; TBBPA		
Confidentiality, Type, and Guideline	Not Reported; Not Reported; Not Reported: continuous-flow system		
Solvent, Reactivity, Storage, Stability	cosolvent/dispersant (HCO-40); NR; NR; NR		
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR		
Test Organism and Test Organism Details	carp (Cyprinus carpio); ca. 15-20 fish; fish are about 30 g in weight and 10 cm in length and typically have a lipid content of 2-6%		
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; 25C; not reported; not reported		
Media Type, TOC, and Salinity	not specified; not specified; not specified		
Dissolved Oxygen, Conductivity, and Hardness	not specified; not specified; not specified		
Exposure Route, Elimination, and Nominal Measurements	not specified; not specified; not specified		
Test Type, Test Temperature, and Test Condition	flow-through; 25C; 100 litres of water		
Comments			
Duration, Parameter, and Sampling Frequency	8 weeks; not specified; not reported		
Concentration	= 8 - = 80 µg/L		
Analytical Method and Analytical Details	GC; not reported;		
Rate Constant and Results per Recovery	not reported; not reported		
Statistics, Basis, and Calculation Basis	not reported; not specified; not specified		
Results Value and Results Details	not specified; 30-341 L/kg (at µg/L); 52-485 L/kg (at µg/L)		
Metabolites, Reference, and Results Reference Substance	not specified; not specified; not specified		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified.
Metric 2:	Test Substance Purity	Medium	The source and purity of the test substance were not reported or verified by analytical means.
Domain 2: Test Design			
Metric 3:	Study Controls	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions			
Metric 5:	Test Method Suitability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Metric 6:	Testing Conditions	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Metric 8:	System Type and Design	Medium	Limited details reported in this secondary source; detail may be in primary literature.

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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5238261			
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable
	Metric 10:	Sampling Methods	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Not applicable to this study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Several test details were assumed. Limited details reported in this secondary source; detail may be in primary literature.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.
Overall Quality Determination		Low		

* Related References: Source: CITI (1992). Biodegradation and bioaccumulation data of existing chemicals based on the CSCL. Chemicals Inspection and Testing Institute, Tokyo, Japan. Summary available via theinternet at http://www.citi.or.jp/e_index.htm., Massachusetts.

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, and Guideline	none; experimental; other: Not specified; uptake of TBBPA			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: mixture; freeze-dried chironomids spiked with a mixture of brominated flame retardants			
Test Organism and Test Organism Details	zebrafish (Danio rerio); male			
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; not reported; not reported; 14 days			
Media Type, TOC, and Salinity	not specified; not reported; not reported			
Dissolved Oxygen, Conductivity, and Hardness	not reported; not reported; not reported			
Exposure Route, Elimination, and Nominal Measurements	diet;; not reported; not reported			
Test Type, Test Temperature, and Test Condition	not specified; not reported; not reported			
Comments				
Duration, Parameter, and Sampling Frequency	42-day uptake; 14-day depuration; not reported; 0, 3, 7, 14, 28, 35 and 42 days (uptake); 7, 14 days (depuration)			
Concentration	ca. 54 mg/kg			
Analytical Method and Analytical Details	not reported; not reported;			
Rate Constant and Results per Recovery	not reported; not reported			
Statistics, Basis, and Calculation Basis	not reported; not reported; not reported			
Results Value and Results Details	not reported; BMF <<1			
Metabolites, Reference, and Results Reference Substance	not reported; not reported; not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 6:	Testing Conditions	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	Medium	Limited details reported in this secondary source; detail may be in primary literature.
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5238261			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable to this study type.
	Metric 10:	Sampling Methods	High	Standard organism; limited details reported in this secondary source; detail may be in primary literature.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Not reported; limited details reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	Low	Not reported; limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Not reported; limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Not applicable to this study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.

Overall Quality Determination

Low

* Related References: Source (not in HERO at time of extraction): Rattfelt J., Norman A., Norrgren L., Haglund P. and Andersson P. L. (2006). Uptake in zebrafish of a structurally diverse set of brominated flame retardants after dietary exposure. Abstract from "DIOXIN, 2006", Oslo, August 21-24, 2006.

Study Citation:	Fackler, P. H. (1989). Bioconcentration and elimination of 14C-residues by fathead minnow (Pimephales promelas) exposed to tetrabromobisphenol A (amended final report).
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6311219

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol-A
Confidentiality, Type, and Guideline	None; Experimental; other: Dynamic Bioconcentration Study; standard protocols cited
Solvent, Reactivity, Storage, Stability	Acetone; NR; Freezer; NR
Radiolabel, Source, State, Purity	14C-TBBPA; specific activity: 9.32 mCi/mmol; Midwest Research Institute, Kansas City, MO; NR; radiopurity 96.0%
Test Organism and Test Organism Details	Fathead minnows (Pimephales promelas); obtained from Springborn Life Sciences, Inc. laboratories
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 19-21°C; 7.0-7.6; 6 days
Media Type, TOC, and Salinity	natural water; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	8.6-9.5 mg/L; specific conductance: 100-130 µmhos/cm; total hardness: 26-30 mg/L CaCO ₃ ; total alkalinity: 21-24 mg/L CaCO ₃
Exposure Route, Elimination, and Nominal Measurements	Flow-through; rapid elimination observed during depuration period; 98% of accumulated 14C residues was eliminated; 5.0 µg/L (nominal) 4.7 µg/L (measured)
Test Type, Test Temperature, and Test Condition	flow-through; 19-21°C; conditions monitored during test period; on one occasion temp reached 19°C
Comments	
Duration, Parameter, and Sampling Frequency	24 days plus 6 days depuration; 30 days total; other; 0h, 5h, 10h, 1d, 2d, 4d, 9d, 14d, 22d, 24d
Concentration	5.0 µg/L
Analytical Method and Analytical Details	LSC; dpm recorded; counts were recorded for a max of 100 min or 2 sigma error of 5%; limit of radiometric detection: 0.29 µg/L;
Rate Constant and Results per Recovery	Not reported; 97-104% (results not adjusted for recovery)
Statistics, Basis, and Calculation Basis	95% CI 900X-1700X; W; steady state
Results Value and Results Details	1200X; model calculations based on measured concentrations: 1300X; BCF whole body basis
Metabolites, Reference, and Results Reference Substance	Not reported; Solvent control; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3: Study Controls	High	Controls were included.
	Metric 4: Test Substance Stability	High	The test substance preparation and storage conditions were reported.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The test method was suitable.
	Metric 6: Testing Conditions	High	Testing conditions were appropriate.

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Study Citation:	Fackler, P. H. (1989). Bioconcentration and elimination of 14C-residues by fathead minnow (Pimephales promelas) exposed to tetrabromobisphenol A (amended final report).			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	6311219			
		EVALUATION		
Domain		Metric	Rating	Comments
	Metric 7:	Testing Consistency	High	Testing was consistent across groups.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	High	A standard species was used.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling was appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability or uncertainty was not likely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination			High	

Study Citation:	Gu, S. Y., Ekpeghere, K. I., Kim, H. Y., Lee, I. S., Kim, D. H., Choo, G., Oh, J. E. (2017). Brominated flame retardants in marine environment focused on aquaculture area: Occurrence, source and bioaccumulation. Science of the Total Environment 601-602:1182-1191.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	3986237

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported; bioaccumulation determination in bay field study in South Korea
Solvent, Reactivity, Storage, Stability	NA; NR; All samples stored in amber bottles at -20°C; NR
Radiolabel, Source, State, Purity	NA; Samples collected from Jinhae bay, Goseong-Jaran bay, Hansan bay, and Gamak bay, in addition to Gal Island in South Korea.; NA; NA
Test Organism and Test Organism Details	Notes: Standards obtained from Wellington Laboratories, Guelph, Canada, prepared in HPLC-grade methanol and stored at -20°C.
Lipid Content, Test Temperature, pH, and Depuration Time	Oyster, Crassostrea gigas; mussel, Mytilus edulis; n=22; n=9
Media Type, TOC, and Salinity	Not reported; Not reported; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	natural water / sediment: marine; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Not reported; Not reported; Not reported
Test Type, Test Temperature, and Test Condition	Sediment; Not reported; Measured; 0.21 (average, sediment), N.D. - 0.61 ng/g dw (range, sediment)
Comments	field study; Not reported; Organism, seawater (0.5 m depth), and sediment (0.1 m depth) were collected at 4 bays in South Korea and from an unpolluted island reference site.
Duration, Parameter, and Sampling Frequency	Not applicable; Not Reported; February 25, 2015 to May 22, 2016
Concentration	0.21 ng/g dw
Analytical Method and Analytical Details	Liquid chromatography - tandem mass spectrometry with negative ion mode electrospray ionization; analytes separated by reverse-phase column; Water samples extracted by automated SPE and ASE with DCM:hexane, concentrated under N2, redissolved in methanol; organism and sediment samples extracted 3x by ultrasonication with DCM:hexane, cleaned up on silica gel columns;
Rate Constant and Results per Recovery	Not applicable; 58 - 88% (recovery of spiked ¹³ C ₁₂ -labelled TBBPA)
Statistics, Basis, and Calculation Basis	Mann-Whitney U test, p < 0.01; Lipid normalized, organic carbon in sediment normalized; steady state
Results Value and Results Details	BSAF=1.07±3.92 (oyster); 6.96 ±19.3 (mussel); Detected at N.D. - 158 ng/g lipid wt. in bivalves (species not specified)
Metabolites, Reference, and Results Reference Substance	Not reported; Procedural blanks; Unpolluted reference site; < LOQ; Significantly lower in sediment, non-significantly lower in organisms, comparable concentration in seawater

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The field sample locations were reported, analytical standard source was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Samples were collected from a reference site, procedural blanks were tested and responded within an acceptable range.
	Metric 4:	Test Substance Stability	High	Sample storage and preparation were reported and appropriate.

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Study Citation:	Gu, S. Y., Ekpeghere, K. I., Kim, H. Y., Lee, I. S., Kim, D. H., Choo, G., Oh, J. E. (2017). Brominated flame retardants in marine environment focused on aquaculture area: Occurrence, source and bioaccumulation. Science of the Total Environment 601-602:1182-1191.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3986237			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	No sample characteristics or environmental conditions at sampling were reported.
	Metric 7:	Testing Consistency	High	Samples were processed and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be at dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Test organism species was reported, no other characteristics were included.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and used widely accepted approaches.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Organism concentrations in the polluted area were relatively higher (not statistically significant) than the reference area, suggesting low bioaccumulation. Similar concentrations between the polluted and the reference area, suggesting TBBPA is widely dispersed.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, percent recovery was reported, and BSAF were lipid normalized. The limits of detection may be reported in supplemental material.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical analysis was described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method, and BSAFS were comparable to previous studies with other brominated flame retardants.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Gu, S. Y., Ekpeghere, K. I., Kim, H. Y., Lee, I. S., Kim, D. H., Choo, G., Oh, J. E. (2017). Brominated flame retardants in marine environment focused on aquaculture area: Occurrence, source and bioaccumulation. Science of the Total Environment 601-602:1182-1191.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3986237			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported; bioaccumulation determination in bay field study in South Korea			
Solvent, Reactivity, Storage, Stability	NA; NR; All samples stored in amber bottles at -20°C; NR			
Radiolabel, Source, State, Purity	NA; Samples collected from Jinhae bay, Goseong-Jaran bay, Hansan bay, and Gamak bay, in addition to Gal Island in South Korea.; NA; NA			
Test Organism and Test Organism Details	Notes: Standards obtained from Wellington Laboratories, Guelph, Canada, prepared in HPLC-grade methanol and stored at -20°C.			
Lipid Content, Test Temperature, pH, and Depuration Time	Oyster, Crassostrea gigas; mussel, Mytilua coruscus; n=22; n=9			
Media Type, TOC, and Salinity	Not reported; Not reported; Not reported; Not reported			
Dissolved Oxygen, Conductivity, and Hardness	natural water / sediment: marine; Not reported; Not reported			
Exposure Route, Elimination, and Nominal Measurements	Not reported; Not reported; Not reported			
Test Type, Test Temperature, and Test Condition	Sediment; Not reported; Measured; N.D. - 2.79 g/L			
Comments	field study; Not reported; Organism, seawater (0.5 m depth), and sediment (0.1 m depth) were collected at 4 bays in South Korea and from an unpolluted island reference site.			
Duration, Parameter, and Sampling Frequency	Not applicable; Not Reported; February 25, 2015 to May 22, 2016			
Concentration	N.d. - 2.79 g/L			
Analytical Method and Analytical Details	Liquid chromatography - tandem mass spectrometry with negative ion mode electrospray ionization; analytes separated by reverse-phase column; Water samples extracted by automated SPE and ASE with DCM:hexane, concentrated under N2, redissolved in methanol; organism and sediment samples extracted 3x by ultrasonication with DCM:hexane, cleaned up on silica gel columns;			
Rate Constant and Results per Recovery	Not applicable; 58 - 88% (recovery of spiked ¹³ C ₁₂ -labelled TBBPA)			
Statistics, Basis, and Calculation Basis	Mann-Whitney U test, p < 0.01; Lipid normalized; steady state			
Results Value and Results Details	BCF=3.19E4±1.06E5 (oyster); 3.67E4±1.06E5; Detected at N.D. - 158 ng/g lipid wt. in bivalves (species not specified)			
Metabolites, Reference, and Results Reference Substance	Not reported; Procedural blanks; Unpolluted reference site; < LOQ; Significantly lower in sediment, non-significantly lower in organisms, comparable concentration in seawater			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	The test substance was identified by name.	
Metric 2:	Test Substance Purity	High	The field sample locations were reported, analytical standard source was reported.	
Domain 2: Test Design				
Metric 3:	Study Controls	High	Samples were collected from a reference site, procedural blanks were tested and responded within an acceptable range.	
Metric 4:	Test Substance Stability	High	Sample storage and preparation were reported and appropriate.	
Domain 3: Test Conditions				
Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.	
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Study Citation:	Gu, S. Y., Ekpeghere, K. I., Kim, H. Y., Lee, I. S., Kim, D. H., Choo, G., Oh, J. E. (2017). Brominated flame retardants in marine environment focused on aquaculture area: Occurrence, source and bioaccumulation. Science of the Total Environment 601-602:1182-1191.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3986237			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	Medium	No sample characteristics or environmental conditions at sampling were reported.
	Metric 7:	Testing Consistency	High	Samples were processed and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be at dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Test organism species was reported, no other characteristics were included.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and used widely accepted approaches.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Organism concentrations in the polluted area were relatively higher (not statistically significant) than the reference area, suggesting low bioaccumulation. Similar concentrations between the polluted and the reference area, suggesting TBBPA is widely dispersed.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, percent recovery was reported, and BSAF were lipid normalized. The limits of detection may be reported in supplemental material.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical analysis was described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method, however BCFs were significantly higher than laboratory studies, due to the complexity of field studies. The authors note the value is therefore difficult to compare to existing bioaccumulation legislative criteria.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Harrad, S., Abdallah, M. A. E., Rose, N. L., Turner, S. D., Davidson, T. A. (2009). Current-use brominated flame retardants in water, sediment, and fish from English lakes. Environmental Science & Technology 43(24):9077-9083.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	1927694

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	None; Experimental; other: Freshwater BAF
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	13-C-labeled; Wellington Laboratories; NR; NR Notes: 13C-labeled used as internal standard
Test Organism and Test Organism Details	Oncorhynchus mykiss; Perca fluviatilis; Carassius carassius; Rutilus rutilus; Cyprinus carpio; Scardinius erythrophthalmus; Rudd/Roach hybrid; Tinca tinca; Esox lucius; 30 samples total from 9 freshwater lakes
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; residues weighed to estimate lipid content; Ambient; Not reported; Not applicable
Media Type, TOC, and Salinity	natural water / sediment: freshwater; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Natural environment; Not applicable; Measured
Test Type, Test Temperature, and Test Condition	field study; Ambient; Concentrations in water, sediment, and fish from 9 English freshwater lakes
Comments	
Duration, Parameter, and Sampling Frequency	Not applicable; other; Samples collected from August 2008 to January 2009
Concentration	Not Reported
Analytical Method and Analytical Details	LC/MS/MS; MDL: TBBP-A 3.4 pg/injection (internal standard);
Rate Constant and Results per Recovery	Not reported; TBBP-A: 72-90%
Statistics, Basis, and Calculation Basis	Not reported; muscle; other
Results Value and Results Details	BAF=4.2 (Average n=5; range: undetectable to 12); perca fluviatilis: 1.7 and 12, carassius carassius 0.7 and 2.3;; Average bioaccumulation factor based on fish muscle samples; steady-state/equilibrium not confirmed
Metabolites, Reference, and Results Reference Substance	Not reported; TBBPA did not bioaccumulate in fish; Analytical blanks; No detections above LOQ in blanks

EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance was identified by analytical means. Source of analytical standards was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Replicate analysis was used for method reproducibility and accuracy and was described in detail in supplemental information.

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Study Citation:	Harrad, S., Abdallah, M. A. E., Rose, N. L., Turner, S. D., Davidson, T. A. (2009). Current-use brominated flame retardants in water, sediment, and fish from English lakes. Environmental Science & Technology 43(24):9077-9083.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	1927694			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability and storage conditions were not reported; however, these factors were not likely to have influenced the test substance or were not likely to have had a substantial impact on the study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were minor omissions in testing conditions; however, the omissions were not likely to have had a substantial impact on the study results.
	Metric 7:	Testing Consistency	Medium	There were likely minor inconsistencies in test conditions across samples or study groups as various sampling sites were used and several organisms sampled; however, this was not likely to have hindered the interpretation of the results.
	Metric 8:	System Type and Design	Medium	Field study; equilibrium was not confirmed or reported; the deviation may limit strict interpretation of the study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Details on each species not included; field study investigated concentrations in aquatic species.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	Outcome assessment methodology reported the intended outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were adequate for the outcomes of interest; additional detail was provided in supporting information.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Potential confounding variables and uncertainties were discussed and accounted for in the study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Details regarding chemical concentrations, partitioning, percent recovery, and method accuracy were described in the paper and supporting information.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analyses were not reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.
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Study Citation:	Harrad, S., Abdallah, M. A. E., Rose, N. L., Turner, S. D., Davidson, T. A. (2009). Current-use brominated flame retardants in water, sediment, and fish from English lakes. Environmental Science & Technology 43(24):9077-9083.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	1927694

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18: QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination	High
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Study Citation:	He, M. J., Luo, X. J., Yu, L. H., Wu, J. P., Chen, S. J., Mai, B. X. (2013). Diastereoisomer and enantiomer-specific profiles of hexabromocyclododecane and tetrabromobisphenol A in an aquatic environment in a highly industrialized area, South China: Vertical profile, phase partition, and bioaccumulation. Environmental Pollution 179:105-110.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	1927551

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, and Guideline	None; Experimental; other: Bioaccumulation in 3 fish species collected from South China
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	Not Reported; NR; NR; NR
Test Organism and Test Organism Details	Mud carp (<i>Cirrhina molitorella</i>), Nile tilapia (<i>Tilapia nilotica</i>), Plecostomus (<i>Hypostomus plecostomus</i>); Collected from Dongjiang River, South China
Lipid Content, Test Temperature, pH, and Depuration Time	2.7-3.7%; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	natural water; Measured in sediment and water but not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Measured but not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Environment; Not applicable; Measured
Test Type, Test Temperature, and Test Condition	field study; Not reported; Sediment samples (2009), water samples (2010), fish samples (no date)
Comments	
Duration, Parameter, and Sampling Frequency	Not applicable; other; 34 fish samples in total
Concentration	$\geq 18.1 - \leq 35.2$ (ng/g lw, in fish) other
Analytical Method and Analytical Details	Extraction followed by LC/MS-NESI (using internal standards); Described briefly, full methods referenced or in supporting details paper that was not readily available; LOD on column=15 pg (defined as a signal-to-noise ratio of 3:1);
Rate Constant and Results per Recovery	Not reported; ¹³ C12-TBBPA internal standard recovery ranged from 51-68% in all matrix; mean recovery=59% in spiked blanks and 56% in matrix spikes for fish
Statistics, Basis, and Calculation Basis	RSD was less than 20% in 3 duplicate samples; lipid weight; other
Results Value and Results Details	2.6-4.6; field log BAF calculated based on the means of TBBPA in the dissolved phase; TBBPA showed log BAFs greater than 3.7 in most fish samples
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	Low	Source and purity were not reported.
Domain 2: Test Design	Metric 3:	Study Controls	Low	Controls were not reported.

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Study Citation:		He, M. J., Luo, X. J., Yu, L. H., Wu, J. P., Chen, S. J., Mai, B. X. (2013). Diastereoisomer and enantiomer-specific profiles of hexabromocyclododecane and tetrabromobisphenol A in an aquatic environment in a highly industrialized area, South China: Vertical profile, phase partition, and bioaccumulation. Environmental Pollution 179:105-110.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		1927551		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 4:	Test Substance Stability	Medium	Details regarding this metric were omitted; however, this was not likely to have hindered the interpretation of the results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	Test method was appropriate, and described in a previously published study by the same authors.
	Metric 6:	Testing Conditions	High	Test conditions (temperature, organic matter) were measured and reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples; no inconsistencies were reported.
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Details on each species were not included; field study investigated concentrations in aquatic species of different trophic levels. Referenced previous study by same authors.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Log BAF values were reported as a range; limited details were provided on the calculations. However, the absence of these details was unlikely to have had a substantial impact on the study results.
	Metric 12:	Test Substance Purity	High	Samples were collected using widely accepted methods/approaches; additional details were referenced to previous study by same authors.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation. No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Log BAF values were reported (as a range and not specific to the isomer aside from mentioning the alpha had the greatest value). Concentrations were lipid normalized.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Study results were reasonable and compared to other studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

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Study Citation:	He, M. J., Luo, X. J., Yu, L. H., Wu, J. P., Chen, S. J., Mai, B. X. (2013). Diastereoisomer and enantiomer-specific profiles of hexabromocyclododecane and tetrabromobisphenol A in an aquatic environment in a highly industrialized area, South China: Vertical profile, phase partition, and bioaccumulation. Environmental Pollution 179:105-110. Aquatic Bioconcentration		
OECD Harmonized Template:			
HERO ID:	1927551		
		EVALUATION	
Domain	Metric	Rating	Comments
Overall Quality Determination		High	

Study Citation:	Hu, F., Pan, L., Xiu, M., Jin, Q. (2015). Exposure of Chlamys farreri to tetrabromobisphenol A: accumulation and multibiomarker responses. Environmental Science and Pollution Research 22(16):12224-12234.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	3575075

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported
Solvent, Reactivity, Storage, Stability	DMSO; NR; NR; NR
Radiolabel, Source, State, Purity	NA; Sigma Chemical, St. Louis, MO; NR; 97%
Test Organism and Test Organism Details	Scallops, Chlamys farreri; Shell length 4 - 5 cm, collected from Shazikou, Yellow Sea, Qingdao, China on September 12, 2012
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 14°C; Not reported; 10 days
Media Type, TOC, and Salinity	not specified; Not reported; 31%
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Water; Not reported; Nominal, concentrations chosen based on observations in sediment (0.2, 0.4, and 0.8 mg/L)
Test Type, Test Temperature, and Test Condition	static; 14°C; 100 organisms in 100 L seawater tank, 3 tanks per group, 4 groups; gills and digestive glands analyzed
Comments	
Duration, Parameter, and Sampling Frequency	20 days; Not Reported; 1, 3, 6, 10 days (exposure), 3, 6, 10 days (depuration period)
Concentration	0.2 - 0.8 mg/L
Analytical Method and Analytical Details	HPLC with photodiode array detector; LOD: 4.5 ng/g dry wt.; Freeze-dried samples homogenized with Na2SO4 in a mortar, extracted with n-hexane and DCM by Soxhlet extraction, cleaned on ProElut C18 SPE column and eluted in methanol. Eluent evaporated to dryness and redissolved in methanol;
Rate Constant and Results per Recovery	Not reported; 79.2% average (n= 4)
Statistics, Basis, and Calculation Basis	Normality (Kolmogorov-Smirnov), homogeneity of variance (Levene), one-way ANOVA by Duncan's test (p<0.05), spearman correlation; Statistical software SPSS 17.0; Organ, dry wt.; steady state
Results Value and Results Details	Average BCF: 6.1, 7.06, 8.63, 9.25, 4.02, 1.37, 0.30 (gills); 15.19, 23.29, 34.41, 31.98, 10.75, 5.73, 0.97 (digestive gland); Averages calculated for exposure days 1, 3, 6, 10, 13, 16, and 20, respectively. Accumulation peaked on 10 and 6 d (gill and digestive gland). Accumulation significantly higher in digestive gland. More than 50% test substance excreted from tissues on day 3 of depuration.
Metabolites, Reference, and Results Reference Substance	Not reported; Control tank; 0.04±0.03 - 0.06±0.02 ug/g dw (gills), 0.08±0.03 - 0.13±0.02 ug/g dw

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
Domain 2: Test Design			The test substance was identified by name.
			The test substance source and purity was reported.
	Metric 3:	Study Controls	High
	Metric 4:	Test Substance Stability	High
			Negative controls were included and responded within a valid range.
			Test substance preparation and exposure concentrations were reported.

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Study Citation:	Hu, F., Pan, L., Xiu, M., Jin, Q. (2015). Exposure of Chlamys farreri to tetrabromobisphenol A: accumulation and multibiomarker responses. Environmental Science and Pollution Research 22(16):12224-12234.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3575075			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Temperature and salinity were reported, other testing conditions were omitted.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established and the system was capable of maintaining test substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Test organism species and size was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and were conducted at an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variation in measurements were addressed by statistical techniques. Only nominal exposure concentrations reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health or attrition were reported, sample sizes were appropriate.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Raw data reported. The analytical method was appropriate, percent recovery and limits of detection were reported. BCFs calculated by reviewer, not study authors, lipid content or lipid normalized values not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistics were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Hu, F., Pan, L., Xiu, M., Jin, Q., Wang, G., Wang, C. (2015). Bioaccumulation and detoxification responses in the scallop <i>Chlamys farreri</i> exposed to tetrabromobisphenol A (TBBPA). <i>Environmental Toxicology and Pharmacology</i> 39(3):997-1007.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	2945241

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; Tetrabromobisphenol A
Confidentiality, Type, and Guideline	none; experimental; other: Non-guideline: bioaccumulation of TBBPA in scallop tissues
Solvent, Reactivity, Storage, Stability	0.01% DMSO used as a vehicle in all tests; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma Chemical Co. Ltd. (UK); NR; 99.3% Notes: NR
Test Organism and Test Organism Details	Scallops (<i>C. farreri</i>); From Shazikou (Yellow Sea, Qingdao, China)
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; 14°C; not reported; not reported
Media Type, TOC, and Salinity	natural water - marine; not reported; 31%
Dissolved Oxygen, Conductivity, and Hardness	not reported; not reported; not reported
Exposure Route, Elimination, and Nominal Measurements	environmental; Not Reported; Not Reported
Test Type, Test Temperature, and Test Condition	static; 14°C; Continuously aerated seawater; gill and digestive gland samples collected
Comments	
Duration, Parameter, and Sampling Frequency	10 days; not reported; Scallops removed on day 0, 0.5, 1, 3, 6 and 10.
Concentration	= 0.2, 0.4 - = 0.8 mg/L
Analytical Method and Analytical Details	HPLC with photodiode array detector at 209 nm; LOD: 4.5 ng/mL;
Rate Constant and Results per Recovery	not reported; Mean recovery of analysis = 79.2%
Statistics, Basis, and Calculation Basis	Cocnetrations presented as mean $\pm$ S.D.; gills and digestive glands; not reported
Results Value and Results Details	Concentrations in digestive gland and gill increased rapidly with exposure concentrations; peak observed on day 6, slight decrease thereafter in the digestive gland, plateauing after day 6 in the gill; at the end of exposure a higher TBBPA load was observed in the digestive gland compared to the gill.; Initial TBBPA test concentration followed by gill concentrations after day 0, 0.5, 1, 3, 6 and 10, respectively: Control (0 mg/L): 0.04 $\pm$ 0.02, 0.06 $\pm$ 0.02, 0.05 $\pm$ 0.02, 0.04 $\pm$ 0.03, 0.05 $\pm$ 0.02, 0.04 $\pm$ 0.01; 0.2 mg/L: 1.46 $\pm$ 0.13, 1.73 $\pm$ 0.22, 1.95 $\pm$ 0.11, 2.28 $\pm$ 0.08, 2.47 $\pm$ 0.17; 0.4 mg/L: 1.92 $\pm$ 0.18, 2.42 $\pm$ 0.25, 2.87 $\pm$ 0.23, 3.65 $\pm$ 0.21, 3.82 $\pm$ 0.26; 0.8 mg/L: 2.27 $\pm$ 0.17, 2.88 $\pm$ 0.31, 3.40 $\pm$ 0.29, 4.28 $\pm$ 0.34, 4.68 $\pm$ 0.29. Initial TBBPA test concentration followed by digestive gland concentrations concentrations after day 0, 0.5, 1, 3, 6 and 10, respectively: Control (0 mg/L): 0.09 $\pm$ 0.03, 0.10 $\pm$ 0.03, 0.12 $\pm$ 0.04, 0.08 $\pm$ 0.03, 0.12 $\pm$ 0.02, 0.11 $\pm$ 0.03; 0.2 mg/L: 2.62 $\pm$ 0.15, 3.57 $\pm$ 0.27, 6.15 $\pm$ 0.55, 8.91 $\pm$ 0.61, 8.108 $\pm$ 0.53; 0.4 mg/L: 3.75 $\pm$ 0.27, 6.92 $\pm$ 0.44, 9.47 $\pm$ 0.32, 12.79 $\pm$ 1.03, 12.51 $\pm$ 0.91; 0.8 mg/L: 5.94 $\pm$ 0.38, 8.33 $\pm$ 0.57, 12.35 $\pm$ 0.64, 21.36 $\pm$ 0.77, 19.28 $\pm$ 1.25.
Metabolites, Reference, and Results Reference Substance	not reported; not reported; not reported

EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified clearly.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design				

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Study Citation:	Hu, F., Pan, L., Xiu, M., Jin, Q., Wang, G., Wang, C. (2015). Bioaccumulation and detoxification responses in the scallop Chlamys farreri exposed to tetrabromobisphenol A (TBBPA). Environmental Toxicology and Pharmacology 39(3):997-1007.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	2945241			
Domain	Metric	EVALUATION		Comments
	Metric 3:	Study Controls	High	An appropriate control was included.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	Medium	Equilibrium was not established or reported but this was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	Low	The test organism was obtained from the Yellow Sea. Environmental concentrations, of target chemical at location, were not assessed.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Concentrations of TBBPA in environmental samples of scallops prior to test were not evaluated, this may have a substantial impact on results.
	Metric 12:	Test Substance Purity	High	Sampling was appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Appropriate statistical techniques between study groups were reported in the study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Bioconcentration factors were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The study results were reasonable; however, the outcome of interest was not reported.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

Study Citation:	Hu, F., Pan, L., Xiu, M., Liu, D. (2015). Dietary accumulation of tetrabromobisphenol A and its effects on the scallop <i>Chlamys farreri</i> . <i>Comparative Biochemistry and Physiology - Part C: Toxicology and Pharmacology</i> 167:7-14.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5496325

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, and Guideline	None; Experimental; other: Dietary accumulation of TBBPA by scallop (<i>Chlamys farreri</i>)
Solvent, Reactivity, Storage, Stability	Dimethylsulphoxide (DMSO); NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma Chemical Co. Ltd. (UK).; NR; 99.3%
Test Organism and Test Organism Details	Scallops (<i>Chlamys farreri</i>); Mean shell length: 4-5 cm; food: algae (<i>Nitzschia closterium</i> f. <i>minutissima</i>).
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 14±1°C; Not reported; Not reported
Media Type, TOC, and Salinity	natural water: marine; Not reported; 3.1%
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Algae were exposed to 400 µg/L TBBPA (dissolved in DMSO) for 24 hours and fed at 50,000 cells/mL.; Not reported; Not reported
Test Type, Test Temperature, and Test Condition	static; 14±1°C; Filtered, continuously aerated seawater was used.
Comments	
Duration, Parameter, and Sampling Frequency	10 days; Not Reported; Days 0, 0.5, 1, 3, 6, and 10
Concentration	Not Reported
Analytical Method and Analytical Details	HPLC with photodiode array detector.; Detection limit: 5ng/mL; method of quantity limit: 9g/mL for water; 5ng/g for algae and scallop.;
Rate Constant and Results per Recovery	Not reported; Mean recoveries of analysis: 86.6% for water, 79.2% for algae and scallop.
Statistics, Basis, and Calculation Basis	Groups were compared by ANOVA and multiple comparisons using the Duncan-test (p<0.05).; Not Reported; Not Reported
Results Value and Results Details	Log BAF in soft tissues after 0.5, 1, 3, 6, and 10 days: 0.53, 0.72, 0.81, 0.83, and 0.84, respectively.; BAF: TBBPA in soft tissues of scallop in g/kg dw/TBBPA in medium in g/L seawater.
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	High	Results from control groups were included and appropriate.
	Metric 4:	Test Substance Stability	Medium	Some details regarding the test substance storage and preparation conditions were not reported but the omissions are unlikely to have a substantial impact on the study results.
Domain 3: Test Conditions				

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Study Citation:	Hu, F., Pan, L., Xiu, M., Liu, D. (2015). Dietary accumulation of tetrabromobisphenol A and its effects on the scallop Chlamys farreri. Comparative Biochemistry and Physiology - Part C: Toxicology and Pharmacology 167:7-14.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5496325			
EVALUATION				
Domain		Metric	Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	The testing conditions were consistent across the sample groups.
	Metric 8:	System Type and Design	High	The system type was appropriate and capable of maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	Medium	Some of the details regarding the test organism were not reported but the omissions are unlikely to have a substantial impact on the study results.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were clearly described and were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was reported for concentration measurements and was unlikely to have an impact on the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences were reported among the study groups in organism attrition.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Target chemical concentrations and recoveries were reported, and the analytical method was suitable for detection and quantification. The lipid normalized BCF was not reported but the omission is unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was described and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Hu, L., Zhou, T., Luo, D., Feng, J., Tao, Y., Zhou, Y., Mei, S. (2019). Bioaccumulation of tetrabromobisphenol A in a laboratory-based fish-water system based on selective magnetic molecularly imprinted solid-phase extraction. Science of the Total Environment 650(Pt 1):1356-1362.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5496538

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, and Guideline	None; Experimental; other: TBBPA bioaccumulation in koi carp (Cyprinus carpio)
Solvent, Reactivity, Storage, Stability	Ethanol; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich, St. Louis, MO, USA; NR; 99%
Test Organism and Test Organism Details	Koi carp (Cyprinus carpio); Not reported
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; None
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	TBBPA dissolved in ethanol was added to test water.; Not reported; Not reported
Test Type, Test Temperature, and Test Condition	static; Not reported; Not Reported
Comments	
Duration, Parameter, and Sampling Frequency	50 days; Not Reported; Days 0, 2, 5, 8, 11, 20, 30, and 50.
Concentration	98.75 µg/L
Analytical Method and Analytical Details	HPLC; Calibration linearity in water and fish, respectively (R ²): 0.9868 and 0.9766. LOD and LOQ in water: 1.0 and 5.0 µg/L; LOD and LOQ in fish: 15.2 and 50.0 ng/g.;
Rate Constant and Results per Recovery	Not reported; Recoveries in water: 89.68-100.5%; recoveries in fish: 98.81-112.16%
Statistics, Basis, and Calculation Basis	Not Reported; Not Reported; Not Reported
Results Value and Results Details	BCF after 50 days: 33.98 L/kg; Log BCF: 1.53; BCF(t)=BCF(0) x e ^λ (Ku(t)+Ke(t ²)) where BCF(0) is the fish uptake factor.
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High The test substance purity was reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	High Appropriate controls were used in the study.
	Metric 4:	Test Substance Stability	High The test substance preparation and storage conditions were reported and appropriate.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High The test method was suitable for the test substance.

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Study Citation:	Hu, L., Zhou, T., Luo, D., Feng, J., Tao, Y., Zhou, Y., Mei, S. (2019). Bioaccumulation of tetrabromobisphenol A in a laboratory-based fish-water system based on selective magnetic molecularly imprinted solid-phase extraction. Science of the Total Environment 650(Pt 1):1356-1362.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5496538			
		EVALUATION		
Domain		Metric	Rating	Comments
	Metric 6:	Testing Conditions	Medium	Some of the testing conditions were not reported but the omissions are unlikely to have a substantial impact on the study results.
	Metric 7:	Testing Consistency	High	There was no change in the testing conditions across the sample groups as only one tank was used for all the test organisms.
	Metric 8:	System Type and Design	High	The system type was appropriate and equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	Medium	Some of the details regarding the test organism were not reported but the omissions are unlikely to have a substantial impact on the study results.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability was accounted for and not likely to impact the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	There were no adverse health effects among the test organisms that influenced the outcome assessment.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate and the chemical concentrations were reported. The lipid normalized BCF was not reported, but the omission is unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis and kinetic calculations were described and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable as compared to the reported results of other studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Macedo, W. V., Bernegossi, A. C., Sabatini, C. A., Corbi, J. J., Zaiat, M. (2020). Application of Dispersive Liquid-Liquid Microextraction Followed by High-Performance Liquid Chromatography/Tandem Mass Spectrometry Analysis to Determine Tetrabromobisphenol A in Complex Matrices. Environmental Toxicology and Chemistry 39(11):2147-2157.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	10115753			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-97-4; Tetrabromobisphenol A			
Confidentiality, Type, and Guideline	No; Experimental; other: Samples collected from organisms and water			
Solvent, Reactivity, Storage, Stability	Stock solutions were prepared in acetonitrile; NR; solutions were stored at −20 °C; NR			
Radiolabel, Source, State, Purity	stable isotope labeled internal standard (13C12-TBBPA) Wellington Laboratories; Sigma-Aldrich; Not Reported; 97%			
Test Organism and Test Organism Details	D. magna and C. sancticaroli; Straus 1820 and Strixino & Strixino 1981			
Lipid Content, Test Temperature, pH, and Depuration Time	Not Reported; 19 (D. magna) and 25 (C. sancticaroli) ± 2°C; Not Reported; Not Reported			
Media Type, TOC, and Salinity	reconstituted water (D. magna) or cultivated in dechlorinated tap water (C. sancticaroli); Not Reported; Not Reported			
Dissolved Oxygen, Conductivity, and Hardness	Not Reported; Not Reported; Not Reported			
Exposure Route, Elimination, and Nominal Measurements	Not Reported; Not Reported; Not Reported			
Test Type, Test Temperature, and Test Condition	not specified; 19 (D. magna) and 25 (C. sancticaroli) ± 2°C; Not Reported			
Comments				
Duration, Parameter, and Sampling Frequency	48 and 96 hours; Not Reported; Not Reported			
Concentration	100 µg/L			
Analytical Method and Analytical Details	ultrasound-dispersive liquid–liquid microextraction–liquid chromatography–mass spectrometry (US–DLLME–LC–MS/MS) method’ HPLC with ESI-MS; LOQ = 2.5 ng/g (D. magna) and 5 ng/g (C. sancticaroli); Not Reported;			
Rate Constant and Results per Recovery	Not Reported; <42.9%			
Statistics, Basis, and Calculation Basis	Not Reported; whole body d.w.; Not Reported			
Results Value and Results Details	bioaccumulation = 3.74 µg/g and 8.87 µg/g; Not Reported			
Metabolites, Reference, and Results Reference Substance	Not Reported; Not Reported; Not Reported			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Low	Although blanks and internal standards were discussed, the full study details were unpublished.
	Metric 4:	Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported.
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Study Citation:	Macedo, W. V., Bernegossi, A. C., Sabatini, C. A., Corbi, J. J., Zaiat, M. (2020). Application of Dispersive Liquid-Liquid Microextraction Followed by High-Performance Liquid Chromatography/Tandem Mass Spectrometry Analysis to Determine Tetrabromobisphenol A in Complex Matrices. Environmental Toxicology and Chemistry 39(11):2147-2157.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	10115753			
Domain		Metric	EVALUATION Rating	Comments
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Low	Limited details; the bioaccumulation study was part of an unpublished acute toxicity bioassay study.
	Metric 6:	Testing Conditions	Low	Limited details; the bioaccumulation study was part of an unpublished acute toxicity bioassay study.
	Metric 7:	Testing Consistency	Low	Limited details; the bioaccumulation study was part of an unpublished acute toxicity bioassay study.
	Metric 8:	System Type and Design	Low	Limited details; the bioaccumulation study was part of an unpublished acute toxicity bioassay study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	High	The test organism information or inoculum source were reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Limited details; the bioaccumulation study was part of an unpublished acute toxicity bioassay study.
	Metric 12:	Test Substance Purity	Low	Limited details; the bioaccumulation study was part of an unpublished acute toxicity bioassay study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Limited details; the bioaccumulation study was part of an unpublished acute toxicity bioassay study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Uninformative	Limited details, these omissions were likely to have a substantial impact on study results. The bioaccumulation study was part of an unpublished acute toxicity bioassay study.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Limited details; the bioaccumulation study was part of an unpublished acute toxicity bioassay study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

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Study Citation:	Macedo, W. V., Bernegossi, A. C., Sabatini, C. A., Corbi, J. J., Zaiat, M. (2020). Application of Dispersive Liquid-Liquid Microextraction Followed by High-Performance Liquid Chromatography/Tandem Mass Spectrometry Analysis to Determine Tetrabromobisphenol A in Complex Matrices. Environmental Toxicology and Chemistry 39(11):2147-2157.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	10115753

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Uninformative	

Study Citation:	Maulvault, A. L., Camacho, C., Barbosa, V., Alves, R., Anacleto, P., Fogaça, F., Kwadijk, C., Kotterman, M., Cunha, S. C., Fernandes, J. O., Rasmussen, R. R., Sloth, J. J., Aznar-Aleman, Ò., Eljarrat, E., Barceló, D., Marques, A. (2018). Assessing the effects of seawater temperature and pH on the bioaccumulation of emerging chemical contaminants in marine bivalves. Environmental Research 161:236-247.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	4164628

EXTRACTION				
Parameter	Data			
CASRN and Test Material	Not Reported; tetrabromobisphenol A			
Confidentiality, Type, and Guideline	None; experimental; other: bioaccumulation in marine bivalves			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	None; Sigma-Aldrich (USA); NR; 97% Notes: TBBPA			
Test Organism and Test Organism Details	Mediterranean mussel, Mytilus galloprovincialis; 1100 collected March 2016 from the Tagus estuary (Lisbon, Portugal).			
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; 19; 19; 23; 23°C; 8.0; 7.6; 8.0; 7.6; 20 days			
Media Type, TOC, and Salinity	natural water - marine; not reported; 35±1%			
Dissolved Oxygen, Conductivity, and Hardness	>5 mg/L; not reported; not reported			
Exposure Route, Elimination, and Nominal Measurements	whole organism; not reported; measured			
Test Type, Test Temperature, and Test Condition	not specified; 19; 19; 23; 23°C; 12 h light/12 h dark			
Comments				
Duration, Parameter, and Sampling Frequency	not reported; Not Reported; days 0, 2, 10, 20 (exposure), 22, 30 and 40 (elimination)			
Concentration	8.1; 2.7; 8.5; 0.9 - 11.1; 5.3; 10.7; 3.1 ug/L			
Analytical Method and Analytical Details	LC-MS/MS; Limit of detection 0.1 ug/L (seawater); 0.3 ug/kg (bivalve); limit of quantification: 1.0 ug/L (seawater); 0.25 ug/kg (bivalve) additional analytical details provided in supplementary materials.;			
Rate Constant and Results per Recovery	243.4±15.8; 150.9±2.6; 256.5±40.4; 285.8±9.0 ng/g dry weight/day; not reported			
Statistics, Basis, and Calculation Basis	warming enhanced bioaccumulation, acidification decreased bioaccumulation but warming combined with acidification increased bioaccumulation.;; edible fraction; kinetic, corrected for growth			
Results Value and Results Details	Not Reported; elimination rates were: 97.3±0.3%; 96.1±0.4%; 99.7±0.1%; 99.5±0.1%;			
Metabolites, Reference, and Results Reference Substance	not reported; not reported; Not Reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Concurrent blank group was included
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
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Study Citation:	Maulvault, A. L., Camacho, C., Barbosa, V., Alves, R., Anacleto, P., Fogaça, F., Kwadijk, C., Kotterman, M., Cunha, S. C., Fernandes, J. O., Rasmussen, R. R., Sloth, J. J., Aznar-Aleman, Ò., Eljarrat, E., Barceló, D., Marques, A. (2018). Assessing the effects of seawater temperature and pH on the bioaccumulation of emerging chemical contaminants in marine bivalves. Environmental Research 161:236-247.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	4164628			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test organism information was reported and is routinely used for similar study types and appropriate.
	Metric 10:	Sampling Methods	Medium	the test organism or species is routinely used for similar study types; however, one or more additional characteristics of the organisms were not reported, but these omissions were not likely to have a substantial impact on study results.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements between study groups were reported in the study and the differences in the measurements and statistical techniques and between study groups were considered or accounted for in data evaluation with minor deviations or omissions.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	There were multiple study groups, and there were no differences among the study groups in organism attrition or health outcomes that influenced the outcome assessment.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	the lipid content or lipid normalized BCF was not reported for BCF studies, but these deficiencies or omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were expected.

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Study Citation:	Maulvault, A. L., Camacho, C., Barbosa, V., Alves, R., Anacleto, P., Fogaça, F., Kwadijk, C., Kotterman, M., Cunha, S. C., Fernandes, J. O., Rasmussen, R. R., Sloth, J. J., Aznar-Alemany, Ò., Eljarrat, E., Barceló, D., Marques, A. (2018). Assessing the effects of seawater temperature and pH on the bioaccumulation of emerging chemical contaminants in marine bivalves. Environmental Research 161:236-247.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	4164628

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18:	QSAR Models	N/A The metric is not applicable to this study type.

Overall Quality Determination	High
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Study Citation:	Netherlands Institute for Fisheries Research, (2002). HBCD and TBBP-A in sewage sludge, sediments and biota, including interlaboratory study.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	4269983			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBP-A			
Confidentiality, Type, and Guideline	None; Experimental; other			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	No; NR; NR; NR			
Test Organism and Test Organism Details	yellow eel (<i>anguilla anguilla</i>); pooled samples of about 10 eels (tail-ends) from each location: Warmebeek Achel-Kluis; Moarvaart Daknam; Benede Nete, Duffel; Grote Be verdijk, Lo-Reninge; IJzer, Nieuwpoort; Dume, Lokeren; Leie, Wervik; Leie, Wevelgem; Leie, Oeselgem			
Lipid Content, Test Temperature, pH, and Depuration Time	measured, not reported; not applicable (field study); not applicable (field study); not applicable (field study)			
Media Type, TOC, and Salinity	not specified; not applicable (field study); not applicable (field study)			
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)			
Exposure Route, Elimination, and Nominal Measurements	environmental; not applicable (field study); Not Reported			
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Not Reported			
Comments				
Duration, Parameter, and Sampling Frequency	eel samples collected in 2000; sediment samples collected in 2001; BAF=concentration in eel (ug/kg lipid)/concentration in sediment (ug/kg TOC); not applicable (field study)			
Concentration	Not Reported			
Analytical Method and Analytical Details	GC/MS; Extraction/decomposition of lipids/basic fractionation followed by analysis.;			
Rate Constant and Results per Recovery	Not reported; The method developed for the analysis of TBBP-A is error-prone due to the many steps involved in sample pre-treatment. The correction made with the internal standard partially overcomes this problem.			
Statistics, Basis, and Calculation Basis	Not Reported; Not Reported; other			
Results Value and Results Details	0.29; 0.08; <0.03; <0.08; 14; 0.14; <0.01; <0.01; <0.01; BAF ≤ to 1 indicates no bioaccumulation. Eel concentrations (ug/kg lipid): 2.6; 0.4; <0.3; <0.2; 13; 4.0; <0.1; <0.1; <0.1; corresponding sediment concentrations (ug/kg TOC): 9.1; 4.8; 9.3; 2.4; 0.9; 28; 33; 140; 120			
Metabolites, Reference, and Results Reference Substance	Not reported; not applicable (field study); Not Reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
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Study Citation:	Netherlands Institute for Fisheries Research, (2002). HBCD and TBBP-A in sewage sludge, sediments and biota, including interlaboratory study.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	4269983			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor deviations.
	Metric 6:	Testing Conditions	Low	Different media samples were not taken concurrently.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to the study type.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	Medium	The species is routinely used for similar study types; however, one or more additional characteristics of the organisms were not reported, but these omissions were not likely to have a substantial impact on study results.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome assessment.
	Metric 12:	Test Substance Purity	Medium	Limitations were identified in sampling methods of the outcome of interest were reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability were reported in the study, the differences in the measurements were considered with omissions, the omissions were not likely to have a substantial impact on study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Health outcomes not reported, but unlikely to influence the results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical methods used were not suitable for detection and quantification of the target chemical and transformation product; however, these deficiencies were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

* Related References: same as 3809184

Study Citation:	Netherlands Institute for Fisheries Research, (2002). HBCD and TBBP-A in sewage sludge, sediments and biota, including interlaboratory study.		
OECD Harmonized Template:	Aquatic Bioconcentration		
HERO ID:	4269983		
EXTRACTION			
Parameter	Data		
CASRN and Test Material	79-94-7; TBBP-A		
Confidentiality, Type, and Guideline	None; Experimental; other		
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR		
Radiolabel, Source, State, Purity	No; NR; NR; NR		
Test Organism and Test Organism Details	yellow eel (<i>anguilla anguilla</i>); pooled samples of about 10 eels (tail-ends) from each location: Leie, St.Martens; Scheidt, Doel; Scheidt, Grens; Scheidt, Oudenaarde; Antwerpen, Kruisschansbrug; Scheidt, Kastel; Scheidt, Kennedytunnel; Dender, Appels; Dender, Ninove		
Lipid Content, Test Temperature, pH, and Depuration Time	measured, not reported; not applicable (field study); not applicable (field study); not applicable (field study)		
Media Type, TOC, and Salinity	not specified; not applicable (field study); not applicable (field study)		
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)		
Exposure Route, Elimination, and Nominal Measurements	environmental; not applicable (field study); Not Reported		
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Not Reported		
Comments			
Duration, Parameter, and Sampling Frequency	eel samples collected in 2000; sediment samples collected in 2001; BAF=concentration in eel (ug/kg lipid)/concentration in sediment (ug/kg TOC); not applicable (field study)		
Concentration	Not Reported		
Analytical Method and Analytical Details	GC/MS; Extraction/decomposition of lipids/basic fractionation followed by analysis.;		
Rate Constant and Results per Recovery	Not reported; The method developed for the analysis of TBBP-A is error-prone due to the many steps involved in sample pre-treatment. The correction made with the internal standard partially overcomes this problem.		
Statistics, Basis, and Calculation Basis	Not Reported; Not Reported; other		
Results Value and Results Details	0.03; <0.01; 0.02; <0.01; 0.27; 0.04; <0.2; <0.02; <0.01; BAF ≤ to 1 indicates no bioaccumulation. Eel concentrations (ug/kg lipid): 2.1; <0.1; 0.4; <0.1; 5.1; 0.5; <0.1; <0.3; <0.1; corresponding sediment concentrations (ug/kg TOC): 72; 11; 21; 680; 19; 12; <0.5; 22; 10		
Metabolites, Reference, and Results Reference Substance	Not reported; not applicable (field study); Not Reported		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified by name.
Metric 2:	Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design			
Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions			
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Study Citation:	Netherlands Institute for Fisheries Research, (2002). HBCD and TBBP-A in sewage sludge, sediments and biota, including interlaboratory study.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	4269983			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor deviations.
	Metric 6:	Testing Conditions	Low	Different media samples were not taken concurrently.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to the study type.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	Medium	The species is routinely used for similar study types; however, one or more additional characteristics of the organisms were not reported, but these omissions were not likely to have a substantial impact on study results.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome assessment.
	Metric 12:	Test Substance Purity	Medium	Limitations were identified in sampling methods of the outcome of interest were reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability were reported in the study, the differences in the measurements were considered with omissions, the omissions were not likely to have a substantial impact on study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Health outcomes not reported, but unlikely to influence the results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical methods used were not suitable for detection and quantification of the target chemical and transformation product; however, these deficiencies were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination

Medium

* Related References: same as 3809184

Study Citation:	Netherlands Institute for Fisheries Research, (2002). HBCD and TBBP-A in sewage sludge, sediments and biota, including interlaboratory study.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	4269983			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBP-A			
Confidentiality, Type, and Guideline	None; Experimental; other: Field sample data			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	No; NR; NR; NR			
Test Organism and Test Organism Details	yellow eel (<i>anguilla anguilla</i>); pooled samples of about 10 eels (tail-ends) from each location: Waal Tiel; Rhine Lobith; Hollands Diep; Haringvliet West; Haringvliet East; Nieuwe Merwede; Meuse Eijsden; Meuse Keizersveer; Roer Vlodrop			
Lipid Content, Test Temperature, pH, and Depuration Time	measured, not reported; not applicable (field study); not applicable (field study); not applicable (field study)			
Media Type, TOC, and Salinity	not specified; not applicable (field study); not applicable (field study)			
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)			
Exposure Route, Elimination, and Nominal Measurements	environmental; not applicable (field study); Not Reported			
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Not Reported			
Comments				
Duration, Parameter, and Sampling Frequency	eel samples collected in 1999; sediment samples collected in 2000; BAF=concentration in eel (ug/kg lipid)/concentration in sediment (ug/kg TOC); not applicable (field study)			
Concentration	Not Reported			
Analytical Method and Analytical Details	GC/MS; Extraction/decomposition of lipids/basic fractionation followed by analysis.;			
Rate Constant and Results per Recovery	Not reported; The method developed for the analysis of TBBP-A is error-prone due to the many steps involved in sample pre-treatment. The correction made with the internal standard partially overcomes this problem.			
Statistics, Basis, and Calculation Basis	Not Reported; Not Reported; other			
Results Value and Results Details	0.02; 0.04; <0.01; <0.01; <0.01; <0.01; <0.01; <0.01; <0.04; BAF ≤ to 1 indicates no bioaccumulation. Eel concentrations (ug/kg lipid): 1.0; 0.9; <0.1; <0.1; <0.1; <0.1; <0.2; <0.1; <0.1; corresponding sediment concentrations (ug/kg TOC): 66; 20; 67; 14; 40; 130; 28; 14; <2.6			
Metabolites, Reference, and Results Reference Substance	Not reported; not applicable (field study); Not Reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
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Study Citation:	Netherlands Institute for Fisheries Research, (2002). HBCD and TBBP-A in sewage sludge, sediments and biota, including interlaboratory study.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	4269983			
Domain		Metric	EVALUATION Rating	Comments
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor deviations.
	Metric 6:	Testing Conditions	Low	Different media samples were not taken concurrently.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to the study type.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	Medium	The species is routinely used for similar study types; however, one or more additional characteristics of the organisms were not reported, but these omissions were not likely to have a substantial impact on study results.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome assessment.
	Metric 12:	Test Substance Purity	Medium	Limitations were identified in sampling methods of the outcome of interest were reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability were reported in the study, the differences in the measurements were considered with omissions, the omissions were not likely to have a substantial impact on study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Health outcomes not reported, but unlikely to influence the results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical methods used were not suitable for detection and quantification of the target chemical and transformation product; however, these deficiencies were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination

Medium

* Related References: same as 3809184

Study Citation:	Springborn Laboratories, (1989). Bioconcentration and elimination of c-residues by fathead minnow (pimephales promelas) exposed to tetrabromobisphenol a (final report) with cover letter dated 031789.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5547084

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; Tetrabromobisphenol-A
Confidentiality, Type, and Guideline	No; experimental; Not Reported: "Protocol for Conducting a Dynamic Bioconcentration Study with Fathead Minnow (Pimephales promelas)", SLS Protocol# 020188IFM-BIOC.BFRIP
Solvent, Reactivity, Storage, Stability	acetone; NR; Stored in freezer prior to use; NR
Radiolabel, Source, State, Purity	Tetrabromobisphenol A (UL-14C); lot #MRI-77-161-19; 8.69 mCi; specific activity 9.32 mCi/mmol; Midwest Research Institute, Kansas City, Missouri; solution in acetone; 96.0% radio purity
Test Organism and Test Organism Details	fathead minnows (Pimephales promelas); SLS Lot #88A73
Lipid Content, Test Temperature, pH, and Depuration Time	Not Reported; 19-21°C; 7.0-7.6; 6 days
Media Type, TOC, and Salinity	natural water, bedrock well and well water from the town of Wareham, Massachusetts; NR; NR
Dissolved Oxygen, Conductivity, and Hardness	8.6 and 9.6 mg/L; 100-130 umhos/cm (dilution water); 26-30 mg/L CaCO3 (dilution water)
Exposure Route, Elimination, and Nominal Measurements	Water; Not Reported; nominal
Test Type, Test Temperature, and Test Condition	continuous until a steady state tissue residue concentration was established; 19-21°C; Not Reported
Comments	
Duration, Parameter, and Sampling Frequency	24 days exposure, 6 days elimination; BCF; 0, 5 and 10 hours and on days 1, 2, 4, 9, 14, 22, and 24 of exposure and days 1, 4, 5 and 6 of depuration
Concentration	5 - µg/L
Analytical Method and Analytical Details	liquid scintillation spectrometer; Beckman Model LS 1801;
Rate Constant and Results per Recovery	Not Reported; 97-104
Statistics, Basis, and Calculation Basis	Not Reported; tissue; 14C-residues in the fish tissue
Results Value and Results Details	1200; BCF = 1200 based on a test substance mean measured concentration exposure level of 4.7 (±0.3) ug/L
Metabolites, Reference, and Results Reference Substance	Specific metabolites not identified in this study; NR; NR

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Some concurrent control groups were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4:	Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported.

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Study Citation:		Springborn Laboratories, (1989). Bioconcentration and elimination of c-residues by fathead minnow (pimephales promelas) exposed to tetrabromobisphenol a (final report) with cover letter dated 031789.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		5547084		
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	Medium	Some test conditions across samples or study groups were not reported, but these discrepancies were not likely to have a substantial impact on study results.
	Metric 8:	System Type and Design	High	Equilibrium was established. The system type and design were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Test organism information was reported, including species or sex, age, and starting body weight and the test organism or species is routinely used for similar study types.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation and all reported variability or uncertainty was not likely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No effects to organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.

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Study Citation:	Springborn Laboratories, (1989). Bioconcentration and elimination of c-residues by fathead minnow (pimephales promelas) exposed to tetrabromobisphe- nol a (final report) with cover letter dated 031789.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5547084

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18:	QSAR Models	N/A The QSAR model had a defined, unambiguous endpoint.

Overall Quality Determination	High
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Study Citation:	Springborn Laboratories, (1989). The subchronic toxicity of sediment-sorbed tetrabromobisphenol A to Chironomus tentans under flow-through conditions (final report) with cover sheet and letter dated 101689.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5547095

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, and Guideline	None; Experimental; other: Bioconcentration in freshwater invertebrates exposed via sediment following ASTM guidelines
Solvent, Reactivity, Storage, Stability	Acetone; NR; TBBPA stored at -20C in a ventilated cabinet; radiolabeled TBBPA stored at -5C; NR
Radiolabel, Source, State, Purity	Midwest Research Institute: 9.32 mCi/mmol; 96.0% radiopurity (purified by TLC); final stock solution 13.8 mg/mL; Brominated Flame Retardant Industry Panel; White powder; 99.15% active ingredient Notes: super stock solution of labeled and unlabeled test material was prepared in acetone
Test Organism and Test Organism Details	Chironomus tentans; Chironomus tentans (freshwater invertebrate) from Springborn Laboratories, Inc.
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 20-22°C; water: 6.9-7.2; sediments: HOC: 5.4, MOC and LOC: 5.5; Not reported
Media Type, TOC, and Salinity	natural water / sediment; HOC: 6.8%, MOC 2.7% and LOC: 0.25%; Not applicable
Dissolved Oxygen, Conductivity, and Hardness	aeration used to maintain levels above 60%; 100-120 microohms/cm; 22-32 mg/L CaCO ₃
Exposure Route, Elimination, and Nominal Measurements	sediment exposure in test dilution water from a bedrock well mixed with untreated town well water; Not reported; Nominal/Mean measured
Test Type, Test Temperature, and Test Condition	flow-through; 20-22°C; Treatment concentrations=0, 13, 25, 50, 100, and 200 mg a.i./kg; sediments had a high sand content and 2-8% silt (details included in paper)
Comments	
Duration, Parameter, and Sampling Frequency	14 days; other; day 0, 3, 7, 10 and 14 (sediment days 0 and 14)
Concentration	13 - 200 mg/kg
Analytical Method and Analytical Details	liquid scintillation; HPLC; MDL from freshwater non-labeled <2.22 mg/mL, labeled < 0.000219 for a 10.00 mL sample;
Rate Constant and Results per Recovery	Not reported; Water recoveries: 102±5.03%; sediment recoveries: 98.0±9.30%; freshwater recoveries non-labeled: 96.1±6.64%; recovery rates of the oxidizer 96.8-100% (experimental data not adjusted for recoveries)
Statistics, Basis, and Calculation Basis	all statistical conclusions made at 95% CI; Not Reported; other
Results Value and Results Details	BCF=240-510 (HOC), 490-1100 (MOC) and 650-3200 (LOC); mean ranges from all treatment levels (sediment)
Metabolites, Reference, and Results Reference Substance	calculated as mean BCF based on ratio of tissue and interstitial water concentrations; dilution water control and solvent (acetone) control included; valid

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Negative controls were included.
	Metric 4:	Test Substance Stability	High	Test substance preparation and storage conditions were reported.
Domain 3: Test Conditions				

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Study Citation:	Springborn Laboratories, (1989). The subchronic toxicity of sediment-sorbed tetrabromobisphenol A to Chironomus tentans under flow-through conditions (final report) with cover sheet and letter dated 101689.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5547095			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Characteristics were reported and monitored.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups.
	Metric 8:	System Type and Design	Medium	Equilibrium was not reported.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Test organism species was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and were conducted at an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variation in measurements were addressed by statistical techniques. Only nominal exposure concentrations reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health or attrition were reported, sample sizes were appropriate.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was detailed elsewhere; percent recovery and limits of detection were reported. BCFs lipid content or lipid normalized values not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistics were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Springborn Laboratories, (1989). Bioconcentration and elimination of C-residues by eastern oysters (<i>Crassostrea virginica</i>) exposed to tetrabromobisphenol A (final report) with attached studies and letter 081889.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5547108

EXTRACTION				
Parameter		Data		
CASRN and Test Material		79-94-7; Tetrabromobisphenol A		
Confidentiality, Type, and Guideline		None; Experimental; other: Bioconcentration in seawater following ASTM guidelines ASTM. 1984. Proposed Standard Practice for Conducting Bioconcentration Tests with Fishes and Saltwater Bivalve Mollusks.		
Solvent, Reactivity, Storage, Stability		Acetone; ring-14C labelled TBBPA, 12.2 mCi and 15.5 mCi/mmol; TBBPA stored at -5C; NR		
Radiolabel, Source, State, Purity		Chemsyn, Lenexa, Kansas; ring labeled; 15.5 mCi/mmole; Brominated Flame Retardant Industry Panel; White powder; 99.15% active ingredient		
Test Organism and Test Organism Details		Notes: specific activity of stock solution of labeled test material in acetone was measured as 59412±404 dpm/ug, 94.1% of theoretical was used for calculations of test results		
Lipid Content, Test Temperature, pH, and Depuration Time		Crassostrea virginica; Crassostrea virginica (Eastern oysters) n=28		
Media Type, TOC, and Salinity		Not reported; 17-21C; 7.6-8.1; 14 days (flowing, uncontaminated seawater)		
Dissolved Oxygen, Conductivity, and Hardness		natural water: marine; Not reported; 32-34 parts per thousand		
Exposure Route, Elimination, and Nominal Measurements		4.9-8.7 mg/L; Not reported; Not reported		
Test Type, Test Temperature, and Test Condition		Not reported; observed during depuration period; Nominal/correction using 94.1% theoretical specific activity		
Comments		flow-through; 17-21C; 97.5% CI for steady state tissue and water concentrations were 630-800 ug/kg and 0.98-1.05 µg/L, respectively		
Duration, Parameter, and Sampling Frequency		20 days; other; exposure period: 0, 6, 12 hours and day 1, 2, 5, 9, 14, 20; depuration period: day 1, 3, 5, 8, 10, 14; water sampled on		
Concentration		1.0 µg/L		
Analytical Method and Analytical Details		Liquid scintillation counting; Limit of radiometric detection: ≤0.34 µg/L;		
Rate Constant and Results per Recovery		Not reported; Oxidizer recovery rates 98.0-103% (experimental data not adjusted); water sample recovery 91.4±20.4%; tissue sample recovery 107±12.2%		
Statistics, Basis, and Calculation Basis		95% CI (BCF values: 570-850); Not Reported; steady state		
Results Value and Results Details		720; 780; mean steady state BCF; model calculation based on measured water and tissue concentrations		
Metabolites, Reference, and Results Reference Substance		Not reported; Not reported; Not reported		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Negative controls were included.
	Metric 4:	Test Substance Stability	High	Test substance preparation and storage conditions were reported.
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Study Citation:	Springborn Laboratories, (1989). Bioconcentration and elimination of C-residues by eastern oysters (<i>Crassostrea virginica</i>) exposed to tetrabromobisphenol A (final report) with attached studies and letter 081889.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5547108			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Characteristics were reported and monitored.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Test organism species was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and were conducted at an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variation in measurements were addressed by statistical techniques.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health or attrition were reported, sample sizes were appropriate.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was detailed elsewhere; percent recovery and limits of detection were reported. BCFs lipid content or lipid normalized values not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistics were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Stoner Labs, (1978). Bioaccumulation of tetrabromobisphenol, in the bluegill sunfish.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5546499

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol
Confidentiality, Type, and Guideline	None; Experimental; other: Bioaccumulation in bluegill sunfish using flow-through bioassay
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	uniformly labeled aromatic rings; specific activity = 9.32 mCi/mmol, diluted to 2.91 mCi/mmol; Velsicol Chemical Corporation; NR; NR
Test Organism and Test Organism Details	Bluegill sunfish (Lepomis macrochirus); Supplied by Alex Fish Co., San Rafael, CA
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; 14 day withdrawal period
Media Type, TOC, and Salinity	not specified; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Environmental media; Not reported; measured
Test Type, Test Temperature, and Test Condition	flow-through; Not reported; Test material delivery rate: 0.062 mL/min; no radiocarbon was detected 2 days after initiation, attributed to low WS
Comments	and substance affinity to plastic tubing of delivery system; this was corrected and test treatment phase was restarted from this point.
Duration, Parameter, and Sampling Frequency	28 days; Not Reported; fish samples collected on days 1, 3, 7, 10, 14, 21, and 28 and days 1, 3, 7, 10 and 14 of the withdrawal phase
Concentration	0.0098±0.0014 ppm
Analytical Method and Analytical Details	combustion analysis of 14CO2 liberated; Radioassay performed in triplicate; LOD=0.002 ppm (water) 0.01 ppm (fish);
Rate Constant and Results per Recovery	Not reported; Not reported
Statistics, Basis, and Calculation Basis	Not reported; Not Reported; Not Reported
Results Value and Results Details	The half-life for edible and visceral tissue was <24 hours; complete elimination of radiocarbon was observed within 7 days once the withdrawal phase had begun; Radiocarbon levels in both the edible and visceral tissue of the fish reached plateau within 3 days of treatment phase; dissipation (to less than 0.01 ppm) occurred within 3 to 7 days of withdrawal phase initiation. Ave radiocarbon level in edible tissue, 0.196 ppm, represented a 20 fold accumulation compared to water concentration; in viscera tissue, 1.69 ppm, represented a 170 fold accumulation compared to water concentration
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The source was reported; the purity was not reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Uninformative	Controls were not included.
	Metric 4:	Test Substance Stability	Low	The test substance stability, homogeneity, preparation, and storage conditions were not reported and these factors likely influenced the test substance or are likely to have a substantial impact on the study results.

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Study Citation:	Stoner Labs, (1978). Bioaccumulation of tetrabromobisphenol, in the bluegill sunfish.				
OECD Harmonized Template:	Aquatic Bioconcentration				
HERO ID:	5546499				
Domain	Metric	EVALUATION		Rating	Comments
Domain 3: Test Conditions					
	Metric 5:	Test Method Suitability	Medium	Applied target chemical concentrations were not observed in water after 2 days; corrections were made to the system.	
	Metric 6:	Testing Conditions	Low	Limited details were reported.	
	Metric 7:	Testing Consistency	Medium	Limited details were reported.	
	Metric 8:	System Type and Design	Medium	Plastic delivery system ha a high affinity for the test substance; corrections were made to the system.	
Domain 4: Test Organisms					
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.	
	Metric 10:	Sampling Methods	Medium	Standard species, limited detail.	
Domain 5: Outcome Assessment					
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.	
	Metric 12:	Test Substance Purity	Low	Limited details were reported.	
Domain 6: Confounding/Variable Control					
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty in the measurements (concentration of test substance; affinity for test system) were not considered or accounted for in data evaluation resulting in some uncertainty; there is concern that variability or uncertainty was likely to have a substantial impact on the results.	
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.	
Domain 7: Data Presentation and Analysis					
	Metric 15:	Data Reporting	Low	Mass balance and recoveries were not reported.	
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.	
Domain 8: Other					
	Metric 17:	Verification or Plausibility of Results	Uninformative	Limited analytical detail, omitted test substance mass balance, and lack of control are serious flaws that make the study unusable.	
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.	

Overall Quality Determination**Uninformative**

Study Citation:	Sun, Y., Guo, H., Yu, H., Wang, X., Wu, J., Xue, Y. (2008). Bioaccumulation and physiological effects of tetrabromobisphenol A in coontail <i>Ceratophyllum demersum</i> L. <i>Chemosphere</i> 70(10):1787-1795.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	4181234

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-4; tetrabromobisphenol A
Confidentiality, Type, and Guideline	None; experimental; other: accumulation and biological response
Solvent, Reactivity, Storage, Stability	acetone; NR; NR; NR
Radiolabel, Source, State, Purity	None; NR; NR; NR Notes: TBBPA
Test Organism and Test Organism Details	<i>Ceratophyllum demersum</i> L.; coontail, obtained from local unpolluted ponds; acclimatized for one month in laboratory conditions (115 umol/sq m/s light with 14 h photoperiod) in 10% Hoagland's solution.
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; 28±2 deg C; not reported; not reported
Media Type, TOC, and Salinity	not specified; not reported; not reported
Dissolved Oxygen, Conductivity, and Hardness	not reported; not reported; not reported
Exposure Route, Elimination, and Nominal Measurements	aqueous; Not Reported; nominal
Test Type, Test Temperature, and Test Condition	static; 28±2 deg C; 10% Hoagland's solution; changed after every 2 days
Comments	
Duration, Parameter, and Sampling Frequency	14 days; Not Reported; 1, 2, 4, 7, 14 days
Concentration	0.05 - 1.0 mg/L
Analytical Method and Analytical Details	HPLC; absorption wavelength 210 nm; free radicals measured by electron paramagnetic resonance;
Rate Constant and Results per Recovery	not reported; analytical recovery 88.2±3.7%
Statistics, Basis, and Calculation Basis	2 step uptake process, rapid uptake for up to 4 days and then slow uptake to 14 days.; not reported; not reported
Results Value and Results Details	Not Reported; at TBBPA exposure concentrations of 0.05, 0.1, 0.2, 0.5 and 1.0 mg/L for 14 days, plant concentrations were ~0.03, 0.12, 0.33, 0.68, 1.15 mg/g dry weight, respectively. (from figure)
Metabolites, Reference, and Results Reference Substance	increase in free radicals; untreated control; Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name and CASRN.
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity were not reported; however, the omissions were not likely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3:	Study Controls	High	Concurrent controls were included.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Study Citation:	Sun, Y., Guo, H., Yu, H., Wang, X., Wu, J., Xue, Y. (2008). Bioaccumulation and physiological effects of tetrabromobisphenol A in coontail <i>Ceratophyllum demersum</i> L. <i>Chemosphere</i> 70(10):1787-1795.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	4181234			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups. The conditions of the exposure were documented.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	the test organism or species is routinely used for similar study types; however, one or more additional characteristics of the organisms were not reported, but these omissions were not likely to have a substantial impact on study results.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	there was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variability and uncertainty were not explicitly addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Attrition or health outcomes were not reported; however, this omission was not likely to have a substantial impact on study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

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Study Citation:	Sun, Y., Guo, H., Yu, H., Wang, X., Wu, J., Xue, Y. (2008). Bioaccumulation and physiological effects of tetrabromobisphenol A in coontail Ceratophyllum demersum L. Chemosphere 70(10):1787-1795.		
OECD Harmonized Template:	Aquatic Bioconcentration		
HERO ID:	4181234		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	SUNY, (2021). Tetrabromobisphenol A and hexabromocyclododecanes in sediments and biota from two typical mangrove wetlands of South China: Distribution, bioaccumulation and biomagnification. Science of the Total Environment 750:41695-41695.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	10115502

EXTRACTION

Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, Type, and Guideline	no; experimental - field study; other: non-guideline study
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported Notes: Field study
Test Organism and Test Organism Details	striped mullet (<i>Mugil cephalus</i> , n=4), mud crab (<i>Scylla serrata</i> , n = 6), red eelgoby (<i>Odontamblyopus rubicundus</i> , n = 4), Chinese black sleeper (<i>Bostrichthys sinensis</i> , n=6) and blue-spotted mudskipper (<i>Boleophthalmus pectinirostris</i> , n = 6); Biota samples collected in October 2013 from Longhai Mangrove Nature Reserve (n=26; JRE)
Lipid Content, Test Temperature, pH, and Depuration Time	lipid %: striped mullet (<i>Mugil cephalus</i>) = 2.37 ± 0.82 ; mud crab (<i>Scylla serrata</i>) = 0.64 ± 0.08 ; red eelgoby (<i>Odontamblyopus rubicundus</i>) = 0.84 ± 0.18 ; Chinese black sleeper (<i>Bostrichthys sinensis</i>) = 0.66 ± 0.07 ; blue-spotted mudskipper (<i>Boleophthalmus pectinirostris</i>) = 0.85 ± 0.11 ; ambient; Not Reported; Not Reported
Media Type, TOC, and Salinity	natural water-sediment (n=18); TOC-normalized concentration (ng/g TOC) of TBBPA ranged from 0.14-0.74; Not Reported
Dissolved Oxygen, Conductivity, and Hardness	Not Reported; Not Reported; Not Reported
Exposure Route, Elimination, and Nominal Measurements	field study; Not Reported; measured
Test Type, Test Temperature, and Test Condition	field study; ambient; Sediment samples collected in November 2012 from Qi'ao Island (n=12) and October 2013 from Longhai Mangrove Nature Reserve (n=18)
Comments	
Duration, Parameter, and Sampling Frequency	Not Reported; Not Reported; Not Reported
Concentration	TBBPA (ng/g): striped mullet (<i>Mugil cephalus</i>) = 1.86 (0.56–4.27); mud crab (<i>Scylla serrata</i>) = 4.33 (2.21–6.34); red eelgoby (<i>Odontamblyopus rubicundus</i>) = 6.55 (2.08–13.1); Chinese black sleeper (<i>Bostrichthys sinensis</i>) = 3.58 (1.17–6.58); blue-spotted mudskipper (<i>Boleophthalmus pectinirostris</i>) = 6.77 (2.92–12.3) - ng/g
Analytical Method and Analytical Details	LC-MS; Method detection limit: 0.69 pg/g dw (sediment) and 0.35 ng/g lw (biota);
Rate Constant and Results per Recovery	Not Reported; spiked blank recovery: $94 \pm 9.6\%$; spiked sediment recovery: $81 \pm 3.4\%$; spiked biota recovery: $101 \pm 2.9\%$
Statistics, Basis, and Calculation Basis	Statistical analysis: SPSS 16.0 and Origin 8.0, level of significance $p < 0.05$; lipid-normalized chemical concentration in biota; TOC-normalized chemical concentration in sediment; steady state
Results Value and Results Details	BSAF (Mean $\pm$ SE): striped mullet (<i>Mugil cephalus</i>) = 5.79 ± 2.60 ; mud crab (<i>Scylla serrata</i>) = 13.5 ± 1.78 ; red eelgoby (<i>Odontamblyopus rubicundus</i>) = 20.4 ± 7.56 ; Chinese black sleeper (<i>Bostrichthys sinensis</i>) = 11.2 ± 2.26 ; blue-spotted mudskipper (<i>Boleophthalmus pectinirostris</i>) = 21.1 ± 4.37 ; TMF = 1.22 ($p = 0.71$); BMF (red eelgoby–mud crab) = 1.51; BMF (Chinese black sleeper–mud crab) = 0.83; BSAF = $C_{biota}(\text{ng/g dw})/C_{sediment}(\text{ng/g, TOC})$; C_{biota} is the lipid-normalized chemical concentration in biota species and $C_{sediment}$ is the TOC-normalized chemical concentration in sediment; $BMF = C_{predator}(\text{ng/g lw})/C_{prey}(\text{ng/g lw})$; $TMF = e^b$, where b is the slope of $\ln(C_{biota}) = a + b \times TL$ (a and b equal the y-intercept and the slope of the linear regression of $\ln(C_{biota})$ against TL, respectively)
Metabolites, Reference, and Results Reference Substance	Not Reported; Not Reported; Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified definitively.

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Study Citation:	SUNY, (2021). Tetrabromobisphenol A and hexabromocyclododecanes in sediments and biota from two typical mangrove wetlands of South China: Distribution, bioaccumulation and biomagnification. Science of the Total Environment 750:41695-41695.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	10115502			
Domain		Metric	EVALUATION Rating	Comments
	Metric 2:	Test Substance Purity	Medium	The test substance source was not reported; however, the omissions were not likely to have a substantial impact on the study results.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	N/A	This metric is not applicable to the study.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	N/A	This metric is not applicable to the study.
	Metric 6:	Testing Conditions	High	Sampling site locations and conditions were reported.
	Metric 7:	Testing Consistency	N/A	This metric is not applicable to the study.
	Metric 8:	System Type and Design	High	Equilibrium assumed in field studies.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	High	Test organism information was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcomes of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcomes of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the datasets.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

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Study Citation:	SUNY, (2021). Tetrabromobisphenol A and hexabromocyclododecanes in sediments and biota from two typical mangrove wetlands of South China: Distribution, bioaccumulation and biomagnification. Science of the Total Environment 750:41695-41695.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	10115502

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	SUNY, (2021). Tetrabromobisphenol A and hexabromocyclododecanes in sediments and biota from two typical mangrove wetlands of South China: Distribution, bioaccumulation and biomagnification. Science of the Total Environment 750:41695-41695.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	10115502

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, Type, and Guideline	no; experimental - field study; other: non-guideline study
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported Notes: Field study
Test Organism and Test Organism Details	striped mullet (<i>Mugil cephalus</i> , n=6), mud crab (<i>Scylla serrata</i> , n = 5), red eelgoby (<i>Odontamblyopus rubicundus</i> , n = 6), Chinese black sleeper (<i>Bostrichthys sinensis</i> , n=6) and blue-spotted mudskipper (<i>Boleophthalmus pectinirostris</i> , n = 4); Biota samples collected in November 2012 from Qi'ao Island (n=27; PRE)
Lipid Content, Test Temperature, pH, and Depuration Time	lipid %: striped mullet (<i>Mugil cephalus</i>) = 0.79 ± 0.16 ; mud crab (<i>Scylla serrata</i>) = 0.77 ± 0.12 ; red eelgoby (<i>Odontamblyopus rubicundus</i>) = 0.62 ± 0.15 ; Chinese black sleeper (<i>Bostrichthys sinensis</i>) = 0.57 ± 0.04 ; blue-spotted mudskipper (<i>Boleophthalmus pectinirostris</i>) = 0.45 ± 0.05 ; ambient; Not Reported; Not Reported
Media Type, TOC, and Salinity	natural water-sediment (n=12); TOC-normalized concentration (ng/g TOC) of TBBPA ranged from 0.42-11.9; Not Reported
Dissolved Oxygen, Conductivity, and Hardness	Not Reported; Not Reported; Not Reported
Exposure Route, Elimination, and Nominal Measurements	field study; Not Reported; measured
Test Type, Test Temperature, and Test Condition	field study; ambient; Sediment samples collected in November 2012 from Qi'ao Island (n=12) and October 2013 from Longhai Mangrove Nature Reserve (n=18)
Comments	Not Reported; Not Reported; Not Reported
Duration, Parameter, and Sampling Frequency	TBBPA conc. (ng/g): striped mullet (<i>Mugil cephalus</i>) = 5.83 (0.67 - 11.0); mud crab (<i>Scylla serrata</i>) = 5.40 (1.26 - 8.10); red eelgoby (<i>Odontamblyopus rubicundus</i>) = 5.33 (1.94 - 10.4); Chinese black sleeper (<i>Bostrichthys sinensis</i>) = 6.97 (4.64 - 11.1); blue-spotted mudskipper (<i>Boleophthalmus pectinirostris</i>) = 15.0 (5.86 - 22.1) - ng/g
Concentration	LC-MS; Method detection limit: 0.69 pg/g dw (sediment) and 0.35 ng/g lw (biota);
Analytical Method and Analytical Details	NR; spiked blank recovery: $94 \pm 9.6\%$, spiked sediment recovery: $81 \pm 3.4\%$, spiked biota recovery: $101 \pm 2.9\%$
Rate Constant and Results per Recovery	Statistical analysis: SPSS 16.0 and Origin 8.0, level of significance $p < 0.05$; lipid-normalized chemical concentration in biota; TOC-normalized chemical concentration in sediment; steady state
Statistics, Basis, and Calculation Basis	BSAF (Mean $\pm$ SE): striped mullet (<i>Mugil cephalus</i>) = 1.24 ± 0.33 ; mud crab (<i>Scylla serrata</i>) = 1.14 ± 0.27 ; red eelgoby (<i>Odontamblyopus rubicundus</i>) = 1.13 ± 0.26 ; Chinese black sleeper (<i>Bostrichthys sinensis</i>) = 1.48 ± 0.79 ; blue-spotted mudskipper (<i>Boleophthalmus pectinirostris</i>) = 3.18 ± 0.74 ; TMF = 2.17 ($p = 0.04$); BMF (red eelgoby-mud crab) = 0.99; BMF (Chinese black sleeper-mud crab) = 1.29; BSAF = Cbiota(ng/g dw)/Csediment (ng/g, TOC); Cbiota is the lipid-normalized chemical concentration in biota species and Csediment is the TOC-normalized chemical concentration in sediment $BMF = C_{predator} (ng/g lw) / C_{prey} (ng/g lw) / TMF = e^b$, where b is the slope of $\ln(C_{biota}) = a + b \times TL$ (a and b equal the y-intercept and the slope of the linear regression of $\ln(C_{biota})$ against TL, respectively)
Results Value and Results Details	Not Reported; Not Reported; Not Reported
Metabolites, Reference, and Results Reference Substance	Not Reported; Not Reported; Not Reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	High	The test substance was identified definitively.
	Metric 2:	Medium	The test substance source was not reported; however, the omissions were not likely to have a substantial impact on the study results.

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Study Citation:	SUNY, (2021). Tetrabromobisphenol A and hexabromocyclododecanes in sediments and biota from two typical mangrove wetlands of South China: Distribution, bioaccumulation and biomagnification. Science of the Total Environment 750:41695-41695.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	10115502			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	N/A	This metric is not applicable to the study.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	N/A	This metric is not applicable to the study.
	Metric 6:	Testing Conditions	High	Sampling site locations and conditions were reported.
	Metric 7:	Testing Consistency	N/A	This metric is not applicable to the study.
	Metric 8:	System Type and Design	High	Equilibrium assumed in field studies.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	High	Test organism information was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcomes of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the datasets.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination**High**

Study Citation:	Tang, B., Zeng, Y. H., Luo, X. J., Zheng, X. B., Mai, B. X. (2015). Bioaccumulative characteristics of tetrabromobisphenol A and hexabromocyclododecanes in multi-tissues of prey and predator fish from an e-waste site, South China. Environmental Science and Pollution Research 22(16):12011-12017.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3350534			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, and Guideline	None; Experimental; other: This study investigated total TBBPA concentration and enantiomeric fractions of (+)- and (-)-alpha-HBCD in mud carp and northern snakehead in a contaminated pond in South China.			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; samples collected from fish species in an e-waste region; NR; NR			
Test Organism and Test Organism Details	Prey fish: mud carp, Cirrhinus molitorella. Predator fish: northern snakehead, Ophicephalus argus.; Length: 30±1 cm (mud carp, n=5), 23±2 cm (northern snakehead, n=5)			
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; Not reported			
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported			
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported			
Exposure Route, Elimination, and Nominal Measurements	Water; Not reported; 837 pg/g ww (mud carp), 4.3 ng/g lw (muscles of mud carp); 384 pg/g (northern snakehead), 9.7 ng/g, lw (muscles northern snakehead)			
Test Type, Test Temperature, and Test Condition	field study; Not reported; Samples collected from natural pond in South China which was contaminated with e-waste.			
Comments				
Duration, Parameter, and Sampling Frequency	Not reported; Not Reported; 2010			
Concentration	Not Reported			
Analytical Method and Analytical Details	LC/MS; detection limit: 16-25 pg/g ww; XDB-C18 column;			
Rate Constant and Results per Recovery	Not applicable; 74-97% in spiked blanks. 84-99% in spiked matrices.			
Statistics, Basis, and Calculation Basis	Relationship between lipid content and concentration in tissues: r^2=0.62, p < 0.001 (mud carp); r^2=0.93, p< 0.001 (northern snakehead); whole body w.w.; other			
Results Value and Results Details	Mud carp=837 pg/g ww, northern snakehead=384 pg/g ww; No TBBPA detected in roe, intestine, and chyme in the two fish species; result suggested that the tissue distribution of TBBPA is species-specific			
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance was able to be identified by the analytical method.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Spiked blanks and spiked matrices were tested to determine recoveries.
	Metric 4:	Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.
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Study Citation:	Tang, B., Zeng, Y. H., Luo, X. J., Zheng, X. B., Mai, B. X. (2015). Bioaccumulative characteristics of tetrabromobisphenol A and hexabromocyclododecanes in multi-tissues of prey and predator fish from an e-waste site, South China. Environmental Science and Pollution Research 22(16):12011-12017.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3350534			
Domain		Metric	EVALUATION Rating	Comments
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Low	The test method did not report concentrations in water for the test substance.
	Metric 6:	Testing Conditions	Medium	Conditions in the water from which the fish were taken were not clearly reported but were unlikely to have impacted the study results.
	Metric 7:	Testing Consistency	High	Samples were taken from the same pond and underwent the same sample preparation.
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Information about the species tested was given and the two selected species were appropriate for the study; Body weights were not reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Uninformative	Outcome assessment methodology did not address the intended outcomes of interest in the study.
	Metric 12:	Test Substance Purity	N/A	Samples were only analyzed once so the adequacy of sampling timing and frequency was not applicable.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Percent lipid was not reported, although concentrations were reported as lipid-normalized.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health or attrition were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Percent recovery and lipid normalized BCFs were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were outlined and appropriate to the study evaluation. No kinetic calculations were made.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Several other studies were cited at various points that validated the study results as being reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination

Uninformative

Study Citation:	Tao, L., Wu, J. P., Zhi, H., Zhang, Y., Ren, Z. H., Luo, X. J., Mai, B. X. (2016). Aquatic bioaccumulation and trophic transfer of tetrabromobisphenol-A flame retardant introduced from a typical e-waste recycling site. Environmental Science and Pollution Research 23(14):14663-14670.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	3986061

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported; bioaccumulation and trophic transfer in a pond near an e-waste recycling site.
Solvent, Reactivity, Storage, Stability	NA; NR; Organism samples stored at -20°C; NR
Radiolabel, Source, State, Purity	NA; Samples collected from a natural pond at an e-waste recycling site in South China; NA; NA
Test Organism and Test Organism Details	Chinese mystery snail, Cipangopaludina chinensis; n=43, trophic level 2.00±0.04
Lipid Content, Test Temperature, pH, and Depuration Time	0.61±0.10%; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Water; Not applicable; Measured, n=6
Test Type, Test Temperature, and Test Condition	field study; Not reported; Water and organism samples collected from a natural pond at an e-waste recycling center in Longtang, Guangdong
Comments	Province, China; Reference mudcarp sample collected from unpolluted site in Yuantan
Duration, Parameter, and Sampling Frequency	Not applicable; Not Reported; 2007
Concentration	380±144 pg/L
Analytical Method and Analytical Details	LC-ESI-MS/MS in negative ionization mode; analytes separated on XDB-C18 column; detection limit 10 pg/g lipid wt.; Homogenized biota samples Soxhlet extracted with hexane/acetone, cleaned up by gel permeation chromatography and on a glass column with 3% deactivated silica gel, eluted with DCM/hexane, concentrated, solvent exchanged to methanol, and concentrated again.;
Rate Constant and Results per Recovery	Not applicable; 80 - 98% (spiked in solvent), 92 - 101% (spiked in fish muscles)
Statistics, Basis, and Calculation Basis	BAF normality tested between species by Kolmogorov-Smirnov test; two-group t test used when normally distributed; Mann-Whitney U test used when not; Linear regression between log TBBPA and species trophic level; significance p < 0.05; Whole body, wet wt.; steady state
Results Value and Results Details	BAF Approx. 5400; 1970±560 pg/g wet wt; TBBPA not significantly negatively correlated to the trophic level (r=-0.82, p=0.09), suggests trophic dilution in the food web; estimated trophic magnification factor=0.25
Metabolites, Reference, and Results Reference Substance	Not reported; Procedural blanks; reference mudcarp from unpolluted site; Not detected; 145±115 pg/g wet wt.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The sample source was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Analytical blanks were included and were within a valid range; non-polluted site samples were collected and detected organism concentrations were 5x below concentrations at the study site.

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Study Citation:	Tao, L., Wu, J. P., Zhi, H., Zhang, Y., Ren, Z. H., Luo, X. J., Mai, B. X. (2016). Aquatic bioaccumulation and trophic transfer of tetrabromobisphenol-A flame retardant introduced from a typical e-waste recycling site. Environmental Science and Pollution Research 23(14):14663-14670.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3986061			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	Organism sample storage and preparation were reported, water sample extraction was reported elsewhere.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	No sample characteristics or environmental conditions were reported.
	Metric 7:	Testing Consistency	High	Samples were processed and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be at dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Test organism species was reported, no other characteristics were included.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and were collected with an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability was addressed by statistical techniques between samples, the reported concentrations did not need to be corrected based on the blanks and extraction efficiency.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, percent recovery and limits of detection were reported. BAFs were calculated by the study authors, lipid content was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and higher compared to previous studies, suggesting this scenario represents worst-case.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Tao, L., Wu, J. P., Zhi, H., Zhang, Y., Ren, Z. H., Luo, X. J., Mai, B. X. (2016). Aquatic bioaccumulation and trophic transfer of tetrabromobisphenol-A flame retardant introduced from a typical e-waste recycling site. Environmental Science and Pollution Research 23(14):14663-14670.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	3986061

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported; bioaccumulation and trophic transfer in a pond near an e-waste recycling site.
Solvent, Reactivity, Storage, Stability	NA; NR; Organism samples stored at -20°C; NR
Radiolabel, Source, State, Purity	NA; Samples collected from a natural pond at an e-waste recycling site in South China; NA; NA
Test Organism and Test Organism Details	Prawn, Macrobrachium nipponense; n=7, trophic level 2.92±0.21
Lipid Content, Test Temperature, pH, and Depuration Time	2.41±0.42%; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Water; Not applicable; Measured, n=6
Test Type, Test Temperature, and Test Condition	field study; Not reported; Water and organism samples collected from a natural pond at an e-waste recycling center in Longtang, Guangdong Province, China; Reference mudcarp sample collected from unpolluted site in Yuantan
Comments	Not applicable; 80 - 98% (spiked in solvent), 92 - 101% (spiked in fish muscles)
Duration, Parameter, and Sampling Frequency	Not applicable; Not Reported; 2007
Concentration	380±144 pg/L
Analytical Method and Analytical Details	LC-ESI-MS/MS in negative ionization mode; analytes separated on XDB-C18 column; detection limit 10 pg/g lipid wt.; Homogenized biota samples Soxhlet extracted with hexane/acetone, cleaned up by gel permeation chromatography and on a glass column with 3% deactivated silica gel, eluted with DCM/hexane, concentrated, solvent exchanged to methanol, and concentrated again.;
Rate Constant and Results per Recovery	Not applicable; 80 - 98% (spiked in solvent), 92 - 101% (spiked in fish muscles)
Statistics, Basis, and Calculation Basis	BAF normality tested between species by Kolmogorov-Smirnov test; two-group t test used when normally distributed; Mann-Whitney U test used when not; Linear regression between log TBBPA and species trophic level; significance p < 0.05; Whole body, wet wt.; steady state
Results Value and Results Details	BAF=4120; 1570±400 pg/g wet wt; TBBPA not significantly negatively correlated to the trophic level (r=-0.82, p=0.09), suggests trophic dilution in the food web; estimated trophic magnification factor=0.25
Metabolites, Reference, and Results Reference Substance	Not reported; Procedural blanks; reference mudcarp from unpolluted site; Not detected; 145±115 pg/g wet wt.

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
Domain 2: Test Design	Metric 3:	Study Controls	High
	Metric 4:	Test Substance Stability	Medium

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Study Citation:	Tao, L., Wu, J. P., Zhi, H., Zhang, Y., Ren, Z. H., Luo, X. J., Mai, B. X. (2016). Aquatic bioaccumulation and trophic transfer of tetrabromobisphenol-A flame retardant introduced from a typical e-waste recycling site. Environmental Science and Pollution Research 23(14):14663-14670.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3986061			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	No sample characteristics or environmental conditions were reported.
	Metric 7:	Testing Consistency	High	Samples were processed and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be at dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Test organism species was reported, no other characteristics were included.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and were collected with an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability was addressed by statistical techniques between samples, the reported concentrations did not need to be corrected based on the blanks and extraction efficiency.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, percent recovery and limits of detection were reported. BAFs were calculated by the study authors, lipid content was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and higher compared to previous studies, suggesting this scenario represents worst-case.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Tao, L., Wu, J. P., Zhi, H., Zhang, Y., Ren, Z. H., Luo, X. J., Mai, B. X. (2016). Aquatic bioaccumulation and trophic transfer of tetrabromobisphenol-A flame retardant introduced from a typical e-waste recycling site. Environmental Science and Pollution Research 23(14):14663-14670.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	3986061

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported; bioaccumulation and trophic transfer in a pond near an e-waste recycling site.
Solvent, Reactivity, Storage, Stability	NA; NR; Organism samples stored at -20°C; NR
Radiolabel, Source, State, Purity	NA; Samples collected from a natural pond at an e-waste recycling site in South China; NA; NA
Test Organism and Test Organism Details	Mud carp, <i>Cirrhinus molitorella</i> ; n=12, trophic level 3.07±0.20
Lipid Content, Test Temperature, pH, and Depuration Time	2.91±0.35%; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Water; Not applicable; Measured, n=6
Test Type, Test Temperature, and Test Condition	field study; Not reported; Water and organism samples collected from a natural pond at an e-waste recycling center in Longtang, Guangdong Province, China; Reference mudcarp sample collected from unpolluted site in Yuantan
Comments	
Duration, Parameter, and Sampling Frequency	Not applicable; Not Reported; 2007
Concentration	380±144 pg/L
Analytical Method and Analytical Details	LC-ESI-MS/MS in negative ionization mode; analytes separated on XDB-C18 column; detection limit 10 pg/g lipid wt.; Homogenized biota samples Soxhlet extracted with hexane/acetone, cleaned up by gel permeation chromatography and on a glass column with 3% deactivated silica gel, eluted with DCM/hexane, concentrated, solvent exchanged to methanol, and concentrated again.;
Rate Constant and Results per Recovery	Not applicable; 80 - 98% (spiked in solvent), 92 - 101% (spiked in fish muscles)
Statistics, Basis, and Calculation Basis	BAF normality tested between species by Kolmogorov-Smirnov test; two-group t test used when normally distributed; Mann-Whitney U test used when not; Linear regression between log TBBPA and species trophic level; significance $p < 0.05$; Whole body, wet wt.; steady state
Results Value and Results Details	BAF approx. 2000; 730±220 pg/g wet wt; TBBPA not significantly negatively correlated to the trophic level ($r=-0.82$, $p=0.09$), suggests trophic dilution in the food web; estimated trophic magnification factor=0.25
Metabolites, Reference, and Results Reference Substance	Not reported; Procedural blanks; reference mudcarp from unpolluted site; Not detected; 145±115 pg/g wet wt.

		EVALUATION		
Domain		Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The sample source was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Analytical blanks were included and were within a valid range; non-polluted site samples were collected and detected organism concentrations were 5x below concentrations at the study site.
	Metric 4:	Test Substance Stability	Medium	Organism sample storage and preparation were reported, water sample extraction was reported elsewhere.

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Study Citation:	Tao, L., Wu, J. P., Zhi, H., Zhang, Y., Ren, Z. H., Luo, X. J., Mai, B. X. (2016). Aquatic bioaccumulation and trophic transfer of tetrabromobisphenol-A flame retardant introduced from a typical e-waste recycling site. Environmental Science and Pollution Research 23(14):14663-14670.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3986061			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	No sample characteristics or environmental conditions were reported.
	Metric 7:	Testing Consistency	High	Samples were processed and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be at dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Test organism species was reported, no other characteristics were included.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and were collected with an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability was addressed by statistical techniques between samples, the reported concentrations did not need to be corrected based on the blanks and extraction efficiency.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, percent recovery and limits of detection were reported. BAFs were calculated by the study authors, lipid content was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and higher compared to previous studies, suggesting this scenario represents worst-case.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Tao, L., Wu, J. P., Zhi, H., Zhang, Y., Ren, Z. H., Luo, X. J., Mai, B. X. (2016). Aquatic bioaccumulation and trophic transfer of tetrabromobisphenol-A flame retardant introduced from a typical e-waste recycling site. Environmental Science and Pollution Research 23(14):14663-14670.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	3986061

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported; bioaccumulation and trophic transfer in a pond near an e-waste recycling site.
Solvent, Reactivity, Storage, Stability	NA; NR; Organism samples stored at -20°C; NR
Radiolabel, Source, State, Purity	NA; Samples collected from a natural pond at an e-waste recycling site in South China; NA; NA
Test Organism and Test Organism Details	Crucian carp, Carassius auratus; n=18, trophic level 2.90±0.41
Lipid Content, Test Temperature, pH, and Depuration Time	3.60±0.56%; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Water; Not applicable; Measured, n=6
Test Type, Test Temperature, and Test Condition	field study; Not reported; Water and organism samples collected from a natural pond at an e-waste recycling center in Longtang, Guangdong Province, China; Reference mudcarp sample collected from unpolluted site in Yuantan
Comments	
Duration, Parameter, and Sampling Frequency	Not applicable; Not Reported; 2007
Concentration	380±144 pg/L
Analytical Method and Analytical Details	LC-ESI-MS/MS in negative ionization mode; analytes separated on XDB-C18 column; detection limit 10 pg/g lipid wt.; Homogenized biota samples Soxhlet extracted with hexane/acetone, cleaned up by gel permeation chromatography and on a glass column with 3% deactivated silica gel, eluted with DCM/hexane, concentrated, solvent exchanged to methanol, and concentrated again.;
Rate Constant and Results per Recovery	Not applicable; 80 - 98% (spiked in solvent), 92 - 101% (spiked in fish muscles)
Statistics, Basis, and Calculation Basis	BAF normality tested between species by Kolmogorov-Smirnov test; two-group t test used when normally distributed; Mann-Whitney U test used when not; Linear regression between log TBBPA and species trophic level; significance $p < 0.05$; Whole body, wet wt.; steady state
Results Value and Results Details	BAF Approx. 1700; 590±230 pg/g wet wt; TBBPA not significantly negatively correlated to the trophic level ($r=-0.82$, $p=0.09$), suggests trophic dilution in the food web; estimated trophic magnification factor=0.25
Metabolites, Reference, and Results Reference Substance	Not reported; Procedural blanks; reference mudcarp from unpolluted site; Not detected; 145±115 pg/g wet wt.

		EVALUATION	
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
Domain 2: Test Design	Metric 3:	Study Controls	High
	Metric 4:	Test Substance Stability	Medium

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Study Citation:	Tao, L., Wu, J. P., Zhi, H., Zhang, Y., Ren, Z. H., Luo, X. J., Mai, B. X. (2016). Aquatic bioaccumulation and trophic transfer of tetrabromobisphenol-A flame retardant introduced from a typical e-waste recycling site. Environmental Science and Pollution Research 23(14):14663-14670.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3986061			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	No sample characteristics or environmental conditions were reported.
	Metric 7:	Testing Consistency	High	Samples were processed and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be at dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Test organism species was reported, no other characteristics were included.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and were collected with an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability was addressed by statistical techniques between samples, the reported concentrations did not need to be corrected based on the blanks and extraction efficiency.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, percent recovery and limits of detection were reported. BAFs were calculated by the study authors, lipid content was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and higher compared to previous studies, suggesting this scenario represents worst-case.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Tao, L., Wu, J. P., Zhi, H., Zhang, Y., Ren, Z. H., Luo, X. J., Mai, B. X. (2016). Aquatic bioaccumulation and trophic transfer of tetrabromobisphenol-A flame retardant introduced from a typical e-waste recycling site. Environmental Science and Pollution Research 23(14):14663-14670.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3986061			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported; bioaccumulation and trophic transfer in a pond near an e-waste recycling site.			
Solvent, Reactivity, Storage, Stability	NA; NR; Organism samples stored at -20°C; NR			
Radiolabel, Source, State, Purity	NA; Samples collected from a natural pond at an e-waste recycling site in South China; NA; NA			
Test Organism and Test Organism Details	Northern snakehead, Ophicephalus argus; n=6, trophic level 4.28±0.17			
Lipid Content, Test Temperature, pH, and Depuration Time	1.52±0.28%; Not reported; Not reported; Not reported			
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported			
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported			
Exposure Route, Elimination, and Nominal Measurements	Water; Not applicable; Measured, n=6			
Test Type, Test Temperature, and Test Condition	field study; Not reported; Water and organism samples collected from a natural pond at an e-waste recycling center in Longtang, Guangdong Province, China; Reference mudcarp sample collected from unpolluted site in Yuantan			
Comments	Not applicable; Not Reported; 2007			
Duration, Parameter, and Sampling Frequency	380±144 pg/L			
Concentration	LC-ESI-MS/MS in negative ionization mode; analytes separated on XDB-C18 column; detection limit 10 pg/g lipid wt.; Homogenized biota samples Soxhlet extracted with hexane/acetone, cleaned up by gel permeation chromatography and on a glass column with 3% deactivated silica gel, eluted with DCM/hexane, concentrated, solvent exchanged to methanol, and concentrated again.;			
Analytical Method and Analytical Details	Not applicable; 80 - 98% (spiked in solvent), 92 - 101% (spiked in fish muscles)			
Rate Constant and Results per Recovery	BAF normality tested between species by Kolmogorov-Smirnov test; two-group t test used when normally distributed; Mann-Whitney U test used when not; Linear regression between log TBBPA and species trophic level; significance p < 0.05; Whole body, wet wt.; steady state			
Statistics, Basis, and Calculation Basis	BAF Approx. 1000; 350±190 pg/g wet wt; TBBPA not significantly negatively correlated to the trophic level (r=-0.82, p=0.09), suggests trophic dilution in the food web; estimated trophic magnification factor=0.25			
Results Value and Results Details	Not reported; Procedural blanks; reference mudcarp from unpolluted site; Not detected; 145±115 pg/g wet wt.			
Metabolites, Reference, and Results Reference Substance				
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The sample source was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Analytical blanks were included and were within a valid range; non-polluted site samples were collected and detected organism concentrations were 5x below concentrations at the study site.
	Metric 4:	Test Substance Stability	Medium	Organism sample storage and preparation were reported, water sample extraction was reported elsewhere.
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Study Citation:	Tao, L., Wu, J. P., Zhi, H., Zhang, Y., Ren, Z. H., Luo, X. J., Mai, B. X. (2016). Aquatic bioaccumulation and trophic transfer of tetrabromobisphenol-A flame retardant introduced from a typical e-waste recycling site. Environmental Science and Pollution Research 23(14):14663-14670.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	3986061			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	No sample characteristics or environmental conditions were reported.
	Metric 7:	Testing Consistency	High	Samples were processed and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be at dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Test organism species was reported, no other characteristics were included.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and were collected with an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability was addressed by statistical techniques between samples, the reported concentrations did not need to be corrected based on the blanks and extraction efficiency.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, percent recovery and limits of detection were reported. BAFs were calculated by the study authors, lipid content was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and higher compared to previous studies, suggesting this scenario represents worst-case.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2015). Flame retardants in printed circuit boards. Final report.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	7500050

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	none; experimental; other: not specified
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported
Test Organism and Test Organism Details	Lepomis macrochirus (Bluegill sunfish); Not Reported
Lipid Content, Test Temperature, pH, and Depuration Time	Not Reported; Not Reported; Not Reported; Not Reported
Media Type, TOC, and Salinity	Not Reported; Not Reported; Not Reported
Dissolved Oxygen, Conductivity, and Hardness	Not Reported; Not Reported; Not Reported
Exposure Route, Elimination, and Nominal Measurements	Not Reported; Not Reported; Not Reported
Test Type, Test Temperature, and Test Condition	Not Reported; Not Reported; Not Reported
Comments	
Duration, Parameter, and Sampling Frequency	Not Reported; Not Reported; Not Reported
Concentration	Not Reported
Analytical Method and Analytical Details	Not Reported; Not Reported;
Rate Constant and Results per Recovery	Not Reported; Not Reported
Statistics, Basis, and Calculation Basis	Not Reported; Not Reported; Not Reported
Results Value and Results Details	BCF = 170; Lepomis macrochirus Bluegill sunfish were exposed to 14C-TBBPA for 28 days to 0.0098 mg/L (flow-through) followed by a 14-day withdrawal period. The bioconcentration factor (BCF) in edible tissue was 20 and 170 in visceral tissue. These BCF values were based on 14C-residues and therefore represent the sum total of parent compound, any retained metabolites and assimilated carbon.
Metabolites, Reference, and Results Reference Substance	Not Reported; Not Reported; Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Limited details reported in this secondary source; detail may be in primary literature.

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Study Citation:	U.S. EPA, (2015). Flame retardants in printed circuit boards. Final report.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	7500050			
Domain		Metric	EVALUATION Rating	Comments
	Metric 6:	Testing Conditions	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable to this study.
	Metric 10:	Sampling Methods	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.

Overall Quality Determination**Medium**

* Related References: Source (not in HERO at time of extraction): ACC (2006b) Test plan revision/updates, revised summaries. Robust summaries & test plans: Phenol, 4,4'-isopropylidenebis[2,6-dibromo-. American Chemistry Council Brominated Flame Retardant Industry Panel (BFRIP). Submitted under the HPV Challenge Program. <http://www.epa.gov/chemrtk/pubs/summaries/phenolis/c13460rr3.pdf>. Also added under HERO ID 5238261

Study Citation:	U.S. EPA, (2015). Flame retardants in printed circuit boards. Final report.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	7500050			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, and Guideline	none; experimental; other: not specified			
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported			
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported			
Test Organism and Test Organism Details	Pimephales promelas; Not Reported			
Lipid Content, Test Temperature, pH, and Depuration Time	Not Reported; Not Reported; Not Reported; Not Reported			
Media Type, TOC, and Salinity	Not Reported; Not Reported; Not Reported			
Dissolved Oxygen, Conductivity, and Hardness	Not Reported; Not Reported; Not Reported			
Exposure Route, Elimination, and Nominal Measurements	Not Reported; Not Reported; Not Reported			
Test Type, Test Temperature, and Test Condition	Not Reported; Not Reported; Not Reported			
Comments	Not Reported; Not Reported; Not Reported			
Duration, Parameter, and Sampling Frequency	Not Reported			
Concentration	Not Reported; Not Reported;			
Analytical Method and Analytical Details	Elimination half-life <24 hours for total 14C radioactivity.; Not Reported			
Rate Constant and Results per Recovery	Not Reported; Not Reported; Not Reported			
Statistics, Basis, and Calculation Basis	BCF = 300; A BCF of 1,200 was measured based on total 14C radioactivity; however, extraction and thin layer chromatograph of the residue in the body of the fish determined that only 24.9% of the 14C radioactivity was due to TBBPA, with the remainder due to metabolites, giving a BCF of 300 for TBBPA.			
Results Value and Results Details	Not Reported; Not Reported; Not Reported			
Metabolites, Reference, and Results Reference Substance				
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 6:	Testing Conditions	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature
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Study Citation:	U.S. EPA, (2015). Flame retardants in printed circuit boards. Final report.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	7500050			
Domain	Metric	EVALUATION Rating	Comments	
	Metric 8:	System Type and Design	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable to this study.
	Metric 10:	Sampling Methods	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.

Overall Quality Determination

Medium

* Related References: Source (not in HERO at time of extraction): Dionne E, Fackler PH, Grandy KA (1989) Bioconcentration and elimination of C-residues by fathead minnow (Pimephales promelas) exposed to tetrabromobisphenol A (final report) with cover letter dated 031789. Prepared by Springborn Laboratories, Inc. for Great Lakes Chemical Corporation. Submitted to the U.S. Environmental Protection Agency under TSCA, Section 4.

Study Citation:	Van Esch, G. J. (1995). Tetrabromobisphenol A and derivatives / first draft prepared by G. J. van Esch.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6670287

EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; 3,3',5,5'-Tetrabromobisphenol A			
Confidentiality, Type, and Guideline	None; Experimental; Not Reported			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR			
Test Organism and Test Organism Details	Carp; NR			
Lipid Content, Test Temperature, pH, and Depuration Time	NR; NR; NR; NR			
Media Type, TOC, and Salinity	NR; NR; NR			
Dissolved Oxygen, Conductivity, and Hardness	NR; NR; NR			
Exposure Route, Elimination, and Nominal Measurements	NR; NR; NR			
Test Type, Test Temperature, and Test Condition	NR; NR; NR			
Comments				
Duration, Parameter, and Sampling Frequency	8 weeks; NR; NR			
Concentration	8 - NR 80 ug/L			
Analytical Method and Analytical Details	NR; NR;			
Rate Constant and Results per Recovery	NR; NR			
Statistics, Basis, and Calculation Basis	NR; Not Reported; Not Reported			
Results Value and Results Details	BCF = 52-485 (8 ug/L), 30-341 (80 ug/L); Not Reported			
Metabolites, Reference, and Results Reference Substance	NR; NR; NR			

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity were not reported in the secondary source.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Concurrent control group details were not reported in the secondary source.
	Metric 4:	Test Substance Stability	Medium	Test substance stability, homogeneity, preparation, and storage conditions were not reported in the secondary source.
Domain 3: Test Conditions				

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Study Citation:	Van Esch, G. J. (1995). Tetrabromobisphenol A and derivatives / first draft prepared by G. J. van Esch.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	6670287			
Domain	Metric	EVALUATION		Comments
	Metric 5:	Test Method Suitability	Medium	Test method details were not reported in the secondary source however there is no indication that the methodology for producing the information was biased towards a particular outcome.
	Metric 6:	Testing Conditions	Medium	Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 7:	Testing Consistency	Medium	Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 8:	System Type and Design	Medium	Information regarding this metric is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 10:	Sampling Methods	Medium	Information regarding this metric is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 12:	Test Substance Purity	Medium	Sampling methodology is unknown is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty were not reported in the secondary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Health outcomes were not reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited data is reported in the secondary source but study data are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	No statistical methods or kinetic calculations were reported in the secondary source.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results are reasonable based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.

Overall Quality Determination**Medium**

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Study Citation:	Van Esch, G. J. (1995). Tetrabromobisphenol A and derivatives / first draft prepared by G. J. van Esch.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6670287

EVALUATION			
Domain	Metric	Rating	Comments
* Related References: Cited: Chemicals Inspection & Testing Institute (1992) Biodegradation and bioaccumulation data of existing chemicals based on the CSCL, Japan. Tokyo, Japan Chemical Industry Ecology, Toxicology and Information Center, pp 4-14.			

Study Citation:	Van Esch, G. J. (1995). Tetrabromobisphenol A and derivatives / first draft prepared by G. J. van Esch.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	6670287			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; 3,3',5,5'-Tetrabromobisphenol A			
Confidentiality, Type, and Guideline	None; Experimental; Not Reported			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	14C in the aromatic ring; NR; NR; NR Notes: NR			
Test Organism and Test Organism Details	Blue gill sunfish (<i>Lepomis macrochirus</i>) (0.5-2.0 g); NR			
Lipid Content, Test Temperature, pH, and Depuration Time	NR; NR; NR; 14 d			
Media Type, TOC, and Salinity	NR; NR; NR			
Dissolved Oxygen, Conductivity, and Hardness	NR; NR; NR			
Exposure Route, Elimination, and Nominal Measurements	NR; NR; NR			
Test Type, Test Temperature, and Test Condition	flow-through; NR; NR			
Comments				
Duration, Parameter, and Sampling Frequency	28 d; NR; NR			
Concentration	NR NR - NR 0.0098 ± 0.0014 mg/L			
Analytical Method and Analytical Details	NR; NR;			
Rate Constant and Results per Recovery	NR; NR			
Statistics, Basis, and Calculation Basis	NR; Not Reported; Not Reported			
Results Value and Results Details	BCF = 20 (edible tissue), 170 (visceral tissue); whole body half-life was < 24 h Plateau levels were reached within 3-7 days. The radiocarbon dissipation to less than 0.01 mg/kg in the fish tissue occurred within 3-7 days of the beginning of the withdrawal phase.			
Metabolites, Reference, and Results Reference Substance	NR; NR; NR			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity were not reported in the secondary source.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Concurrent control group details were not reported in the secondary source.
	Metric 4:	Test Substance Stability	Medium	Test substance stability, homogeneity, preparation, and storage conditions were not reported in the secondary source.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Test method details were not reported in the secondary source however there is no indication that the methodology for producing the information was biased towards a particular outcome.
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Study Citation:	Van Esch, G. J. (1995). Tetrabromobisphenol A and derivatives / first draft prepared by G. J. van Esch.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	6670287			
Domain	Metric	EVALUATION		Comments
	Metric 6:	Testing Conditions	Medium	Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 7:	Testing Consistency	Medium	Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 8:	System Type and Design	Medium	Information regarding this metric is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 10:	Sampling Methods	Medium	Information regarding this metric is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 12:	Test Substance Purity	Medium	Sampling methodology is unknown is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty were not reported in the secondary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Health outcomes were not reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited data is reported in the secondary source but study data are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	No statistical methods or kinetic calculations were reported in the secondary source.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results are reasonable based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.

Overall Quality Determination**Medium**

* Related References: Cited: Nye DE (1978) The bioaccumulation of tetrabromobisphenol, in the bluegill sunfish. Santa Clara, California, Stoner Laboratories, Inc. (Report to Velsicol Chemical Corporation, Chicago, submitted to WHO by the Brominated Flame Retardant Industry Panel).

Study Citation:	Zeng, L., Cheng, D., Mao, Z., Zhou, Y., Jing, T. (2022). ZIF-8/nitrogen-doped reduced graphene oxide as thin film microextraction adsorbents for simultaneous determination of novel halogenated flame retardants in crayfish-aquaculture water systems. Chemosphere 287(Pt 4):132408.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	10116650

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	No; Experimental; other: Field samples from water and crayfish
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NA; Tokyo Chemical Industry (Tokyo, Japan); NR; NR
Test Organism and Test Organism Details	Crayfish; NR
Lipid Content, Test Temperature, pH, and Depuration Time	NR; Ambient; NR; NR
Media Type, TOC, and Salinity	natural water - freshwater; NR; NR
Dissolved Oxygen, Conductivity, and Hardness	NR; NR; NR
Exposure Route, Elimination, and Nominal Measurements	water contact (freshwater species); NR; measured
Test Type, Test Temperature, and Test Condition	field study; Ambient; Not Reported
Comments	
Duration, Parameter, and Sampling Frequency	Crayfish and aquaculture water collected from 4 locations (Jianli prefecture (crab-crayfish polyculture)) and Qianjiang city (pond intensive culture), Hubei province, and Jianhu prefecture (rice-crayfish culture and lotus crayfish culture) in Jiangsu province, China.; Other; Once
Concentration	0.46 - ng/mL
Analytical Method and Analytical Details	high-performance liquid chromatography-ultraviolet detection; thin film microextraction (TFME) device; Method detection limit: 0.039 ng/mL, method quantification limit: 0.13 ng/mL;
Rate Constant and Results per Recovery	NR; spiked recoveries: 90.9-97.5% (crayfish), 91.7-104.7% (water)
Statistics, Basis, and Calculation Basis	Not Reported; whole body; BCF = TBBPA concentration in crayfish / TBBPA concentration in water
Results Value and Results Details	BCF = 8.65 to 18.86 L/kg (Table S8); Concentration of TBBPA: 2.77 to 11.88 ng/g in crayfish, 0.32 to 0.63 ng/L in water (Table S8); levels in the head shell and viscera were higher than those in the flesh and back shell
Metabolites, Reference, and Results Reference Substance	NR; NA; NA

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	The test substance source was reported; however, the test substance purity was not reported.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to the study.

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Study Citation:	Zeng, L., Cheng, D., Mao, Z., Zhou, Y., Jing, T. (2022). ZIF-8/nitrogen-doped reduced graphene oxide as thin film microextraction adsorbents for simultaneous determination of novel halogenated flame retardants in crayfish-aquaculture water systems. Chemosphere 287(Pt 4):132408.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	10116650			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	N/A	The metric is not applicable to the study.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to the study.
	Metric 8:	System Type and Design	High	Equilibrium was assumed for field studies.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study.
	Metric 10:	Sampling Methods	Medium	The test organism are not routinely used for similar study types; however, the deviation was not likely to have a substantial impact on study results.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	Medium	The study reported the use of sampling methods that address the outcome(s) of interest, however, used novel methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

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Study Citation:	Zeng, L., Cheng, D., Mao, Z., Zhou, Y., Jing, T. (2022). ZIF-8/nitrogen-doped reduced graphene oxide as thin film microextraction adsorbents for simultaneous determination of novel halogenated flame retardants in crayfish-aquaculture water systems. Chemosphere 287(Pt 4):132408.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	10116650

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	Zhang, H., Kelly, B. C. (2018). Sorption and bioaccumulation behavior of multi-class hydrophobic organic contaminants in a tropical marine food web. Chemosphere 199:44-53.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5427902

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	None; Experimental; other: Guideline not reported
Solvent, Reactivity, Storage, Stability	NA; NA; Seawater collected in amber glass bottles at 4°C; sediment stored in glass jars at -20°C; fish samples wrapped in aluminum and transported in icebox to lab where tissues were excised and stored in glass jars at -20°C; NR
Radiolabel, Source, State, Purity	NA; Singapore Strait; NA; NA Notes: Stable-isotope carbon-13 and deuterium labelled compounds were used as internal standards
Test Organism and Test Organism Details	Muraenesox sp., Arius venosus and Hexanemachthys sagor, Chiloscylidium indicum, Dasyatis lata, Lutjanus johnii, and Pomadasys aurita; n= 14, 11, 3, 1, 3, and 5 respectively
Lipid Content, Test Temperature, pH, and Depuration Time	See Appx A table S2 in Supplementary Information; 30°C (average); Not reported; Not applicable
Media Type, TOC, and Salinity	natural water / sediment: marine; Not reported; 30 ppt (average)
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Water; Not applicable; see appx A table S7 - S8 in Supplementary information
Test Type, Test Temperature, and Test Condition	field study; 30°C (average); Not Reported
Comments	
Duration, Parameter, and Sampling Frequency	Sampling occurred 2011 - 2012; Not Reported; Not reported
Concentration	Not reported -
Analytical Method and Analytical Details	GC-EI-MS/MS and LC-ESI/MS/MS; NR, reported in supplemental information;
Rate Constant and Results per Recovery	Not reported; Not reported
Statistics, Basis, and Calculation Basis	Trophic magnification: log-linear regression between log 10 concentration in biota and trophic level; Lipid normalized, organ wt.; steady state
Results Value and Results Details	BSAF (biota-sediment accumulation factor): 2.39; Estimated, low detection frequencies in the environment.
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Test material details are likely reported in supplemental information.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	Concurrent controls are not required for field studies.
	Metric 4:	Test Substance Stability	Medium	Sample storage conditions were reported; sample preparation were not reported but may be included in the supplemental information.
Domain 3: Test Conditions				

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Study Citation:	Zhang, H., Kelly, B. C. (2018). Sorption and bioaccumulation behavior of multi-class hydrophobic organic contaminants in a tropical marine food web. Chemosphere 199:44-53.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5427902			
Domain		Metric	EVALUATION Rating	Comments
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some general environmental sample conditions were reported.
	Metric 7:	Testing Consistency	High	Sample collection and analysis was consistent across samples.
	Metric 8:	System Type and Design	High	Field studies are assumed to be at equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	Medium	Organism species were reported, other characteristics were not reported but may be in supplemental information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methodology addressed the outcomes of interest and the study used widely accepted approaches.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variability and uncertainty were not explicitly addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No reported differences in organism health or attrition.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Target chemical concentrations in the environment or tissue samples were not reported, species specific BAF values were not reported, extraction efficiency was not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods used for trophic magnification determination were described and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Zhu, B., Han, J., Lei, L., Hua, J., Zuo, Y., Zhou, B. (2021). Effects of SiO ₂ nanoparticles on the uptake of tetrabromobisphenol A and its impact on the thyroid endocrine system in zebrafish larvae. Ecotoxicology and Environmental Safety 209:11845-11845.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	10116509

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, and Guideline	No; Experimental; Not Reported
Solvent, Reactivity, Storage, Stability	Dimethyl sulfoxide; NR; 4°C; NR
Radiolabel, Source, State, Purity	NR; Sigma (St. Louis, MO, USA); NR; >97%
Test Organism and Test Organism Details	Zebrafish; Adult wild-type zebrafish embryos (Danio rerio, AB strain). Embryos were collected within 1 h after spawning and were examined under a stereomicroscope to remove unfertilized eggs.
Lipid Content, Test Temperature, pH, and Depuration Time	Not Reported; 28±0.5°C; Not Reported; Not Reported
Media Type, TOC, and Salinity	Not Reported; Not Reported; Not Reported
Dissolved Oxygen, Conductivity, and Hardness	Not Reported; Not Reported; Not Reported
Exposure Route, Elimination, and Nominal Measurements	TBBPA in 600mL of exposure media; Not Reported; Measured: 49.6±1.5, 101.9±7.6, 196.9±7.6
Test Type, Test Temperature, and Test Condition	Static; 28±0.5°C; The exposure solution was renewed daily.
Comments	
Duration, Parameter, and Sampling Frequency	24 h; Not Reported; 24 h
Concentration	0 - 200 µg/L
Analytical Method and Analytical Details	GC-MS/MS; Agilent 7890B GC with Agilent 7000C triple-quadrupole MS. LOD was 0.26 ng/mL in water and 0.85 ng/g in larvae (3x higher than instrumental background noise).;
Rate Constant and Results per Recovery	Not Reported; Recoveries of 13-C12-PCB-208 were 87-110%
Statistics, Basis, and Calculation Basis	Not Reported; whole body d.w.; BCF = concentrations in zebrafish larvae/concentrations in water
Results Value and Results Details	Concentrations in zebrafish larvae at 24 h in 50, 100, and 200 µg/L TBBPA exposures (ng/g dw): 15.5±2.6, 34.8±2.9, and 61.8±3.7, respectively; At 24 h, TBBPA concentrations in water were 37.6±2.9, 69.4±5.2, and 138.4±4.6 µg/L in the 50, 100, and 200 µg/L initial concentrations, respectively.BCF (SRC calculated) based on concentrations in zebrafish larvae/concentrations in water ≈ 2.4, 2.0, 2.4 at exposure levels of 50, 100, and 200 µg/L, respectively
Metabolites, Reference, and Results Reference Substance	Not Reported; Not Reported; Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate procedural blanks were used.
	Metric 4:	Test Substance Stability	High	The test substance storage conditions were reported and appropriate.

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Study Citation:	Zhu, B., Han, J., Lei, L., Hua, J., Zuo, Y., Zhou, B. (2021). Effects of SiO ₂ nanoparticles on the uptake of tetrabromobisphenol A and its impact on the thyroid endocrine system in zebrafish larvae. Ecotoxicology and Environmental Safety 209:11845-11845.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	10116509			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	The test conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Multiple sample groups were tested at each exposure and no differences were reported across sample groups.
	Metric 8:	System Type and Design	Low	The system was capable of maintaining substance concentrations; however, equilibrium was not established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	Test organism information was reported and routinely used for similar study types.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the outcome assessment methodology and the intended outcome of interest - the uptake rate constant was not calculated.
	Metric 12:	Test Substance Purity	Low	Sampling only occurred at one time, prohibiting the calculation of rate constants.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty were accounted for in the measurements and unlikely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	There were multiple study groups and exposure to the test substance did not affect the survival rate.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Lipid normalized BCFs were not measured or reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Kinetic calculations were not reported or possible.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The reported results are reasonable given the test design and conditions.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		Low		

Study Citation:	Chen, X., Gu, J., Wang, Y., Gu, X., Zhao, X., Wang, X., Ji, R. (2017). Fate and O-methylating detoxification of Tetrabromobisphenol A (TBBPA) in two earthworms (<i>Metaphire guillelmi</i> and <i>Eisenia fetida</i>). Environmental Pollution 227:526-533.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	5541141

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; bioaccumulation: terrestrial; Experimental; other: Determination of BCF in earthworms
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	Uniformly 14C-ring-labeled TBBPA; specific activity = 7.4E8 Bq/mmol; chemical purity = 99%; Sigma Aldrich (non radiolabeled); NR; 97% Notes: TBBPA
Test Organism and Test Organism Details	Earthworms; <i>Metaphire guillelmi</i> and <i>Eisenia fetida</i> obtained from an earthworm breeding farm in Jurong, Zhenjiang, China.
Lipid Content, Test Temperature, pH, and Depuration Time	<i>E. fetida</i> 10.5% and <i>M. guillelmi</i> 6.2% (dry-weight based); 20C; soil pH = 6.91; 24 hours
Moisture, TOC, and Test Conditions Comments	Soil moisture: 40% MWHC; 34.7% clay, 36.1% silt, 29.2% sand, and 0.32% organic content; Clay loam soil
Nominal Measured and Time Plateau	Measured; soils spiked with 1.5 kBq/g 14C-TBBPA and 10 mg/kg soil nonlabeled TBBPA; Not reported
Duration, Parameter, and Sampling Frequency	Uptake: the soil was aged for 14 days with TBBPA, organisms were added to the jars and incubated for 21 days in the dark; other; 1 <i>M. guillelmi</i> and 5 <i>E. fetida</i> per replicate removed on days 1, 4, 7, 10, 14, and 21, rinsed with ultrapure water, depurated for 24 h; 1 <i>M. guillelmi</i> and 5 <i>E. fetida</i> were removed on day 21, depurated, dissected into organ fractions
Analytical Method and Analytical Details	TBBPA distribution in the soils was evaluated via combustion on a biological oxidizer with a recovery of 98% ($\pm 1.7\%$); Earthworm analysis via HPLC - 14C-LSC; TBBPA metabolites via GC-MS; Extraction efficiency from <i>M. guillelmi</i> = $99 \pm 0.6\%$ and <i>E. fetida</i> = $97 \pm 2\%$;
Results Value, Result Type, and Results Standard Deviation	<i>E. fetida</i> BSAF = 0.43 ± 0.06 , BAF = 14 ± 2 ; <i>M. guillelmi</i> BSAF = 0.57 ± 0.05 , BAF = 11 ± 1 ; BSAF; Not Reported
Calculation Basis and Basis	steady state; normalized lipid fraction
Elimination, Metabolites, Kinetic Parameter, and Statistics	BSAF at equilibrium was calculated KS/kd; BAF at equilibrium was calculated as KS/kd.(f lipid/f OC); monomethyl ether-TBBPA and dimethyl ether-TBBPA; <i>E. fetida</i> KS = 0.03 ± 0.002 , kd = 0.07 ± 0.01 ; <i>M. guillelmi</i> KS = 0.08 ± 0.01 , kd = 0.14 ± 0.03 ; kd: radioactivity uptake (g organic carbon per g lipid per day) and kd depuration (per day); normality: Shapiro-Wilk test; homogeneity Leven test; significance ANOVA and Duncan test; all conducted using IBM SPSS 19.0; $p < 0.05$

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Controls were not explicitly included in the study.
	Metric 4:	Test Substance Stability	Medium	Test substance preparation was minimally described.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable.

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Study Citation:	Chen, X., Gu, J., Wang, Y., Gu, X., Zhao, X., Wang, X., Ji, R. (2017). Fate and O-methylating detoxification of Tetrabromobisphenol A (TBBPA) in two earthworms (<i>Metaphire guillelmi</i> and <i>Eisenia fetida</i>). Environmental Pollution 227:526-533.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	5541141			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	Medium	Test conditions were not fully reported in the study.
	Metric 7:	Testing Consistency	High	Available test conditions were consistent across replicates and study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Test organism species reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty were not explicitly considered in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Quality assurance and quality controls were described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		High		

Study Citation:	Chen, X., Gu, X., Zhao, X., Wang, Y., Pan, Y., Ma, X., Wang, X., Ji, R. (2019). Species-dependent effects of earthworms on the fates and bioavailability of tetrabromobisphenol A and cadmium coexisted in soils. Science of the Total Environment 658:1416-1422.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	5114358

Parameter		EXTRACTION		
CASRN and Test Material		79-94-7; TBBPA		
Confidentiality, EndPoint, Type, Guideline		None; other; Experimental; other: Not reported;		
Solvent, Reactivity, Storage, Stability		Methanol; NR; NR; NR		
Radiolabel, Source, State, Purity		14C-ring-labeled, 7.4E8 Bq/mmol specific radioactivity; Synthesized in study laboratory; Liquid; 99%		
Test Organism and Test Organism Details		Eisenia fetida - [Annelida]; n = 5 mature organisms with clear clitellum, fresh weight 0.50 - 0.60 g		
Lipid Content, Test Temperature, pH, and Depuration Time		Not reported; 20°C; Not reported; 24 hours		
Moisture, TOC, and Test Conditions Comments		24%; Not reported; Organisms placed in 250 mL glass jars containing 30 g dw native soil (paddy field in Wujin, Jiangsu Province, China) amended with or without Cd and 14-C TBBPA; vessels stopped with rubber stopper with NaOH trap for 14CO2		
Nominal Measured and Time Plateau		Measured; 45 kBq initial radioactivity; Not reported		
Duration, Parameter, and Sampling Frequency		14 days; Not Reported; Not reported		
Analytical Method and Analytical Details		Liquid scintillation counter; Freeze-dried homogenized organism and soil samples extracted with methanol; bound residues determined by combustion in a biological oxidizer; radioactive liquid solutions mixed with scintillation cocktail;		
Results Value, Result Type, and Results Standard Deviation		BSAF approx. 2.2; 10% of initial radioactivity absorbed; Not Reported; Not Reported		
Calculation Basis and Basis		steady state; normalized lipid fraction		
Elimination, Metabolites, Kinetic Parameter, and Statistics		Only 30% extractable residue (77% extractable residue of total detected) remained as parent compound; diMeO-TBBPA (dominant), MeO-TBBPA; Not applicable; One-way ANOVA and Duncan test conducted by SPSS 19.0 to determine significant difference (p < 0.05); normality checked by Shapiro-Wilk test, variance homogeneity by Levene test; Cd did not significantly impact uptake		
Domain		EVALUATION		
		Metric	Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source (in-laboratory) and purity were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Control organisms were not included but this is not expected to significantly impact study results.
	Metric 4:	Test Substance Stability	High	Test substance preparation was reported, the solvent was evaporated before study start.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Temperature and soil moisture content were reported, other soil characteristics may be included in supplemental information.

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Study Citation:	Chen, X., Gu, X., Zhao, X., Wang, Y., Pan, Y., Ma, X., Wang, X., Ji, R. (2019). Species-dependent effects of earthworms on the fates and bioavailability of tetrabromobisphenol A and cadmium coexisted in soils. Science of the Total Environment 658:1416-1422.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	5114358			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	High	The system was capable of maintaining test substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	The test organism species and commercial source was reported, the starting weight was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment was capable of determining BSAF values.
	Metric 12:	Test Substance Purity	Medium	Sampling methods addressed the outcomes of interest, frequency was not specified.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Study groups without Cd present were included, the uptake was not significantly impacted by Cd. Bound and extractable residues were accounted for. No other significant sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No lethality occurred in any study group. Significantly reduced biomass was observed at the end of the treatments but was not significantly different between treatments.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; mass balance of 95-101% was reported. Metabolites were identified. The BSAF was not reported and raw data was only reported graphically (lipid normalized).
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method, however a BSAF value was not reported; BSAF calculated by reviewer based on approximate graphical values.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Chen, X., Gu, X., Zhao, X., Wang, Y., Pan, Y., Ma, X., Wang, X., Ji, R. (2019). Species-dependent effects of earthworms on the fates and bioavailability of tetrabromobisphenol A and cadmium coexisted in soils. Science of the Total Environment 658:1416-1422.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	5114358			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Not reported;			
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR			
Radiolabel, Source, State, Purity	14C-ring-labeled, 7.4E8 Bq/mmol specific radioactivity; Synthesized in study laboratory; Liquid; 99%			
Test Organism and Test Organism Details	Metaphire guillelmi; n = 1 mature organism with clear clitellum, fresh weight 2.50 - 3.00 g			
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 20°C; Not reported; 24 hours			
Moisture, TOC, and Test Conditions Comments	24%; Not reported; Organisms placed in 250 mL glass jars containing 30 g dw native soil (paddy field in Wujin, Jiangsu Province, China) amended with or without Cd and 14-C TBBPA; vessels stopped with rubber stopper with NaOH trap for 14CO2			
Nominal Measured and Time Plateau	Measured; 45 kBq initial radioactivity; Not reported			
Duration, Parameter, and Sampling Frequency	14 days; Not Reported; Not reported			
Analytical Method and Analytical Details	Liquid scintillation counter; Freeze-dried homogenized organism and soil samples extracted with methanol; bound residues determined by combustion in a biological oxidizer; radioactive liquid solutions mixed with scintillation cocktail;			
Results Value, Result Type, and Results Standard Deviation	BSAF approx. 3.7; 17% of initial radioactivity absorbed; Not Reported; Not Reported			
Calculation Basis and Basis	steady state; normalized lipid fraction			
Elimination, Metabolites, Kinetic Parameter, and Statistics	Only 17% extractable residue (68% of total detected was extractable fraction) remained as parent compound; diMeO-TBBPA (dominant), MeO-TBBPA; Not applicable; One-way ANOVA and Duncan test conducted by SPSS 19.0 to determine significant difference (p < 0.05); normality checked by Shapiro-Wilk test, variance homogeneity by Levene test; Cd did not significantly impact uptake			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source (in-laboratory) and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Control organisms were not included but this is not expected to significantly impact study results.
	Metric 4:	Test Substance Stability	High	Test substance preparation was reported, the solvent was evaporated before study start.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Temperature and soil moisture content were reported, other soil characteristics may be included in supplemental information.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	High	The system was capable of maintaining test substance concentrations.
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Study Citation:	Chen, X., Gu, X., Zhao, X., Wang, Y., Pan, Y., Ma, X., Wang, X., Ji, R. (2019). Species-dependent effects of earthworms on the fates and bioavailability of tetrabromobisphenol A and cadmium coexisted in soils. Science of the Total Environment 658:1416-1422.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	5114358			
Domain	Metric	EVALUATION Rating		Comments
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	The test organism species and commercial source was reported, the starting weight was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment was capable of determining BSAF values.
	Metric 12:	Test Substance Purity	Medium	Sampling methods addressed the outcomes of interest, frequency was not specified.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Study groups without Cd present were included, the uptake was not significantly impacted by Cd. Bound and extractable residues were accounted for. No other significant sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No lethality occurred in any study group. Significantly reduced biomass was observed at the end of the treatments but was not significantly different between treatments.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; mass balance of 95-101% was reported. Metabolites were identified. The BSAF was not reported and raw data was only reported graphically (lipid normalized).
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method, however a BSAF value was not reported; BSAF calculated by reviewer based on approximate graphical values.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Gu, J., Chen, X., Wang, Y., Wang, L., Szlavec, K., Ma, Y., Ji, R. (2020). Bioaccumulation, physiological distribution, and biotransformation of tetrabromobisphenol a (TBBPA) in the geophagous earthworm <i>Metaphire guillelmi</i> - hint for detoxification strategy. <i>Journal of Hazardous Materials</i> 388:122027.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	6775143

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	No; bioaccumulation: terrestrial; Experimental; other: lab study with radiolabeled TBBPA
Solvent, Reactivity, Storage, Stability	methanol; NR; NR; NR
Radiolabel, Source, State, Purity	14C-ring-labeled TBBPA; Labeled TBBPA synthesized from uniformly 14C-ring-labeled phenol (Li et al., 2014); Non-labeled from Sigma Corp. (Shanghai, China); NR; 1.48 GBq mmol ⁻¹ , 99% radiochemical purity, 97% chemical purity
Test Organism and Test Organism Details	Earthworm (<i>Metaphire guillelmi</i>); collected from a farm in Jurong, Jiangsu Province, China; weight range of 2.7–3.7 g
Lipid Content, Test Temperature, pH, and Depuration Time	7.1% ± 0.4% (n=3) of its dry body weight; 20 °C; 7.17; 18 days
Moisture, TOC, and Test Conditions Comments	Soil wetted to 60% water-holding capacity; 2.5% total organic carbon; 30 g soil, placed in a 100-mL flask; Earthworms were kept in the uncontaminated experimental soil with 60% water-holding capacity at 20 °C in the dark for 15 days before the experiments; three flasks with the same conditions were prepared except for the addition of TBBPA. Soil characterized as: gleyic hydric anthrosol; Eutric Gleysols, medium to fine textured.
Nominal Measured and Time Plateau	TBBPA and radioactivity in the soil was 9.96 µg g ⁻¹ and 0.65 kBq g ⁻¹ , respectively; 10 days for TBBPA; 15-30 days for metabolites based on Figure 3
Duration, Parameter, and Sampling Frequency	48 days total (uptake 30 days and elimination 18 days); whole body, study contains info for other body parts/organs; 5 day intervals during accumulation and 3, 6, 12, and 18 during depuration, based on figure 3
Analytical Method and Analytical Details	HPLC-14C-LSC and separate liquid scintillation counter; Agilent HPLC series 1100 system coupled to a diode-array detector and an online radio-flow detector and radioactivity was quantitatively analyzed with LS6500, Beckman Coulter, USA.;
Results Value, Result Type, and Results Standard Deviation	The recovery of radioactivity in this experiment ranged from 92% to 100%; BSAF (biota-soil accumulation factor); ± 0.5
Calculation Basis and Basis	steady state; 14C-BSAF = 3.6
Elimination, Metabolites, Kinetic Parameter, and Statistics	TBBPA in the earthworm body increased rapidly; after this first quick uptake period, TBBPA decreased. Simultaneous increase of 14C-metabolites detected in earthworm body, biotransformation and biodegradation of TBBPA took place after the initial uptake process.; polar compounds and O-methylation products of TBBPA; $k_u = 1.61 \pm 0.19$ day ⁻¹ ; $k_d = 0.16 \pm 0.02$ day ⁻¹ ; software OriginPro 2015 used for the data

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	High	A concurrent blank group was included.

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Study Citation:		Gu, J., Chen, X., Wang, Y., Wang, L., Szlavec, K., Ma, Y., Ji, R. (2020). Bioaccumulation, physiological distribution, and biotransformation of tetrabromobisphenol a (TBBPA) in the geophagous earthworm <i>Metaphire guillelmi</i> - hint for detoxification strategy. <i>Journal of Hazardous Materials</i> 388:122027.		
OECD Harmonized Template:		Terrestrial Bioconcentration		
HERO ID:		6775143		
Domain	Metric	EVALUATION		Comments
	Metric 4:	Test Substance Stability	Medium	Some test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups. The conditions of the exposure were documented.
	Metric 8:	System Type and Design	High	Equilibrium was established. The system type and design were capable of appropriately maintaining substance concentrations
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study.
	Metric 10:	Sampling Methods	High	Test organism information was reported, including starting body weight.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	There were multiple study groups, and there were no differences among the study groups in organism attrition or health outcomes (i.e., unexplained mortality) that influenced the outcome assessment.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product(s) concentrations (if required), extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.

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Study Citation:	Gu, J., Chen, X., Wang, Y., Wang, L., Szlavecz, K., Ma, Y., Ji, R. (2020). Bioaccumulation, physiological distribution, and biotransformation of tetrabromobisphenol a (TBBPA) in the geophagous earthworm <i>Metaphire guillelmi</i> - hint for detoxification strategy. <i>Journal of Hazardous Materials</i> 388:122027.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	6775143

		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination	High
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Study Citation:	He, M. J., Luo, X. J., Yu, L. H., Liu, J., Zhang, X. L., Chen, S. J., Chen, D., Mai, B. X. (2010). Tetrabromobisphenol-A and hexabromocyclododecane in birds from an e-waste region in South China: Influence of diet on diastereoisomer- and enantiomer-specific distribution and trophodynamics. Environmental Science & Technology 44(15):5748-5754.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	1927673

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Aquatic and terrestrial BMF of TBBPA via analysis of food webs in South China
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	internal standard: 13C12-TBBPA; Cambridge Isotope Laboratories (Andover, USA); NR; NR Notes: field study
Test Organism and Test Organism Details	Chinese pond heron (<i>Ardeola bacchus</i>), white-breasted waterhen (<i>Amaurornis phoenicurus</i>), slaty-breasted rail (<i>Gallirallus striatus</i>), common snipe (<i>Gallinago gallinago</i>), spotted dove (<i>Streptopelia chinensis</i>), Chinese francolin (<i>Francolinus pintadeanus</i>); 40 samples collected from 6 bird species between 2005 and 2008 in Qingyuan County e-waste recycling region in Pearl River Delta; further detail referenced
Lipid Content, Test Temperature, pH, and Depuration Time	Lipid%: Chinese pond heron (<i>Ardeola bacchus</i>) = 1.34 (1.01-10.1) white-breasted waterhen (<i>Amaurornis phoenicurus</i>) = 1.58 (0.92-5.11) slaty-breasted rail (<i>Gallirallus striatus</i>) = 1.59 (1.21-6.52) common snipe (<i>Gallinago gallinago</i>) = 5.5 (1.21-8.06) spotted dove (<i>Streptopelia chinensis</i>) = 1.92 (1.22-3.95) Chinese francolin (<i>Francolinus pintadeanus</i>) = 5.20 (3.88-5.62) Fish 4.13 = 4.13 (1.30-6.85); Ambient; Not reported; Not applicable
Moisture, TOC, and Test Conditions Comments	Not reported; Not reported; Bird samples and samples of surrounding fish, water, grain, plant leaf and soil analyzed for TBBPA; relative trophic status of the collected birds based on stable isotope ratio: spotted dove < slaty-breasted rail and Chinese Francolin < common snipe < white-breasted waterhen < Chinese pond heron
Nominal Measured and Time Plateau	Measured; TBBPA was detected in all muscle tissues of the birds; Not applicable
Duration, Parameter, and Sampling Frequency	Not applicable; other; samples collected between 2005 and 2008
Analytical Method and Analytical Details	LCMS negative ion mode m/z 640.7-79 and 640.7-81, 13C: 652.7-79 and 652.7-81, d18: 658-7-79 and 658-7-81, internal standards used; chiral column for enantiomer separation; 15N and 13C isotope analysis: trophic level; Recoveries in blanks: TBBPA 80%; internal std: 74.8%; MDL 0.27 ng/g.;
Results Value, Result Type, and Results Standard Deviation	grain/spotted dove BMFs for TBBPA ranged from 0.03-0.16; fish/Chinese pond heron BMFs for TBBPA BMF ranged from 13-24; BMF; Not Reported
Calculation Basis and Basis	steady state (field study); predator/prey feeding relationship
Elimination, Metabolites, Kinetic Parameter, and Statistics	Not applicable; Not reported; Not reported; Simple linear regression analysis using SSPS 11.5 software

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
The test substance was identified by chemical name. The test substance was identified by analytical means. The source of the analytical standard was reported.			
Domain 2: Test Design	Metric 3:	Study Controls	High
			Procedural blanks were included and acceptable.

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Study Citation:	He, M. J., Luo, X. J., Yu, L. H., Liu, J., Zhang, X. L., Chen, S. J., Chen, D., Mai, B. X. (2010). Tetrabromobisphenol-A and hexabromocyclododecane in birds from an e-waste region in South China: Influence of diet on diastereoisomer- and enantiomer-specific distribution and trophodynamics. Environmental Science & Technology 44(15):5748-5754.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	1927673			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation and storage conditions were not reported; however, these factors were not likely to have influenced the test substance or were not likely to have had a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Detailed information on species and site was cited, although limited detail on environmental sampling parameters was provided. However, these omissions were not likely to have had a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Conditions of exposure were documented. Birds collected were found dead or dying from various causes; however, given that the intent of the study was to determine chemical concentrations in bird species regardless of exposure method, this should not have impacted the study results.
	Metric 8:	System Type and Design	High	Field study; system type and design were considered appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Details on each species were cited in supporting information; field study investigated concentrations in species of different trophic levels.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details were provided on the derivation of the biomagnification factor values.
	Metric 12:	Test Substance Purity	High	No sampling limitations were noted that would have influenced the study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No confounding variables were identified; sources of variability and uncertainty were accounted for in data evaluation and presentation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Some details were omitted; extra detail in supporting information; however, critical parameters such as injection temperature for speciation were not reported; this limited the validity of the results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Limited data were provided regarding this metric; however, this was not likely to have hindered the interpretation of the results.
Domain 8: Other				

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Study Citation:	He, M. J., Luo, X. J., Yu, L. H., Liu, J., Zhang, X. L., Chen, S. J., Chen, D., Mai, B. X. (2010). Tetrabromobisphenol-A and hexabromocyclododecane in birds from an e-waste region in South China: Influence of diet on diastereoisomer- and enantiomer-specific distribution and trophodynamics. Environmental Science & Technology 44(15):5748-5754.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	1927673

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 17: Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 18: QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination **High**

* Related References: ECHA rating:4 ECHA rational for rating: Literature paper which is only listed in short abstract and is therefore not assignable for reliability. Correction was printed for lipid weight and BMF values in HEROID: 3575371 (duplicate HERO ID 10115230)

Study Citation:	Hou, X., Wei, L., Tang, Y., Kong, W., Liu, J., Schnoor, J. L., Jiang, G. (2021). Two Typical Glycosylated Metabolites of Tetrabromobisphenol A Formed in Plants: Excretion and Deglycosylation in Plant Root Zones. Environmental Science & Technology Letters 8(4):313-319.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	10115348

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; other; experimental; other: Hydroponic exposure study evaluating metabolism/metabolites
Solvent, Reactivity, Storage, Stability	ultrapure water; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Dr. Ehrenstorfer GmbH (Augsburg, Germany); solid; 99%
Test Organism and Test Organism Details	Whole pumpkin seedlings (<i>Cucurbita maxima</i> × <i>C. moschata</i>) from Taigu Yinong Seed Co., Ltd., Shanxi Province, China; Healthy seedlings of about 5 cm height grown in hydroponic solutions
Lipid Content, Test Temperature, pH, and Depuration Time	NR; 22 °C; NR; NR
Moisture, TOC, and Test Conditions Comments	NR; NR; seedlings, roots, stems, and leaves were analyzed
Nominal Measured and Time Plateau	1 µmol/L; NR
Duration, Parameter, and Sampling Frequency	240 hours; NR; 3, 6, 12, 24, 48, 96, 168, and 240 hours
Analytical Method and Analytical Details	LC-MS/MS; Additional details cited to a previous study;
Results Value, Result Type, and Results Standard Deviation	TBBPA accumulation in roots increased to $10,233 \pm 210$ pmol after 6 hours, then decreased to $3,318 \pm 748$ pmol after 240 hours. In stems, TBBPA levels rose to 565 ± 64 pmol at 6 hours and declined to 93 ± 64 pmol after 240 hours. Two metabolites were identified: TBBPA mono- β -D-glucopyranoside (TBBPA MG) and TBBPA di- β -D-glucopyranoside (TBBPA DG). These metabolites were released from the roots into the rhizosphere, where they were deglycosylated by microorganisms and by enzymes secreted by both roots and microorganisms, resulting in the regeneration of TBBPA.; NR; concentrations reported with standard deviations
Calculation Basis and Basis	other; NR
Elimination, Metabolites, Kinetic Parameter, and Statistics	TBBPA was detected in roots and stems; not detected in leaves; glycosylated metabolites: TBBPA MG and TBBPA DG; adsorption/absorption of TBBPA by pumpkin roots from aqueous solutions is very fast. TBBPA decreased exponentially from 40,000 pmol (initial added mass) to 6224 ± 987 pmol in the first 3 h and then slowly decreased to 336 ± 121 pmol (240 h); TBBPA in unplanted control group was $98.2 \pm 3.4\%$ after a 240 hours, no TBBPA was detected in the pumpkin tissues or hydroponic solutions of the blank control group; Statistical analysis: Origin 2018; linear regressions with confidence level was set at 95%, and significant differences were considered at a $p < 0.05$ threshold. Coefficients of determination (R ²) all exceeded 0.97 in the linear regressions

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate controls were included and valid.
	Metric 4:	Test Substance Stability	High	The test substance preparations were reported.

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Study Citation:	Hou, X., Wei, L., Tang, Y., Kong, W., Liu, J., Schnoor, J. L., Jiang, G. (2021). Two Typical Glycosylated Metabolites of Tetrabromobisphenol A Formed in Plants: Excretion and Deglycosylation in Plant Root Zones. Environmental Science & Technology Letters 8(4):313-319.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	10115348			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Reported test conditions were consistent.
	Metric 8:	System Type and Design	High	The system type and design were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study.
	Metric 10:	Sampling Methods	High	The test organism was obtained from a reliable or commercial source.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	There were differences between the assessment methodology and the intended outcome assessment.
	Metric 12:	Test Substance Purity	High	The study reported the use of acceptable sampling methods.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	There were multiple study groups, and there were no differences among the study groups in organism attrition or health outcomes (i.e., unexplained mortality) that influenced the outcome assessment.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	BCF were not measured or reported. This study identified the metabolic detoxification of the plants.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Kinetic calculations were not conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The study results were reasonable; however, outcome(s) of interest not reported.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination		High		

Study Citation:	Jiang, Y., Hong, H., Liu, J., Lu, H., Wang, Q., Xia, K., Yan, C., Yang, J. (2020). Effect of mangrove species on removal of tetrabromobisphenol A from contaminated sediments. Chemosphere 244:125385.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	10113618

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; Bioconcentration factor (BCF); translocation factor (TF); experimental; other: non-guideline study
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	13-C12-TBBPA; NR; NR; NR
Test Organism and Test Organism Details	Avicennia marina (A. marina); Surface sediment (0-20 cm) and mangrove propagules (A. marina) used in the experiment were obtained from a mangrove forest in the Jiulongjiang River Estuary Fujian Province, China. Three healthy A. marina seedlings with similar sizes were planted into each pot with sterile and non-sterile sediment spiked with TBBPA; sediments aged for 7 days prior to study.
Lipid Content, Test Temperature, pH, and Depuration Time	NR; 25±5C; sediment pH = 6.69±0.01; NR
Moisture, TOC, and Test Conditions Comments	60-80% relative humidity maintained during experiment; sediment moisture 46.6±1.35%; 2.04±0.03; Sediment: sand 4.66%, silt 66.5%, clay 28.84%; salinity 1.34‰; 12 h daily light exposure
Nominal Measured and Time Plateau	Sterilized sediment: 10.83±0.46 mg/kg dw; non-sterilized sediment: 10.78±0.18 mg/kg dw; sediments aged for 7 days prior to study; NR
Duration, Parameter, and Sampling Frequency	14, 35, and 93 days; BCF; TF; plants and sediment samples collected on day 0, 7, 14, 21, 35, 49, 63, and 93
Analytical Method and Analytical Details	ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS); solid phase extraction; recoveries of 13C12-TBBPA from sediment, roots, stems, and leaves ranged from 86 ± 9.7% to 110 ± 6.9%, 52.1 ± 6.8% to 91.7 ± 15.1%, 62.0 ± 10.7% to 97.1 ± 13.9%, and 45.0 ± 2.3% to 120.8 ± 6.5%, respectively; MDL: 0.08, 0.12, 0.33, and 0.25 ng/g for sediment, roots, stems, and leaves, respectively;
Results Value, Result Type, and Results Standard Deviation	A. marina (14, 35, and 93 day values) BCF _{root} = 1.13±0.12, 0.49 ± 0.20, 0.83 ± 0.13; BCF _{whole plant} = 1.18 ± 0.13, 0.56 ± 0.21, 1.13 ± 0.15; TF _{root-stem} = 0.035 ± 0.002, 0.11 ± 0.052, 0.28 ± 0.04; TF _{stem-leaf} = 0.01 ± 0.00, 0.047 ± 0.024, 0.092 ± 0.012; BCF (bioconcentration factor) and TF (translocation factor); data: means ± standard deviation were reported
Calculation Basis and Basis	steady state; BCF _{root} = TBBPA concentration in plant tissue/TBBPA concentration in sediment; BCF _{whole plant} = TBBPA concentration in whole plant/TBBPA concentration in sediment; TF = TBBPA concentration in aboveground plant tissue/TBBPA concentration in root; TFR-s: root-stem translocation factor; TFR-l: stem-leaf translocation factor
Elimination, Metabolites, Kinetic Parameter, and Statistics	NR; NR; TBBPA was detectable in all plant tissue of both A. marina and K. obovata on the 14th, 35th, and 93rd day of the greenhouse experiment; Statistical analysis: OriginPro 2016 (Origin Lab, USA) and SPSS Statistics 20 (IBM SPSS, USA)

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	Medium
The test substance was identified definitively. The test substance source was not reported; however, the omissions were not likely to have a substantial impact on the study results.			
Domain 2: Test Design	Metric 3:	Study Controls	High
A concurrent negative control or blank group were included.			

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Study Citation:	Jiang, Y., Hong, H., Liu, J., Lu, H., Wang, Q., Xia, K., Yan, C., Yang, J. (2020). Effect of mangrove species on removal of tetrabromobisphenol A from contaminated sediments. Chemosphere 244:125385.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	10113618			
Domain	Metric	EVALUATION		Comments
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established. The system type and design were appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	High	Test organism information was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Attrition or health outcomes were not reported; however, this omission was not likely to have a substantial impact on study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were reported
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination

High

Study Citation:	Jiang, Y., Hong, H., Liu, J., Lu, H., Wang, Q., Xia, K., Yan, C., Yang, J. (2020). Effect of mangrove species on removal of tetrabromobisphenol A from contaminated sediments. Chemosphere 244:125385.		
OECD Harmonized Template:	Terrestrial Bioconcentration		
HERO ID:	10113618		
EXTRACTION			
Parameter	Data		
CASRN and Test Material	79-97-4; TBBPA		
Confidentiality, EndPoint, Type, Guideline	no; Bioconcentration factor (BCF); translocation factor (TF); experimental; other: non-guideline study		
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR		
Radiolabel, Source, State, Purity	13-C12-TBBPA; NR; NR; NR		
Test Organism and Test Organism Details	Kandelia obovata (K. obovata); Surface sediment (0-20 cm) and mangrove propagules (K. obovata) used in the experiment were obtained from a mangrove forest in the Jiulongjiang River Estuary Fujian Province, China. Three healthy K. obovata seedlings with similar sizes were planted into each pot with sterile and non-sterile sediment spiked with TBBPA; sediments aged for 7 days prior to study.		
Lipid Content, Test Temperature, pH, and Depuration Time	NR; 25±5C; sediment pH = 6.69±0.01; Not Reported		
Moisture, TOC, and Test Conditions Comments	60-80% relative humidity maintained during experiment; sediment moisture 46.6 ± 1.35%; 2.04±0.03; Sediment: sand 4.66%, silt 66.5%, clay 28.84%; salinity 1.34%; 12 h daily light exposure		
Nominal Measured and Time Plateau	Sterilized sediment: 10.83 ± 0.46 mg/kg dw; non-sterilized sediment: 10.78 ± 0.18 mg/kg dw; sediments aged for 7 days prior to study; Not Reported		
Duration, Parameter, and Sampling Frequency	14, 35, and 93 days; BCF; TF; plants and sediment samples collected on day 0, 7, 14, 21, 35, 49, 63, and 93		
Analytical Method and Analytical Details	ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS); solid phase extraction; recoveries of 13C12-TBBPA from sediment, roots, stems, and leaves ranged from 86 ± 9.7% to 110 ± 6.9%, 52.1 ± 6.8% to 91.7 ± 15.1%, 62.0 ± 10.7% to 97.1 ± 13.9%, and 45.0 ± 2.3% to 120.8 ± 6.5%, respectively; MDL: 0.08, 0.12, 0.33, and 0.25 ng/g for sediment, roots, stems, and leaves, respectively;		
Results Value, Result Type, and Results Standard Deviation	K. obovata BCFroot = 1.69 ± 0.31, 2.69 ± 0.96, 3.72 ± 0.29; BCFwhole plant = 1.97 ± 0.33, 2.99 ± 1.05, 4.50 ± 0.35; TFroot-stem = 0.16 ± 0.017, 0.092 ± 0.009, 0.16 ± 0.017 b; TFstem-leaf = 0.009 ± 0.00, 0.020 ± 0.008, 0.051 ± 0.004; BCF (bioconcentration factor) and TF (translocation factor); data: means ± standard deviation were reported		
Calculation Basis and Basis	steady state; BCFroot = TBBPA concentration in plant tissue/TBBPA concentration in sediment; BCFwhole plant = TBBPA concentration in whole plant/TBBPA concentration in sediment; TF = TBBPA concentration in aboveground plant tissue/TBBPA concentration in root; TFr-s: root-stem translocation factor; TFs-l: stem-leaf translocation factor		
Elimination, Metabolites, Kinetic Parameter, and Statistics	NR; NR; TBBPA was detectable in all plant tissue of both A. marina and K. obovata on the 14th, 35th, and 93rd day of the greenhouse experiment; Statistical analysis: OriginPro 2016 (Origin Lab, USA) and SPSS Statistics 20 (IBM SPSS, USA)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
Metric 2:	Test Substance Purity	Medium	The test substance source was not reported; however, the omissions were not likely to have a substantial impact on the study results.
Domain 2: Test Design			
Metric 3:	Study Controls	High	A concurrent negative control or blank group were included.
Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
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Study Citation:	Jiang, Y., Hong, H., Liu, J., Lu, H., Wang, Q., Xia, K., Yan, C., Yang, J. (2020). Effect of mangrove species on removal of tetrabromobisphenol A from contaminated sediments. Chemosphere 244:125385.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	10113618			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established. The system type and design were appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	High	Test organism information was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Attrition or health outcomes were not reported; however, this omission was not likely to have a substantial impact on study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were reported
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination		High		

Study Citation:	Jiang, Y., Lu, H., Wang, Y., Hong, H., Wang, Q., Liu, J., Yan, C. (2020). Uptake, biotransformation and physiological response of TBBPA in mangrove plants after hydroponics exposure. Marine Pollution Bulletin 151:1.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	10113700

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; bioaccumulation: terrestrial; experimental; other: non-guideline study
Solvent, Reactivity, Storage, Stability	DMSO; NR; NR; NR
Radiolabel, Source, State, Purity	13-C12-TBBPA; NR; NR; NR
Test Organism and Test Organism Details	Avicennia marina (A. marina); mangrove propagule; obtained from a mangrove forest in the Jiulongjiang River Estuary Fujian Province, China
Lipid Content, Test Temperature, pH, and Depuration Time	NR; 25 ± 5°C; NR; NR
Moisture, TOC, and Test Conditions Comments	relative humidity during the test maintained at 60–80%; NR; 12 h light at 800–1400 μmol photons m ⁻² s ⁻¹ and 12 h in the dark
Nominal Measured and Time Plateau	5.0 mg/L (nominal); NR
Duration, Parameter, and Sampling Frequency	7 and 14 days; Not Reported; after 7 and 14-day interval incubation
Analytical Method and Analytical Details	ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS); Recovery of 13C12-TBBPA in roots, stems, leaves were 88.61 ± 11.87%, 78.83 ± 7.44%, 64.78 ± 7.50%, respectively. Based on S/N = 3, the TBBPA method limited to detection (LOD) were 0.11, 0.34, and 0.23 ng/g in roots, stems, leaves, respectively;
Results Value, Result Type, and Results Standard Deviation	A. marina BCF = 9.44 ± 1.09; TF _{root-stem} = 0.51 ± 0.088; TF _{stem-leaf} = 0.12 ± 0.014; BCF (bioconcentration factor) and TF (translocation factor); data: means ± standard deviation were reported
Calculation Basis and Basis	Not Reported; BCF = TBBPA concentrations in root / initial TBBPA concentration in solution; TF _{root-stem} = TBBPA concentration in stem / TBBPA concentration in root; TF _{stem-leaf} = TBBPA concentration in leaf / TBBPA concentration in stem
Elimination, Metabolites, Kinetic Parameter, and Statistics	debromination products of TBBPA observed in root samples; products identified: tribromobisphenol A (TriBBPA), monobromobisphenol A (MonoBBPA), and bisphenol A (BPA); concentrations in root, stem and leaf increased significantly with the TBBPA concentrations and durations time of exposure; Statistical analysis: OriginPro 2016 (Origin Lab, USA) and SPSS Statistics 20 (IBM SPSS, USA)

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	The test substance source was not reported; however, the omissions or identified impurities were not likely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3:	Study Controls	High	A concurrent negative control was included.
	Metric 4:	Test Substance Stability	High	The test substance preparation conditions were reported.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.

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Study Citation:	Jiang, Y., Lu, H., Wang, Y., Hong, H., Wang, Q., Liu, J., Yan, C. (2020). Uptake, biotransformation and physiological response of TBBPA in mangrove plants after hydroponics exposure. Marine Pollution Bulletin 151:1.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	10113700			
Domain	Metric	EVALUATION		Comments
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	The system type and design were appropriate for the study.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	Medium	The test organism or species is not routinely used for similar study types; however, characteristics of the organisms were reported.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	There were multiple study groups, and there were no differences among the study groups in organism attrition or health outcomes (i.e., unexplained mortality) that influenced the outcome assessment.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	High	Data reporting was appropriate for the study.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	High	A QSAR model was not reported.
Overall Quality Determination			High	

Study Citation:	Jiang, Y., Lu, H., Wang, Y., Hong, H., Wang, Q., Liu, J., Yan, C. (2020). Uptake, biotransformation and physiological response of TBBPA in mangrove plants after hydroponics exposure. Marine Pollution Bulletin 151:1.		
OECD Harmonized Template:	Terrestrial Bioconcentration		
HERO ID:	10113700		
EXTRACTION			
Parameter	Data		
CASRN and Test Material	79-97-4; TBBPA		
Confidentiality, EndPoint, Type, Guideline	no; bioaccumulation: terrestrial; experimental; other: non-guideline study		
Solvent, Reactivity, Storage, Stability	DMSO; NR; NR; NR		
Radiolabel, Source, State, Purity	13-C12-TBBPA; NR; NR; NR		
Test Organism and Test Organism Details	Kandelia obovata (K. obovata); mangrove propagule; obtained from a mangrove forest in the Jiulongjiang River Estuary Fujian Province, China		
Lipid Content, Test Temperature, pH, and Depuration Time	NR; 25±5°C; NR; NR		
Moisture, TOC, and Test Conditions Comments	relative humidity during the test maintained at 60–80%; NR; 12 h light at 800–1400 μmol photons m–2 s–1 and 12 h in the dark according		
Nominal Measured and Time Plateau	5.0 mg/L (nominal); NR		
Duration, Parameter, and Sampling Frequency	7 and 14 days; Not Reported; after 7 and 14-day interval incubation		
Analytical Method and Analytical Details	ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS); Recovery of 13C12-TBBPA in roots, stems, leaves were 88.61 ± 11.87%, 78.83 ± 7.44%, 64.78 ± 7.50%, respectively. Based on S/N = 3, the TBBPA method limited to detection (LOD) were 0.11, 0.34, and 0.23 ng g–1 in roots, stems, leaves, respectively;		
Results Value, Result Type, and Results Standard Deviation	K. obovata BCF = 16.96 ± 1.00; TFroot-stem = 0.46 ± 0.019; TFstem-leaf = 0.038 ± 0.0064; BCF (bioconcentration factor) and TF (translocation factor); data: means ± standard deviation were reported		
Calculation Basis and Basis	Not Reported; BCF = TBBPA concentrations in root / initial TBBPA concentration in solution; TFroot-stem = TBBPA concentration in stem / TBBPA concentration in root; TFstem-leaf = TBBPA concentration in leaf / TBBPA concentration in stem		
Elimination, Metabolites, Kinetic Parameter, and Statistics	debromination products of TBBPA observed in root samples; products identified: tribromobisphenol A (TriBBPA), monobromobisphenol A (MonoBBPA), and bisphenol A (BPA); concentrations in root, stem and leaf increased significantly with the TBBPA concentrations and durations time of exposure; Statistical analysis: OriginPro 2016 (Origin Lab, USA) and SPSS Statistics 20 (IBM SPSS, USA)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
Metric 2:	Test Substance Purity	Medium	The test substance source was not reported; however, the omissions or identified impurities were not likely to have a substantial impact on the study results.
Domain 2: Test Design			
Metric 3:	Study Controls	High	A concurrent negative control was included.
Metric 4:	Test Substance Stability	High	The test substance preparation conditions were reported.
Domain 3: Test Conditions			
Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
Metric 8:	System Type and Design	High	The system type and design were appropriate for the study.
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Study Citation:	Jiang, Y., Lu, H., Wang, Y., Hong, H., Wang, Q., Liu, J., Yan, C. (2020). Uptake, biotransformation and physiological response of TBBPA in mangrove plants after hydroponics exposure. Marine Pollution Bulletin 151:1.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	10113700			
Domain	Metric	EVALUATION Rating		Comments
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	Medium	The test organism or species is not routinely used for similar study types; however, characteristics of the organisms were reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	There were multiple study groups, and there were no differences among the study groups in organism attrition or health outcomes (i.e., unexplained mortality) that influenced the outcome assessment.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reporting was appropriate for the study.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	High	A QSAR model was not reported.
Overall Quality Determination			High	

Study Citation:	Reindl, A. R., Falkowska, L. (2014). Flame retardants at the top of a simulated baltic marine food web- A case study concerning african penguins from the Gdansk zoo. Archives of Environmental Contamination and Toxicology 68(2):259-264.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	2528326

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, EndPoint, Type, Guideline	None; bioaccumulation: terrestrial; Experimental; other: BAF and BMF in a Simulated Baltic Marine Food Web
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; AccuStandard; NR; ≥ 99.3 -100% by HPLC Notes: Analytical standard
Test Organism and Test Organism Details	other; African penguins (<i>Spheniscus demersus</i>) from the Gdansk Zoo
Lipid Content, Test Temperature, pH, and Depuration Time	lowest lipid content (smallest fish) = 7.4% and a directly proportional increase of $\leq 16\%$ of largest fish; lipid content increased ($r = 0.97$, $p/0.05$) with increasing body weight; Not reported; Not reported; TBBPA in guano ranged between 3.7 and 6.1 ng/g dw; Deposition into guano confirms rapid excretion in birds and also therefore the existence of a fast-acting organism detoxification mechanism.
Moisture, TOC, and Test Conditions Comments	Not reported; Not reported; Primary food source Baltic herring (<i>Clupea harengus</i>) from Gdansk Bay; daily consumption of approximately 0.5 kg of whole herring, which contains on average 10.5 % of lipids; average daily dose of TBBPA were estimated at 26.3 ± 14.9 ng
Nominal Measured and Time Plateau	Measured; Not reported
Duration, Parameter, and Sampling Frequency	Three African penguin ages tested: 8 years 7 months, 7 months and 6 months; other; Not reported
Analytical Method and Analytical Details	HPLC equipped with diode array detector, and run at a fixed wavelength of 208 nm; extraction via Soxhlet method; final purification via SPE method; quantitation limit: 0.9 ug/kg; recovery: 91.0-93.8%;
Results Value, Result Type, and Results Standard Deviation	BAF values ranged from 1.2-6.5; BMF values ranged from 2.7-9.8; BAF; Not Reported
Calculation Basis and Basis	other; not specified
Elimination, Metabolites, Kinetic Parameter, and Statistics	Results: BAF: Age 8yr,7mo - muscle: 3.9, liver: 4.1, adipose: 5.2, brain: 6.5; Age 7mo - muscle: 1.7, liver: 1.8, adipose: 2.7, brain: 4.4; Age 6mo - muscle: 1.2, liver: 1.9, adipose: 1.4, brain: 3.1BMF: Age 8yr,7mo - muscle: 9.8, liver: 5.9; Age 7mo - muscle: 4.2, liver: 2.5; Age 6mo - muscle: 3.0, liver: 2.7; Not reported; Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The test substance source and purity of analytical standard were reported.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	This metric is not applicable to this type of study.
	Metric 4:	Test Substance Stability	N/A	This metric is not applicable to this type of study.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Reported conditions were appropriate for this type of study.
	Metric 7:	Testing Consistency	N/A	This metric is not applicable to this type of study.

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Study Citation:		Reindl, A. R., Falkowska, L. (2014). Flame retardants at the top of a simulated baltic marine food web- A case study concerning african penguins from the Gdansk zoo. Archives of Environmental Contamination and Toxicology 68(2):259-264.		
OECD Harmonized Template:		Terrestrial Bioconcentration		
HERO ID:		2528326		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	N/A	This metric is not applicable to this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Test organism information was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	There was incomplete reporting of outcome assessment methods.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcomes of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements were not identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Lipid content was reported fish but not for penguins; lipid-normalized factors not specified.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical analysis was reported and appropriate; BAF, BMF calculations were not described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	SUNY, (2019). Bioaccumulation and translocation of tetrabromobisphenol A and hexabromocyclododecanes in mangrove plants from a national nature reserve of Shenzhen City, South China. Environment International 129:239-246.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	5679991

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, EndPoint, Type, Guideline	None; bioaccumulation: terrestrial; Experimental; other: Bioaccumulation and translocation of TBBPA in mangrove plants
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	Internal standard 13C12-TBBPA; mangrove plants and sediments from urban nature reserve in South China; NR; NR Notes: TBBPA
Test Organism and Test Organism Details	other; Bruguiera sexangula (n=6), Kandelia obovata (n=6) and Avicennia marina (n=5)
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; not reported; not reported; not applicable
Moisture, TOC, and Test Conditions Comments	not reported; not reported; Analysis of tissues (roots, stems and leaves) of three mangrove plant species and corresponding sediments from Futian National Nature Reserve of Shenzhen City to examine sediment-root bioaccumulation factors (RCFs) and translocation factors (TFs) of TBBPA
Nominal Measured and Time Plateau	measured; not applicable
Duration, Parameter, and Sampling Frequency	not applicable; DT50; Not applicable
Analytical Method and Analytical Details	ultra-high performance liquid chromatography tandem mass spectrometry; Average recovery in spiked experiments 68.1–114.0% (SD < 11.5%); MDL in supporting information;
Results Value, Result Type, and Results Standard Deviation	Bruguiera sexangular RCF = 0.006±0.002, TFs-l = 0.15±0.07, TFr-s = 87.7±67.5; Kandelia obovate RCF = 0.43±0.43, TFs-l = 0.13±0.07, TFr-s = 100.1±59.0; Avicennia marina RCF = 0.004±0.002, TFs-l = 5.46±3.58, TFr-s = 1.68±0.52; BSAF; Yes
Calculation Basis and Basis	steady state; not specified
Elimination, Metabolites, Kinetic Parameter, and Statistics	Sediment-root bioaccumulation factors (RCFs); Root-stem translocation factor (TFr-s); Stem-leaf translocation factor (TFs-l); not reported; not reported; One-way analysis of variance (ANOVA) accompanied with least significant difference (LSD); p < 0.05

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	Sample sources and analytical standard sources were reported.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	A concurrent control was not required for this study type.
	Metric 4:	Test Substance Stability	High	The field sample preparation and storage conditions were reported.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Limited details on environmental conditions were reported.
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8:	System Type and Design	High	Field study; therefore, equilibrium is assumed.

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Study Citation:	SUNY, (2019). Bioaccumulation and translocation of tetrabromobisphenol A and hexabromocyclododecanes in mangrove plants from a national nature reserve of Shenzhen City, South China. Environment International 129:239-246.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	5679991			
Domain	Metric	EVALUATION Rating		Comments
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	The test species were reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	No confounding variables were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Yu, Y.,j, Chen, X.,c, Wang, Z.,d, Liu, L.,t, Ge, Q.,z, Wang, Q., Zhang, Y.,p, Yu, Z.,l, Ma, R.,x (2020). Excretion characteristics and tissue accumulation of tetrabromobisphenol-A in male rats after sub-chronic inhalation exposure. Environmental Pollution 263(Pt B):114440.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	10113657

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, EndPoint, Type, Guideline	no; bioaccumulation: terrestrial; Experimental; other: non-guideline study
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	13C12-TBBPA (>99%); Cambridge Isotope Laboratories (MA, USA); Tokyo Chemical Industry (Tokyo, Japan); solid; >98% Notes: TBBPA was milled to respirable size (<10 mm) to generate aerosol TBBPA
Test Organism and Test Organism Details	Male Wistar rats; housed in an SPF grade laboratory; 12 hr light/dark cycle
Lipid Content, Test Temperature, pH, and Depuration Time	TBBPA concentrations in the livers of dosed rats were 1.1e20.4 times higher than those in the other tissues (except the serum) on a lipid weight basis; 23±2C; NR; Not Reported
Moisture, TOC, and Test Conditions Comments	humidity 40% to 60%; NR; aerosol TBBPA and clean air were mixed and used for inhalation exposure: 2 hours/day for 90 days
Nominal Measured and Time Plateau	Four groups: 12.9 ± 4.2 (Group A), 54.6 ± 11.1 (Group B), 121.6 ± 15.4 (Group C), and 455.0 ± 62.4 mg/m3 (Group D); Not Reported
Duration, Parameter, and Sampling Frequency	inhalation exposure; Not Reported; excretion samples (urine and feces) were collected on days 0, 1, 10, 20, 30, 40, 50, 60, 70, 80, and 90; animals were sacrificed on day 90 and serum, lung, liver, heart, thymus gland, spleen, testicle, muscle, kidney, and brain samples were collected
Analytical Method and Analytical Details	HPLC with MS; recoveries of 13C12-TBBPA were 83%±135% in serum, 90% to 131% in urine, 81% to 110% in feces, and 74% to 121% in tissue samples; LOD was 0.01 ng/g lipid, 0.03 ng/mL, 0.02 ng/g dry weight, and 0.01 ng/g lipid in serum, urine, feces, and tissues (except serum), respectively;
Results Value, Result Type, and Results Standard Deviation	Group A (12.9 mg/m3), B (54.6 mg/m3), C (121.6 mg/m3), and D (455.0 mg/m3). Lung: 4.88, 1.28, 0.65, 0.48 Liver: 58.98, 29.91, 21.08, 9.28 Heart: 4.13, 1.65, 0.85, 0.79 Thymus gland: 19.59, 5.89, 3.36, 1.59 Spleen: 9.13, 2.38, 1.16, 0.45 Testicle: 12.99, 3.21, 1.72, 1.34 Muscle: 49.69, 16.14, 9.85, 8.43 Kidney: 20.90, 10.05, 5.94, 4.90 Brain: 13.58, 3.81, 2.60, 1.49 Serum: 59.05, 32.27, 31.01, 19.08; Concentration of TBBPA between rat tissues and inhalation exposure doses; NR
Calculation Basis and Basis	other; Not Reported
Elimination, Metabolites, Kinetic Parameter, and Statistics	19.18% to 72.54% of the inhaled dose was excreted in feces; Not Reported; <1% TBBPA accumulated in each tissue; highest concentrations in serum and livers; Statistical analysis via: Origin Pro 2016 software. Statistical analyses were performed using SPSS 22.0 and p < 0.05

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance was reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Control groups were included.
	Metric 4:	Test Substance Stability	High	The test substance preparation was reported.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.

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Study Citation:	Yu, Y.,j, Chen, X.,c, Wang, Z.,d, Liu, L.,t, Ge, Q.,z, Wang, Q., Zhang, Y.,p, Yu, Z.,l, Ma, R.,x (2020). Excretion characteristics and tissue accumulation of tetrabromobisphenol-A in male rats after sub-chronic inhalation exposure. Environmental Pollution 263(Pt B):114440.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	10113657			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	High	Testing conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	The system type and design were appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	High	The test organism or species is routinely used for similar study types.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome assessment.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	There were multiple study groups, and there were no differences among the study groups in organism attrition or health outcomes (i.e., unexplained mortality) that influenced the outcome assessment.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reporting was appropriate for the study.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the datasets.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination		High		

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	none; experimental; other			
Solvent, Reactivity, Storage, Stability	acetone; NR; NR; NR			
Radiolabel, Source, State, Purity	14C-labelled tetrabromobisphenol-A; possibly mixed with a composite sample of unlabelled tetrabromobisphenol-A from five different manufacturers; solution; NR			
Sampling Frequency, Sampling Details, and Number of Replicates	24 and 48 hours; Not Reported; not reported			
pH, Test Temperature, Buffer, and Test Details	sediments 5.4-5.5; not reported; not reported; solid-phase concentrations were not measured during the study and are based on the nominal amount of substance added			
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; 3 sediments used with OC = 0.25%, 2.7%, and 6.8%.; not reported			
Bulk Density and Matrix Details	not reported; sediments produced by mixing different proportions of two natural stream sediments, one rich in organic debris and one predominantly sandy in nature			
Media, Recovery, and Statistics	sediment/water; not reported; not reported			
Transformation Products, Equilibrium	not reported; not reported; not reported			
Adsorption Details, and Equilibrium Desorption Details	not reported; not reported; not reported			
Reference Substance, Reference Substance Results, and Percent Adsorption	not reported; not reported; not reported			
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	not reported; not reported; not reported; not reported			
Desorption Type	Koc: organic carbon-water partition coefficient; 68,753 L/kg			
Partition Coefficient Type and Partition Coefficient Results	sediment/water; not reported			
Partition Coefficient Phase and Partition Coefficient Results	not reported			
Mass Balance	not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design	Metric 3:	Study Controls	High	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5238261			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance; additional detail may be in primary literature.
	Metric 6:	Testing Conditions	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable to this study.
	Metric 10:	Sampling Methods	N/A	Not applicable to this study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Not applicable to this study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Results are reasonable; additional detail may be in primary literature.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.

Overall Quality Determination

High

* Related References: Source (not in HERO at time of extraction): Springborn Life Sciences (1989c). Bioconcentration and elimination of 14C-residues by eastern oysters (Crassostrea virginica) exposed to tetrabromobisphenol-A. Report No 89-1-2918. Springborn Life Sciences, Inc., Wareham, Massachusetts.

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	none; experimental; other: non-guideline			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Sampling Frequency, Sampling Details, and Number of Replicates	not reported; Not Reported; not reported			
pH, Test Temperature, Buffer, and Test Details	not reported; not reported; not reported; not reported			
Matrix, Clay Silts and Organic Carbon, and CEC	other; not reported; not reported			
Bulk Density and Matrix Details	not reported; not reported			
Media, Recovery, and Statistics	sediment/water; not reported; not reported			
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	not reported; not reported; not reported			
Reference Substance, Reference Substance Results, and Percent Adsorption	not reported; not reported; not reported			
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	not reported; not reported; not reported; not reported			
Partition Coefficient Type and Partition Coefficient Results	Kp: sediment-water partition coefficient; 18,562 L/kg			
Partition Coefficient Phase and Partition Coefficient Results	sediment/water; not reported			
Mass Balance	not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 6:	Testing Conditions	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5238261			
Domain		Metric	EVALUATION Rating	Comments
	Metric 8:	System Type and Design	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable to this study.
	Metric 10:	Sampling Methods	N/A	Not applicable to this study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Not applicable to this study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Results are reasonable; additional detail may be in primary literature.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.

Overall Quality Determination

Medium

* Related References: Source (not in HERO at time of extraction): Watanabe I. (1988). Behaviour of organobrominated compounds at the sediment phase in the environment. Kosshu Eisei Hen, 26, 129-133 (in Japanese).

Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5238261			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	none; experimental; other: non-guideline; column study			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	14C-labelled tetrabromobisphenol-A; NR; NR; NR			
Sampling Frequency, Sampling Details, and Number of Replicates	not reported; Not Reported; not reported			
pH, Test Temperature, Buffer, and Test Details	not reported; not reported; not reported; Column flow velocity of 4.1 mm/min			
Matrix, Clay Silts and Organic Carbon, and CEC	silt loam; silt loam soil and sand; not reported			
Bulk Density and Matrix Details	not reported; not reported			
Media, Recovery, and Statistics	sediment/water; not reported; not reported			
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	not reported; not reported; not reported			
Reference Substance, Reference Substance Results, and Percent Adsorption	not reported; not reported; not reported			
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	not reported; Soil column: 16.2% of the applied radioactivity remained in the first 1 cm of the soil, with 6-7% of the total radioactivity in each of the next four sections. Generally the amount of the total radioactivity found in the lower 1 cm sections decreased from 4% to 2%, except for a slight increase to 5% of the total dose at 3-5 cm from the bottom of the column; sand column: 4.5% found in column effluent.; Not Reported; not reported			
Desorption Type	Kp; Kp: soil-water partition coefficient estimated as 63-233 L/kg			
Partition Coefficient Type and Partition Coefficient Results	soil/water; not reported			
Partition Coefficient Phase and Partition Coefficient Results	not reported			
Mass Balance				
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 4:	Test Substance Stability	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	Test method was suitable; additional detail may be in primary literature.
	Metric 6:	Testing Conditions	High	Details reported in this secondary source are sufficient; additional detail may be in primary literature.
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Study Citation:	ECB, (2008). Risk assessment of 2,2',6,6'-tetrabromo-4,4'-isopropylidene diphenol (tetrabromobisphenol-A).			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5238261			
Domain		Metric	EVALUATION Rating	Comments
	Metric 7:	Testing Consistency	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 8:	System Type and Design	High	Details reported in this secondary source are sufficient; additional detail may be in primary literature.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable to this study.
	Metric 10:	Sampling Methods	N/A	Not applicable to this study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 12:	Test Substance Purity	Medium	Limited details reported in this secondary source; detail may be in primary literature.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited details reported in this secondary source; detail may be in primary literature.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Not applicable to this study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Results are reasonable; additional detail may be in primary literature.
	Metric 18:	QSAR Models	N/A	Not applicable to this study.

Overall Quality Determination

High

* Related References: Source (not in HERO at time of extraction): Larsen G., Casey F., Bergman Å. and Hakk H. (2001). Mobility, sorption and fate of tetrabromobisphenol-A (TBBPA) in loam soil and sand. Poster presentation at Second International Workshop on Brominated Flame Retardants, May 14-16, Stockholm University, Sweden.

Study Citation:	Gong, H., Hu, J., Rui, X., Luo, J., Zhu, N. (2023). Unveiling the occurrence, distribution, removal, and environmental impacts of 65 emerging contaminants in neglected fresh leachate from municipal solid waste incineration plants. Journal of Hazardous Materials 460:132355.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	11312629

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A (TBBPA)
Confidentiality, Type, Guideline	none; experimental; other: monitoring study
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported Notes: monitoring study samples used for the test substance; details were not reported for the analytical standards or reference material
Sampling Frequency, Sampling Details, and Number of Replicates	sampling conducted in 2022 (reported in suppl file); leachate and sludge samples collected from municipal solid waste incineration plants (MSWIPs) in Shanghai; NR
pH, Test Temperature, Buffer, and Test Details	Fengxian influent and effluent in leachate treatment systems 6.04-8.1 (reported in suppl file); NR; assume ambient air temperature of Shanghai (with an approx. range of 0°C to 40°C); NR; TBBPA concentrations in Fengxian fresh leachate 2173.56 ng/L (reported in suppl file)
Matrix, Clay Silts and Organic Carbon, and CEC	other; Fengxian TOC of influent 12145 mg/L and effluent 93 mg/L; NR
Bulk Density and Matrix Details	NR; aqueous leachate phase
Media, Recovery, and Statistics	sludge phase; average recovery in collected samples: Leachate = 98-103%, sludge = 94-106% (reported in suppl file); Pearson and Spearman correlation analyses and significant differences ($p < 0.05$ or $p < 0.01$) were conducted using IBM SPSS Statistics 23 [31]. Normal distribution test using Shapiro-Wilk (S-W).
Transformation Products, Equilibrium	NR; NR; NR
Adsorption Details, and Equilibrium Desorption Details	NR; NR; NR
Reference Substance, Reference Substance Results, and Percent Adsorption	NR; NR; NR; NR
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	NR; NR; NR; NR
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	Kd distribution coefficient; Kd = 0.02 L/g; Based on the TBBPA concentrations in the Fengxian aerobic tank 1 leachate (O1) = 2271.88 ng/L, aerobic tank 2 leachate (O2) = 1971.40 ng/L, and ultrafiltration leachate (UF) = 2212.41 ng/L; aerobic tank 1 sludge (O1S) = 43.33 ng/g, aerobic tank 2 sludge (O2S) = 33.13 ng/g, and ultrafiltration filtration sludge (UFS) = 51.73 ng/g. Average Csludge = 2151.9 ng/g and average Cleachate = 42.73 ng/L.
Partition Coefficient Phase and Partition Coefficient Results	Aqueous and sludge phases of Fengxian's MSWIPs leachate biological treatment system; Kd = Csludge/Cleachate, (L/g). Fengxian's leachate biological treatment system has anaerobic-anoxic/aerobic, anoxic/aerobic and ultrafiltration stages.
Mass Balance	Not Reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	High	The test substance was identified definitively by name.
	Metric 2:	Medium	The test substance purity and the reference standards used were not reported; however, the omissions were not likely to have a substantial impact on the study results.

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Study Citation:	Gong, H., Hu, J., Rui, X., Luo, J., Zhu, N. (2023). Unveiling the occurrence, distribution, removal, and environmental impacts of 65 emerging contaminants in neglected fresh leachate from municipal solid waste incineration plants. Journal of Hazardous Materials 460:132355.				
OECD Harmonized Template:	Adsorption and Desorption				
HERO ID:	11312629				
Domain		Metric	EVALUATION Rating		Comments
Domain 2: Test Design					
	Metric 3:	Study Controls	N/A	The metric is not applicable to the study type.	
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to the study type.	
Domain 3: Test Conditions					
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.	
	Metric 6:	Testing Conditions	Medium	Monitoring study site conditions were generally reported.	
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to the study type.	
	Metric 8:	System Type and Design	High	Equilibrium may be assumed in this type of study.	
Domain 4: Test Organisms					
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study.	
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.	
Domain 5: Outcome Assessment					
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.	
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.	
Domain 6: Confounding/Variable Control					
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.	
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.	
Domain 7: Data Presentation and Analysis					
	Metric 15:	Data Reporting	High	Analytical methods used were suitable for detection and quantification of the target chemical.	
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).	
Domain 8: Other					
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable for a biological treatment system sludge/leachate derived Kd.	
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Study Citation:	Gong, H., Hu, J., Rui, X., Luo, J., Zhu, N. (2023). Unveiling the occurrence, distribution, removal, and environmental impacts of 65 emerging contaminants in neglected fresh leachate from municipal solid waste incineration plants. Journal of Hazardous Materials 460:132355.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	11312629

		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 18:	QSAR Models	N/A A QSAR model was not reported.

Overall Quality Determination	High
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Study Citation:	Han, W., Luo, L., Zhang, S. (2013). Adsorption of tetrabromobisphenol A on soils: Contribution of soil components and influence of soil properties. Colloids and Surfaces A: Physicochemical and Engineering Aspects 428:60-64.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5622511

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; other
Solvent, Reactivity, Storage, Stability	HPLC-grade methanol; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich Corporation; NR; >97% Notes: TBBPA
Sampling Frequency, Sampling Details, and Number of Replicates	Not reported; after centrifugation TBBPA in supernatant measured; 2
pH, Test Temperature, Buffer, and Test Details	7.02; 20±2°C; HCl or NaOH; tubes sealed with PTFE-lined caps shaken in dark from 24 hrs (based on preliminary test for equilibration)
Matrix, Clay Silts and Organic Carbon, and CEC	Mollisol; 5.09-5.63% SOC; 16.59% clay; 38.59 cmol/kg
Bulk Density and Matrix Details	surface area: 22.71 m ² /g; average pore diameter: 3.81; Heilongjiang soil
Media, Recovery, and Statistics	Not reported; Not reported; r squared: 0.99
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; Not reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	Kd; 1578.65 L/kg; Kd = qe/Ce with a TBBPA solution of 0.5 mg/L; Kf = 1000.68 L/kg, n= 0.75
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	Koc; 31027.96 L/kg
Partition Coefficient Phase and Partition Coefficient Results	soil-water; KOC = Kd/SOC
Mass Balance	Adsorption of TBBPA was therefore calculated by mass balance.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate controls were included.
	Metric 4:	Test Substance Stability	High	Test substance preparation was reported.
Domain 3: Test Conditions				

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Study Citation:	Han, W., Luo, L., Zhang, S. (2013). Adsorption of tetrabromobisphenol A on soils: Contribution of soil components and influence of soil properties. Colloids and Surfaces A: Physicochemical and Engineering Aspects 428:60-64.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5622511			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported.
	Metric 7:	Testing Consistency	High	Testing was consistent across study groups.
	Metric 8:	System Type and Design	High	System design was reported and appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling was reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited detail regarding analytical methods; MDL or extraction efficiency were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical analysis was appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination

High

Study Citation:	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5348243			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	None; Experimental; EPA OPPTS 835.1110 (Activated Sludge Sorption Isotherm)			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; Fischer Scientific Canada; NR; ACS grade			
Sampling Frequency, Sampling Details, and Number of Replicates	Not reported; collected in amber glass containers; dissolved oxygen, pH and temperature were recorded immediately after sample collection.; Not reported			
pH, Test Temperature, Buffer, and Test Details	7.1; 21.5°C; no; TBBPA concentration 30 ng/L; Diluted sludge added to the reactor was 1, 2, 4, 6, 8, 10, 12 and 15 mL			
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; not applicable; Not reported			
Bulk Density and Matrix Details	Not reported; fresh sludge collected from the aeration basin of conventional activated sludge process			
Media, Recovery, and Statistics	not applicable; Not reported; appropriate			
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported			
Reference Substance, Reference Substance Results, and Percent Adsorption	not applicable; Not Reported; Not reported			
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Kw (vessel wall partition coefficient); 0.053 mL/cm2; triplicate experiments to determine vessel-wall partition coefficient; Not reported			
Partition Coefficient Type and Partition Coefficient Results	average log Koc; 6.02			
Partition Coefficient Phase and Partition Coefficient Results	solids-water in activated sewage sludge; determined at 8 different activated sewage sludge concentrations; corrected for glass vessel partitioning			
Mass Balance	loss Kw=0.053 mL/cm2; average log sludge-water partition coefficient (logKp) = 4.54. not determined			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name and CASRN.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
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Study Citation:	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5348243			
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.		
OECD Harmonized Template:	Adsorption and Desorption		
HERO ID:	5348243		
EXTRACTION			
Parameter	Data		
CASRN and Test Material	79-94-7; TBBPA		
Confidentiality, Type, Guideline	None; Experimental; EPA OPPTS 835.1110 (Activated Sludge Sorption Isotherm)		
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR		
Radiolabel, Source, State, Purity	NR; Fischer Scientific Canada; NR; ACS grade		
Sampling Frequency, Sampling Details, and Number of Replicates	Not reported; collected in amber glass containers; dissolved oxygen, pH and temperature were recordedimmediately after sample collection.; Not reported		
pH, Test Temperature, Buffer, and Test Details	6.82; 21.3°C; no; TBBPA concentration 30 ng/L; Diluted sludge added to the reactor was 1, 2, 4, 6, 8, 10, 12 and 15 mL		
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; not applicable; Not reported		
Bulk Density and Matrix Details	Not reported; fresh sludge collected from the aeration basin of membrane bioreactor process		
Media, Recovery, and Statistics	not applicable; Not reported; appropriate		
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported		
Reference Substance, Reference Substance Results, and Percent Adsorption	not applicable; Not Reported; Not reported		
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Kw (vessel wall partition coefficient); 0.053 mL/cm2; triplicate experiments to determine vessel-wall partition coefficient; Not reported		
Partition Coefficient Type and Partition Coefficient Results	average log Koc; 5.76		
Partition Coefficient Phase and Partition Coefficient Results	solids-water in activated sewage sludge; determined at 8 different activated sewage sludge concentrations; corrected for glass vessel partitioning loss Kw=0.053 mL/cm2; average log sludge-water partition coefficient (logKp) = 4.31.		
Mass Balance	not determined		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	The test substance was identified by name and CASRN.
Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design			
Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions			
Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
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Study Citation:	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5348243			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Lan, J., Shen, Z., Gao, W., Liu, A. (2019). Occurrence of bisphenol-A and its brominated derivatives in tributary and estuary of Xiaoqing River adjacent to Bohai Sea, China. Marine Pollution Bulletin 149:1.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	10114302

Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, Type, Guideline	no; experimental - monitoring data; other: non-guideline study
Solvent, Reactivity, Storage, Stability	methanol; Not Reported; standard solution stored at -4C; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Sigma Aldrich; Not Reported; $\geq 97\%$
Sampling Frequency, Sampling Details, and Number of Replicates	NR; Soil, sediment and water samples were collected from along the tributary of Xiaoqing River (Zhangseng River) near the estuary to Bohai Sea; NR
pH, Test Temperature, Buffer, and Test Details	NR; ambient; NR; Surface soil (0–5 cm), river water, and sediment samples were simultaneously collected at each sampling site, and the distance between two adjacent sampling sites was ~2 km
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; NR; NR
Bulk Density and Matrix Details	NR; Not Reported
Media, Recovery, and Statistics	natural water; 78-95%; Origin 9.0, which was also used for Spearman's rank correlation test
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	debromination products were low brominated BPA, including TriBBPA, DBBPA, and MBBPA, with BPA as the terminal product. Values of (TriBBPA+DBBPA+MBBPA) / TBBPA in 15 sediment samples were of 7.5–151.8% (average, 36.6%), indicating that some transformation products were likely to be from debromination of TBBPA in sediment; NR; NR
Reference Substance, Reference Substance Results, and Percent Adsorption	NR; NR; NR
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	NR; NR; NR; NR
Partition Coefficient Type and Partition Coefficient Results	calculated; $C_{\text{sediment}}/C_{\text{water}} = 1.94 \times 10^4$ (average), 3.14×10^3 (median), $3.55\text{--}2.27 \times 10^5$ (range).
Partition Coefficient Phase and Partition Coefficient Results	sediment/water; soil/water; Based on average levels reported: sediment: $2.61\text{E}+05$ ng/kg dwwater: 37.1 ng/LCsediment/Cwater = $7.04\text{E}+03$ L/kg (SRC calculated)soil: $1.79\text{E}+04$ ng/kgwater: 37.1 ng/LCsoil/Cwater = $4.82\text{E}+02$ L/kg (SRC calculated)
Mass Balance	NR

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance was reported.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	This metric is not applicable to the study.
	Metric 4:	Test Substance Stability	N/A	This metric is not applicable to the study.

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Study Citation:	Lan, J., Shen, Z., Gao, W., Liu, A. (2019). Occurrence of bisphenol-A and its brominated derivatives in tributary and estuary of Xiaoqing River adjacent to Bohai Sea, China. Marine Pollution Bulletin 149:1.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	10114302			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	N/A	This metric is not applicable to the study.
	Metric 6:	Testing Conditions	Medium	There were omissions in site conditions; however, omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	Medium	Environmental samples collected at various locations within a ~2 km range.
	Metric 8:	System Type and Design	High	Equilibrium assumed in field sampling.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome assessment.
	Metric 12:	Test Substance Purity	Medium	Minor limitations were identified in sampling methods of the outcome(s) of interest were reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	An appropriate analytical method was used.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to the study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination		High		

Study Citation:	Li, Y., Zhou, Q., Wang, Y., Xie, X. (2011). Fate of tetrabromobisphenol A and hexabromocyclododecane brominated flame retardants in soil and uptake by plants. Chemosphere 82(2):204-209.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	1927658

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; other: Sorption to soil matrix in an aging study
Solvent, Reactivity, Storage, Stability	Stock solutions prepared in methanol; NR; Stock solutions stored at -20C; NR
Radiolabel, Source, State, Purity	13C12-labeled TBBPA used as a standard; Sigma-Aldrich Co. (Dorset, England); NR; NR
Sampling Frequency, Sampling Details, and Number of Replicates	Sampled after 8 weeks; sterile soil and dry soil were stored at 4C and then extracted; 3 each sterile and dry soil
pH, Test Temperature, Buffer, and Test Details	6.50; room temperature; Not reported; 10 g of spiked soil placed in glass tubes and kept in dark (autoclaved and dry treatments were included)
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; 3.86% organic matter, 0.142% total N; 199 mmol/kg
Bulk Density and Matrix Details	Not reported; Soil samples collected from 0-20 cm in an uncultivated and unpolluted field in an arboretum in Tianjin, China
Media, Recovery, and Statistics	Not applicable; 13C12 labeled TBBPA = 90±8%; SPSS 12.0 software was used to analyze the data
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; Concentrations of TBBPA were less than 60 µg/kg after 8 weeks indicating a 90% decrease from initial concentration
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	Not reported; Sorption to soil matrix was indicated as a significant factor in TBBPAs short term fate in soils; Concentrations in sterilized and non-sterilized (planted or unplanted) soil suggested that microbial and photochemical degradation was insignificant; Not reported
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	Not reported; Not reported
Partition Coefficient Phase and Partition Coefficient Results	other; Not reported
Mass Balance	Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source was reported, purity was not reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Controls were included.
	Metric 4:	Test Substance Stability	High	Test substance preparation and storage were reported.
Domain 3: Test Conditions				

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Study Citation:	Li, Y., Zhou, Q., Wang, Y., Xie, X. (2011). Fate of tetrabromobisphenol A and hexabromocyclododecane brominated flame retardants in soil and uptake by plants. Chemosphere 82(2):204-209.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	1927658			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some detail omitted.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology addressed the dataset; however, a partitioning coefficient was not obtained from the study.
	Metric 12:	Test Substance Purity	Low	Sampling methods were not described in detail.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, limits of detection and extraction recovery were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Liu, D., Liu, J., Guo, M., Xu, H., Zhang, S., Shi, L., Yao, C. (2016). Occurrence, distribution, and risk assessment of alkylphenols, bisphenol A, and tetrabromobisphenol A in surface water, suspended particulate matter, and sediment in Taihu Lake and its tributaries. Marine Pollution Bulletin 112(1-2):142-150.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	3457337

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; other: Not reported
Solvent, Reactivity, Storage, Stability	NA; NR; Water samples: 2L in brown glass bottles, filtered, 4°C Sediment samples: stainless steel containers, -20°C; NR
Radiolabel, Source, State, Purity	NA; Taihu Lake, China; NA; NA Notes: Analytical standard obtained from J&K Chemical, Ltd., St. Louis, MO
Sampling Frequency, Sampling Details, and Number of Replicates	November 2015; Surface water (0-1 m) and sediment samples (0-0.1 m) collected from 26 sites in Taihu Lake, China; Not reported
pH, Test Temperature, Buffer, and Test Details	Not reported; Not reported; Not reported; Field study, pollutant concentrations analyzed in water, suspended particulate matter, and sediment of river.
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Not reported; Not reported
Bulk Density and Matrix Details	Not reported; Natural suspended particulate matter
Media, Recovery, and Statistics	Natural river water; Not reported; Not reported
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not Reported; Not Reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; 81%
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	NA; Not Reported; Not Reported; Not reported
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	Not Reported; Not Reported
Partition Coefficient Phase and Partition Coefficient Results	suspended matter-water; % sorption calculated by $[\text{concentration in particulate}] / ([\text{concentration in particulate}] + [\text{concentration in water}]) * 100\%$. Pollutant detected in water at only 2 sites.
Mass Balance	NA

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The source of the field samples was reported.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Method or field blanks were not explicitly included.
	Metric 4:	Test Substance Stability	High	Sample storage conditions and preparation were reported and appropriate for the study.

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Study Citation:	Liu, D., Liu, J., Guo, M., Xu, H., Zhang, S., Shi, L., Yao, C. (2016). Occurrence, distribution, and risk assessment of alkylphenols, bisphenol A, and tetrabromobisphenol A in surface water, suspended particulate matter, and sediment in Taihu Lake and its tributaries. Marine Pollution Bulletin 112(1-2):142-150.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	3457337			
Domain		Metric	EVALUATION Rating	Comments
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	No environmental conditions or sample characteristics were reported, they may be included in supplemental information.
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be at equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods addressed the outcomes of interest and were acceptable for a field study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability between sites was discussed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Raw data reported graphically, extraction efficiency and limits of detection were not reported but may be included in supplemental information, the analytical method was appropriate. Limited information available to conduct independent calculations.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical analyses were conducted for other study groups but was not reported for the test substance.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and comparable to previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination

High

Study Citation:	Sun, Z. H., Mao, L., Feng, Z., Yu, Y. J., Yu, H. X. (2008). [Effects of dissolved organic matter from wastewater on sorption of tetrabromobisphenol A to soils]. Nongye Huanjing Kexue Xuebao / Journal of Agro-Environment Science 27(6):2222-2226.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5636576

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	no; experimental; other: not reported; batch equilibrium tests
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Sampling Frequency, Sampling Details, and Number of Replicates	NR; NR; NR
pH, Test Temperature, Buffer, and Test Details	7-8; NR; NR; NR
Matrix, Clay Silts and Organic Carbon, and CEC	other; 3 soils were evaluated; fluvo-aquic soil (sandy loam), meadow brown soil (loamy clay), grey lime (silt loam); NR
Bulk Density and Matrix Details	NR; soil with dissolved organic matter from influent and effluent of a municipal WWTP
Media, Recovery, and Statistics	NR; NR; NR
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NR; NR; NR
Reference Substance, Reference Substance Results, and Percent Adsorption	NR; NR; NR
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	NR; NR; NR; NR
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	Kd; 20.0-465.7 L/kg in three different soils
Partition Coefficient Phase and Partition Coefficient Results	NR; NR
Mass Balance	NR

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	Low	Unable to verify test substance purity; source written in foreign language.
Domain 2: Test Design	Metric 3:	Study Controls	Low	Unable to verify study controls; source written in foreign language.
	Metric 4:	Test Substance Stability	Low	Unable to verify test method stability; source written in foreign language.
Domain 3: Test Conditions				

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Study Citation:	Sun, Z. H., Mao, L., Feng, Z., Yu, Y. J., Yu, H. X. (2008). [Effects of dissolved organic matter from wastewater on sorption of tetrabromobisphenol A to soils]. Nongye Huanjing Kexue Xuebao / Journal of Agro-Environment Science 27(6):2222-2226.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5636576			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 5:	Test Method Suitability	Low	Unable to verify test method suitability; source written in foreign language.
	Metric 6:	Testing Conditions	Low	Unable to verify test conditions; source written in foreign language.
	Metric 7:	Testing Consistency	Low	Unable to verify test consistency; source written in foreign language.
	Metric 8:	System Type and Design	Low	Unable to verify equilibrium; source written in foreign language.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric does not apply to this study type.
	Metric 10:	Sampling Methods	N/A	This metric does not apply to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Unable to verify intended outcome; source written in foreign language.
	Metric 12:	Test Substance Purity	Low	Unable to verify sampling method; source written in foreign language.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Unable to verify confounding variables; source written in foreign language.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric does not apply to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Unable to verify metric; source written in foreign language.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric does not apply to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Unable to verify study results; source written in foreign language.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported

Overall Quality Determination**Low**

* Related References: Source written in foreign language.

Study Citation:	Sun, Z., Mao, L., Xian, Q., Yu, Y., Li, H., Yu, H. (2008). Effects of dissolved organic matter from sewage sludge on sorption of tetrabromobisphenol A by soils. Journal of Environmental Sciences 20(9):1075-1081.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5497212

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; other: Not reported; Effects of soil amendment with liquid sewage sludge on sorption
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich Chemicals, USA; NR; >97%
Sampling Frequency, Sampling Details, and Number of Replicates	Once; Tubes centrifuged at 4000 r/min for 10 min; 2
pH, Test Temperature, Buffer, and Test Details	7.64 - 8.01 (test system); 8.16 (soil:water 1 g : 2.5 mL), 7.99 (sewage solution); 25°C; Not reported; 1.00 g soil, test substance solution, and 0, 9, 18, 36, 90, and 180 mg OC/L Liquid sewage sludge were added to 15 mL glass tubes with PTFE-lined screw caps
Matrix, Clay Silts and Organic Carbon, and CEC	sandy loam; 13.4% clay, 24.4% silt, 62.4% sand, 8.47 g/kg organic carbon; 10.8 cmol(+)/kg
Bulk Density and Matrix Details	Not reported; 0-20 cm depth soil collected from Fengqui County of Henan Province, China
Media, Recovery, and Statistics	0, 9, 18, 36, 90, and 180 mg OC/L Liquid sewage sludge from Suojincun Municipal Wastewater Treatment Plant, Nanjing, China, with 0.01 mol CaCl ₂ and 100 mg/L NaN ₃ ; Not reported; Linear sorption isotherm
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NA; Shaken at 150 r/min for 48 h; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; Not Reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Not Reported; Not Reported; Not Reported; Not Reported
Partition Coefficient Type and Partition Coefficient Results	Kd; 18.5±0.3, 41.7±1.3, 44.4±1.5, 50.9±1.3, 66.4±2.5, and 83.1±3.3 L/kg
Partition Coefficient Phase and Partition Coefficient Results	soil-water; Results reported for 0, 9, 18, 36, 90, and 180 mg OC/L Liquid sewage sludge amendment, respectively. Sorption promoted in the presence of dissolved organic matter from liquid sewageLinear sorption isotherm, R ² = 0.998, 0.988, 0.984, 0.993, 0.983, 0.984Koc values can be estimated from Kd values in the absence of DOM and fraction OC reported for each soil
Mass Balance	Loss from photochemical decomposition, volatilization, and sorption to the test tube was negligible

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was reported by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	The results of controls were reported for mass balance, and negligible loss was observed.

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Study Citation:	Sun, Z., Mao, L., Xian, Q., Yu, Y., Li, H., Yu, H. (2008). Effects of dissolved organic matter from sewage sludge on sorption of tetrabromobisphenol A by soils. Journal of Environmental Sciences 20(9):1075-1081.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5497212			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	Test substance concentrations were not reported, storage was not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	All appropriate testing conditions, including soil and sewage characteristics, were reported.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	The system achieved equilibrium and was capable of maintaining test substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining partition coefficients.
	Metric 12:	Test Substance Purity	Medium	Sampling methods focused on the correct phases and were collected at an acceptable frequency, but sample preparation details were not reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No notable sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; limits of detection or recovery were not reported. Qualitative mass balance was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Sorption linear isotherm calculations were applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination			High	

Study Citation:	Sun, Z., Mao, L., Xian, Q., Yu, Y., Li, H., Yu, H. (2008). Effects of dissolved organic matter from sewage sludge on sorption of tetrabromobisphenol A by soils. Journal of Environmental Sciences 20(9):1075-1081.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5497212

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; other: Not reported; Effects of soil amendment with liquid sewage sludge on sorption
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich Chemicals, USA; NR; >97%
Sampling Frequency, Sampling Details, and Number of Replicates	Once; Tubes centrifuged at 4000 r/min for 10 min; 2
pH, Test Temperature, Buffer, and Test Details	7.41 - 7.90 (test system); 7.81 (soil:water 1 g : 2.5 mL), 7.99 (sewage solution); 25°C; Not reported; 1.00 g soil, test substance solution, and 0, 9, 18, 36, 90, and 180 mg OC/L Liquid sewage sludge were added to 15 mL glass tubes with PTFE-lined screw caps
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; loamy clay; 26.9% clay, 21.8% silt, 51.3% sand, 13.7 g/kg organic carbon; 22.6 cmol(+)/kg
Bulk Density and Matrix Details	Not reported; 0-20 cm depth soil collected from Shenyang City of Liaoning Province, China
Media, Recovery, and Statistics	0, 9, 18, 36, 90, and 180 mg OC/L Liquid sewage sludge from Suojincun Municipal Wastewater Treatment Plant, Nanjing, China, with 0.01 mol CaCl ₂ and 100 mg/L NaNO ₃ ; Not reported; Linear sorption isotherm
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NA; Shaken at 150 r/min for 48 h; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; Not Reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Not Reported; Not Reported; Not Reported; Not Reported
Partition Coefficient Type and Partition Coefficient Results	K _d ; 84.2±2.5, 158.5±4.6, 140.5±4.9, 137.4±2.4, 11.3±2.0, and 80.6±2.0 L/kg
Partition Coefficient Phase and Partition Coefficient Results	soil-water; Results reported for 0, 9, 18, 36, 90, and 180 mg OC/L Liquid sewage sludge amendment, respectively. Sorption promoted with low conc. of dissolved organic matter from liquid sewageLinear sorption isotherm, R ² = 0.987, 0.987, 0.982, 0.995, 0.995, 0.991K _{oc} values can be estimated from K _d values in the absence of DOM and fraction OC reported for each soil
Mass Balance	Loss from photochemical decomposition, volatilization, and sorption to the test tube was negligible

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was reported by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	The results of controls were reported for mass balance, and negligible loss was observed.
	Metric 4:	Test Substance Stability	Medium	Test substance concentrations were not reported, storage was not reported.

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Study Citation:	Sun, Z., Mao, L., Xian, Q., Yu, Y., Li, H., Yu, H. (2008). Effects of dissolved organic matter from sewage sludge on sorption of tetrabromobisphenol A by soils. Journal of Environmental Sciences 20(9):1075-1081.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5497212			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	All appropriate testing conditions, including soil and sewage characteristics, were reported.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	The system achieved equilibrium and was capable of maintaining test substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining partition coefficients.
	Metric 12:	Test Substance Purity	Medium	Sampling methods focused on the correct phases and were collected at an acceptable frequency, but sample preparation details were not reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No notable sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; limits of detection or recovery was not reported. Qualitative mass balance was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Sorption linear isotherm calculations were applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination		High		

Study Citation:	Sun, Z., Mao, L., Xian, Q., Yu, Y., Li, H., Yu, H. (2008). Effects of dissolved organic matter from sewage sludge on sorption of tetrabromobisphenol A by soils. Journal of Environmental Sciences 20(9):1075-1081.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5497212

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; other: Not reported; Effects of soil amendment with liquid sewage sludge on sorption
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich Chemicals, USA; NR; >97%
Sampling Frequency, Sampling Details, and Number of Replicates	Once; Tubes centrifuged at 4000 r/min for 10 min; 2
pH, Test Temperature, Buffer, and Test Details	7.17 - 7.97 (test system); 7.11 (soil:water 1 g : 2.5 mL), 7.99 (sewage solution); 25°C; Not reported; 1.00 g soil, test substance solution, and 0, 9, 18, 36, 90, and 180 mg OC/L Liquid sewage sludge were added to 15 mL glass tubes with PTFE-lined screw caps
Matrix, Clay Silts and Organic Carbon, and CEC	silt loam; 12.8% clay, 45.9% silt, 41.3% sand, 21.3 g/kg organic carbon; 9.50 cmol(+)/kg
Bulk Density and Matrix Details	Not reported; 0-20 cm depth soil collected from Hechi City of Guangxi Province, China
Media, Recovery, and Statistics	0, 9, 18, 36, 90, and 180 mg OC/L Liquid sewage sludge from Suojincun Municipal Wastewater Treatment Plant, Nanjing, China, with 0.01 mol CaCl ₂ and 100 mg/L NaN ₃ ; Not reported; Linear sorption isotherm
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NA; Shaken at 150 r/min for 48 h; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; Not Reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Not Reported; Not Reported; Not Reported; Not Reported
Partition Coefficient Type and Partition Coefficient Results	K _d : 394.1±15.7, 363.2±7.0, 315.4±10.2, 289.7±6.6, 273.0±9.8, and 211.2±9.3 L/kg
Partition Coefficient Phase and Partition Coefficient Results	soil-water; Results reported for 0, 9, 18, 36, 90, and 180 mg OC/L Liquid sewage sludge amendment, respectively. Sorption decreased with increasing dissolved organic matter from liquid sewageLinear sorption isotherm, R ² = 0.977, 0.994, 0.984, 0.984, 0.989, 0.978K _{oc} values can be estimated from K _d values in the absence of DOM and fraction OC reported for each soil
Mass Balance	Loss from photochemical decomposition, volatilization, and sorption to the test tube was negligible

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was reported by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	The results of controls were reported for mass balance, and negligible loss was observed.
	Metric 4:	Test Substance Stability	Medium	Test substance concentrations were not reported, storage was not reported.

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Study Citation:	Sun, Z., Mao, L., Xian, Q., Yu, Y., Li, H., Yu, H. (2008). Effects of dissolved organic matter from sewage sludge on sorption of tetrabromobisphenol A by soils. Journal of Environmental Sciences 20(9):1075-1081.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5497212			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	All appropriate testing conditions, including soil and sewage characteristics, were reported.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	The system achieved equilibrium and was capable of maintaining test substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining partition coefficients.
	Metric 12:	Test Substance Purity	Medium	Sampling methods focused on the correct phases and were collected at an acceptable frequency, but sample preparation details were not reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No notable sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; limits of detection or recovery was not reported. Qualitative mass balance was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Sorption linear isotherm calculations were applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination		High		

Study Citation:	Sun, Z., Yu, Y., Mao, L., Feng, Z., Yu, H. (2008). Sorption behavior of tetrabromobisphenol A in two soils with different characteristics. Journal of Hazardous Materials 160(2-3):456-461.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5636571

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; other: Sorption in soil using batch equilibrium experiments
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich chemicals; NR; >97% Notes: TBBPA
Sampling Frequency, Sampling Details, and Number of Replicates	Not reported; Not reported; Not reported
pH, Test Temperature, Buffer, and Test Details	LN soil = 7.81; GX soil = 7.11; 25°C; Not reported; Sorption experiments were conducted using batch equilibration technique; Desorption was evaluated using decant and refill technique
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; LN soil: 13.7 g/kg OC, 51.3% sand, 21.8% silt, 26.9% clay; GX soil: 21.3 g/kg OC, 41.3% sand, 45.9% silt, 12.8% clay; LN soil = 22.6 cmol(+)/kg; GX soil = 9.50 cmol(+)/kg
Bulk Density and Matrix Details	Not reported; Surface soil: Liaoning LN soil (loamy clay) and Guangxi GX soil (silt loam)
Media, Recovery, and Statistics	background solution was 0.01M CaCl ₂ to maintain a constant ionic strength and 100mg/L NaNO ₃ to inhibit microbial activity; Not reported; Not reported
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Sorption reached apparent equilibrium at 48 hrs, this was selected as the sorption equilibrium time for all the samples in the sorption and desorption experiments; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; Sorption at 30 min. LN soil = 85.5% and GX soil = 72.4%; at 2h LN soil = 91.0% and GX soil = 93.2%
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Not reported; Not reported; Kf: Freundlich affinity coefficient (mg/kg)(mg/L) ⁻ⁿ , n = an empirical exponent which indicated isotherm nonlinearity; LN soil sorption Kf = 78.5±1.36, n = 0.748±0.019, desorption Kf = 108.6±2.35, n = 0.851±0.014; GX soil sorption Kf = 364.6±9.42, n = 0.756±0.023, desorption Kf = 484.6±29.2, n = 0.741±0.033 (R-squared ca. 0.99)
Partition Coefficient Type and Partition Coefficient Results	Not reported; Not reported
Partition Coefficient Phase and Partition Coefficient Results	soil-water; Not reported
Mass Balance	Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate controls were included; results valid.

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Study Citation:	Sun, Z., Yu, Y., Mao, L., Feng, Z., Yu, H. (2008). Sorption behavior of tetrabromobisphenol A in two soils with different characteristics. Journal of Hazardous Materials 160(2-3):456-461.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5636571			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 4:	Test Substance Stability	Medium	Test substance preparation was not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported.
	Metric 7:	Testing Consistency	High	Testing was consistent across study groups.
	Metric 8:	System Type and Design	High	System design was reported and appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling was reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Limited detail regarding analytical methods; MDL or extraction efficiency were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical analysis was appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Tong, F., Gu, X., Gu, C., Ji, R., Tan, Y., Xie, J. (2015). Insights into tetrabromobisphenol A adsorption onto soils: Effects of soil components and environmental factors. Science of the Total Environment 536:582-588.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5496640

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; other: TBBPA adsorption onto natural black soil and black soil treated to reduce organic matter and oxide content.
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR
Radiolabel, Source, State, Purity	14-C-ring-labeled TBBPA (2.442 x 10 ¹² Bq mol ⁻¹ . 99% radiochemical purity, 97% chemical purity.; Sigma-Aldrich; NR; >97% Notes: NR
Sampling Frequency, Sampling Details, and Number of Replicates	Not reported; Black Soil (Histosols), collected from Hailin City, Jielongjinag Province, China at 0-20cm soil depth was used.; Not reported
pH, Test Temperature, Buffer, and Test Details	7.0; 25±1°C; Not reported; TBBPA (unlabeled and labeled mixture in methanol) was added to a soil suspension in water (10g/L) and mixed for 24 hours in the dark at concentrations of 0.05-2.0 mg/L.
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Clay/Silt/Sand: 1.31/11.25/87.43; Organic matter: 53.6g/kg; 18.66 cmol/kg
Bulk Density and Matrix Details	Not reported; The solvent, methanol, was limited to <1% v/v.
Media, Recovery, and Statistics	Experiments were done using untreated soil (BS samples), NaOCl treated soil to reduce organic matter content (BS1 samples), and NaOCl followed by dithionite-citrate-bicarbonate (DCB) to remove free ferric (hydro)oxides (BS2 samples).; Not reported; R ² for Kd values of BS, BS1, and BS2 were 0.9900, 0.9809, and 0.9737.
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; Not reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Not reported; Not reported; Not reported; Kd's with 95% confidence intervals for BS, BS1, and BS2 samples (L/kg): 337.1 (315.6-358.5), 23.79 (21.68-25.90), 116.9 (104.67-129.1).
Partition Coefficient Type and Partition Coefficient Results	Koc for untreated soil (at pH <7); 3.65 L/g
Partition Coefficient Phase and Partition Coefficient Results	Not Reported; The removal of soil organic matter reduced the sorption by 93%
Mass Balance	Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance radiochemical and chemical purities were reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Controls were not reported but the omission is unlikely to have a substantial impact on the study results.

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Study Citation:	Tong, F., Gu, X., Gu, C., Ji, R., Tan, Y., Xie, J. (2015). Insights into tetrabromobisphenol A adsorption onto soils: Effects of soil components and environmental factors. Science of the Total Environment 536:582-588.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5496640			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 4:	Test Substance Stability	High	The test substance preparation was reported and appropriate.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test material and was tested below its aqueous solubility.
	Metric 6:	Testing Conditions	High	The testing conditions were clearly described and appropriate.
	Metric 7:	Testing Consistency	High	Experiments were done in duplicate and there were no reported changes in the testing conditions.
	Metric 8:	System Type and Design	High	Equilibrium was established and the system was capable of maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was accounted for in the results and any differences between sample groups were reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Mass balance results were not reported but the omission is unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination

High

Study Citation:	Tong, F., Gu, X., Gu, C., Ji, R., Tan, Y., Xie, J. (2015). Insights into tetrabromobisphenol A adsorption onto soils: Effects of soil components and environmental factors. Science of the Total Environment 536:582-588.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5496640

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; other: TBBPA adsorption onto natural red soil and red soil treated to reduce organic matter and oxide content.
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR
Radiolabel, Source, State, Purity	14-C-ring-labeled TBBPA (2.442 x 10 ¹² Bq mol ⁻¹ . 99% radiochemical purity, 97% chemical purity.; Sigma-Aldrich; NR; >97% Notes: NR
Sampling Frequency, Sampling Details, and Number of Replicates	Not reported; Red soil (Ferrosols), collected from Hailin City, Jielongjinag Province, China at 0-20cm soil depth was used.; Not reported
pH, Test Temperature, Buffer, and Test Details	7.0; 25±1°C; Not reported; TBBPA (unlabeled and labeled mixture in methanol) was added to a soil suspension in water (10g/L) and mixed for 24 hours in the dark at concentrations of 0.05-2.0 mg/L.
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Clay/Silt/Sand: 6.65/30.98/62.37; Organic matter: 12.4 g/kg; 9.66 cmol/kg
Bulk Density and Matrix Details	Not reported; The solvent, methanol, was limited to <1% v/v.
Media, Recovery, and Statistics	Experiments were done using untreated soil (RS samples), NaOCl treated soil to reduce organic matter content (RS1 samples), and NaOCl followed by dithionite-citrate-bicarbonate (DCB) to remove free ferric (hydro)oxides (RS2 samples).; Not reported; R ² for Kd values of RS, RS1, and RS2 were 0.9900, 0.9809, and 0.9737.
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; Not reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Not reported; Not reported; Not reported; Kd's with 95% confidence intervals for RS, RS1, and RS2 samples (L/kg): 75.98 (72.79–79.17), 35.86 (34.36–37.36), 49.85 (46.92–52.78).
Partition Coefficient Type and Partition Coefficient Results	Koc for untreated soil (at pH <7); 3.56 L/g
Partition Coefficient Phase and Partition Coefficient Results	Not Reported; The removal of soil organic matter reduced the sorption by 53% in red soil
Mass Balance	Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance radiochemical and chemical purities were reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Controls were not reported but the omission is unlikely to have a substantial impact on the study results.
	Metric 4:	Test Substance Stability	High	The test substance preparation was reported and appropriate.

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Study Citation:	Tong, F., Gu, X., Gu, C., Ji, R., Tan, Y., Xie, J. (2015). Insights into tetrabromobisphenol A adsorption onto soils: Effects of soil components and environmental factors. Science of the Total Environment 536:582-588.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5496640			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test material and was tested below its aqueous solubility.
	Metric 6:	Testing Conditions	High	The testing conditions were clearly described and appropriate.
	Metric 7:	Testing Consistency	High	Experiments were done in duplicate and there were no reported changes in the testing conditions.
	Metric 8:	System Type and Design	High	Equilibrium was established and the system was capable of maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was accounted for in the results and any differences between sample groups were reported
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Mass balance results were not reported but the omission is unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Wang, X., Li, C., Yuan, X., Yang, S. (2020). Contamination Level, Distribution Characteristics, and Ecotoxicity of Tetrabromobisphenol A in Water and Sediment from Weihe River Basin, China. International Journal of Environmental Research and Public Health 17(11):3750.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	10114428

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Not Reported
Confidentiality, Type, Guideline	No; Experimental; other
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; AccuStandard (New Haven, CT, USA); NR; NR Notes: NR
Sampling Frequency, Sampling Details, and Number of Replicates	36 sampling points; 36 water samples and 34 sediment samples were collected at 36 sampling points in the mainstream and tributaries of Weihe River.; Not Reported
pH, Test Temperature, Buffer, and Test Details	Water samples were adjusted to pH =< 2 after collection; NR; NR; Not Reported
Matrix, Clay Silts and Organic Carbon, and CEC	other; NR; NR
Bulk Density and Matrix Details	NR; Not Reported
Media, Recovery, and Statistics	Not Reported; Sediment samples: 57.96-145.75%; water samples: 41.75-129.28%; TBBPA concentrations in sediment ranged from not detected to 3.889 ng/g dw; mean was 0.283 ng/g dw.
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not Reported; Not Reported; Not Reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not Reported; No correlation was found between TBBPA and TOC in sediment samples (correlation coefficient r-squared: 0.00566).; Not Reported; Mean (St. Dev) calculated Kf at 8 sites where TBBPA was detected in both sediment and water samples: 13.7 (15.9)
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Not Reported; Kf at sampling sites 7, 9, 10, 20, 26, 27, 28, and 34 = 14.7, 0.195, 9.5, 7.26, 5.41, 50.6, 4.29, and 17.4 (Calculations in file attached)
Partition Coefficient Type and Partition Coefficient Results	sediment/water; SRC Calculations (in file attached): Koc at sampling sites 7, 9, 10, 20, 26, 27, 28, and 34 = 25.1, 0.15, 5.6, 4.65, 3.65, 36.1, 2.88, and 14.3; log Koc at sampling sites 7, 9, 10, 20, 26, 27, 28, and 34 = 1.4, -0.8, 0.75, 0.67, 0.56, 1.56, 0.46, and 1.16
Partition Coefficient Phase and Partition Coefficient Results	
Mass Balance	Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	Medium	The test substance purity was not reported; however, it was obtained from AccuStandard and is likely to be suitable.
Domain 2: Test Design	Metric 3:	Study Controls	High	No target compounds were detected in the blank experiments.
	Metric 4:	Test Substance Stability	High	The preparation and storage conditions of the samples were reported and appropriate.

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Study Citation:	Wang, X., Li, C., Yuan, X., Yang, S. (2020). Contamination Level, Distribution Characteristics, and Ecotoxicity of Tetrabromobisphenol A in Water and Sediment from Weihe River Basin, China. International Journal of Environmental Research and Public Health 17(11):3750.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	10114428			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to the study type.
	Metric 8:	System Type and Design	High	As a field study, equilibrium between the water and sediment samples is assumed.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	There were minor differences between the assessment methodology and the intended outcome assessment; however, sufficient data were presented to perform partition calculations.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	There is concern that variability or uncertainty was likely to have a substantial impact on the results; results and the correlation between TOC and TBBPA concentration R-squared = 0.00566 indicated no correlation between TOC and TBBPA. This does not align with TBBPA's chemical structure or physicochemical properties.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical methods were suitable for detection and quantification of the target chemical.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis was not conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Reported values were inconsistent with related physical chemical properties and other studies indicating TOC is an influential factor, suggesting that unidentified study deficiencies likely exist.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Low**

Study Citation:	Xie, J., Zhao, N., Zhang, Y., Hu, H., Zhao, M., Jin, H. (2022). Occurrence and partitioning of bisphenol analogues, triclocarban, and triclosan in seawater and sediment from East China Sea. Chemosphere 287(Pt 2):132218.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	10117951

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	No; Experimental; other: Field study: partitioning calculations based on monitoring samples
Solvent, Reactivity, Storage, Stability	Not Reported; NA; NA; NA
Radiolabel, Source, State, Purity	¹³ C12-TBBPA (purity ≥99%) from Wellington Laboratories (Guelph, Ontario, Canada) and Cambridge Isotope Laboratories (Andover, MA, USA); Sigma-Aldrich (St. Louis, MO, USA); NR; 98%
Sampling Frequency, Sampling Details, and Number of Replicates	14 locations; October 2019 from inshore/offshore coastal areas of Zhejiang; Sediment: 2-5 cm depth grab samples and seawater: 1.5 L steel buckets ; transferred to brown glass flasks after collection; at least 3 individual samples (sediment and water) collected
pH, Test Temperature, Buffer, and Test Details	Seawater samples ranged from 7 to 9.2 (Table S2); Seawater samples ranged 15.8 to 23 deg C (Table S2); Not Reported; Not Reported
Matrix, Clay Silts and Organic Carbon, and CEC	other; TOCs of sediments range 1.0 to 2.3% (mean 1.6%); Not Reported
Bulk Density and Matrix Details	Not Reported; Salinity: 18.3-33.6‰ (Table S2)
Media, Recovery, and Statistics	sediment; sediment: 110% SD = 8.3; seawater: 105% SD = 6.9; IBM SPSS software (version 20; Chicago, IL, USA) Pearson's correlation, independent t-test, and the significance level (two-tailed) set at p < 0.05
Transformation Products, Equilibrium	NR; Not Reported; Not Reported
Adsorption Details, and Equilibrium Desorption Details	
Reference Substance, Reference Substance Results, and Percent Adsorption	Not Reported; Not Reported; Not Reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	Not Reported; Not Reported; Not Reported; Not Reported
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	2.3; Organic carbon normalized partitioning coefficients (log K _{oc}) = 2.3 (mean, SD 0.15; range 2.1-2.5; based on n =5)
Partition Coefficient Phase and Partition Coefficient Results	sediment:water (marine); Not Reported
Mass Balance	Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	High	A concurrent field blank (500 mL Milli-Q water, n = 3) were included.

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Study Citation:	Xie, J., Zhao, N., Zhang, Y., Hu, H., Zhao, M., Jin, H. (2022). Occurrence and partitioning of bisphenol analogues, triclocarban, and triclosan in seawater and sediment from East China Sea. Chemosphere 287(Pt 2):132218.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	10117951			
Domain		Metric	EVALUATION Rating	Comments
	Metric 4:	Test Substance Stability	Medium	Some test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	N/A	The metric is not applicable to the field study.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to the study.
	Metric 8:	System Type and Design	High	Equilibrium was assumed for field study and environmental monitoring samples.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

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Study Citation:	Xie, J., Zhao, N., Zhang, Y., Hu, H., Zhao, M., Jin, H. (2022). Occurrence and partitioning of bisphenol analogues, triclocarban, and triclosan in seawater and sediment from East China Sea. Chemosphere 287(Pt 2):132218.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	10117951

		EVALUATION	
Domain	Metric	Rating	Comments
Overall Quality Determination		High	

Study Citation:	Yang, S., Wang, S., Zheng, B., Wu, F., Fu, Q. (2015). Sorption-desorption characteristics of tetrabromobisphenol A on humin and sediment of Lake Chaohu, China. Environmental and Engineering Geoscience 21(2):91-99.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	4181948

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; other: Not reported; Batch equilibrium sorption-desorption
Solvent, Reactivity, Storage, Stability	Water:methanol at 10:1 (v/v); NR; NR; NR
Radiolabel, Source, State, Purity	NA; Sigma-Aldrich, Inc. (St. Louis, MO, USA); NR; 99.99% Notes: Industrial standard grade was obtained from Alfa Aesar (Beijing, China), with 97% purity
Sampling Frequency, Sampling Details, and Number of Replicates	Once after 12 hours; Beakers centrifuged, 1 mL supernatant and 5 g sediment analyzed; Not reported
pH, Test Temperature, Buffer, and Test Details	Not reported; 25±0.5°C; Not reported; 1000 mL beakers with Teflon lined caps, shaken at 150 rpm for 12 hrs
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Original sediment: 10.5-27% clay, 1.4-3.3% coarse silt, 11.3-28.5% medium silt, 49.1-63.8% fine silt, 0-13.6% sand, 3.36% organic carbon; Not reported
Bulk Density and Matrix Details	original sediment density: 1.1012 g/kg; 10 g surface sediment sample in Lake Chaohu, clay group obtained from freeze-fried original sediment passed through a 60-mesh sieve
Media, Recovery, and Statistics	490 mL background solution: Test substance solution (0.1 to 10 mg/L mg/L in water:methanol), 0.01 M CaCl ₂ and NaNO ₃ solution; Not reported; Not reported
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NA; 150 rpm for 12 hours; Conducted, details NR
Reference Substance, Reference Substance Results, and Percent Adsorption	Controls with solutes without sediment; Loss < 1%, considered negligible; Not reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	Koc (clay group); 6,339; Not Reported; Freundlich Kf = 2.13
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	Langmuir; K = 0.407
Partition Coefficient Phase and Partition Coefficient Results	sediment-water; Langmuir: R ² = 0.943, Gamma max = 8.56 mg/kg Freundlich: 1/n = 0.573, R ² = 0.998
Mass Balance	Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Sorption controls were included and losses were negligible.

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Study Citation:	Yang, S., Wang, S., Zheng, B., Wu, F., Fu, Q. (2015). Sorption-desorption characteristics of tetrabromobisphenol A on humin and sediment of Lake Chaohu, China. Environmental and Engineering Geoscience 21(2):91-99.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	4181948			
Domain	Metric	EVALUATION		Comments
	Metric 4:	Test Substance Stability	Medium	The test substance preparation was reported, storage conditions were not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	The sediment characteristics were reported for the original sediment only, test conducted with modified sediments.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	Equilibrium times were determined in previous kinetics experiment, equilibrium was therefore established and the test substance was capable of maintaining test substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining Koc.
	Metric 12:	Test Substance Purity	High	The sampling methods analyzed the appropriate media and were collected with an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No notable sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was reported; the limits of detection and recovery were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The sorption models were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method, but the experiments were conducted with modified sediment and may not reflect sorption to natural sediment.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Yang, S., Wang, S., Zheng, B., Wu, F., Fu, Q. (2015). Sorption-desorption characteristics of tetrabromobisphenol A on humin and sediment of Lake Chaohu, China. Environmental and Engineering Geoscience 21(2):91-99.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	4181948

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; other: Not reported; Batch equilibrium sorption-desorption
Solvent, Reactivity, Storage, Stability	Water:methanol at 10:1 (v/v); NR; NR; NR
Radiolabel, Source, State, Purity	NA; Sigma-Aldrich, Inc. (St. Louis, MO, USA); NR; 99.99% Notes: Industrial standard grade was obtained from Alfa Aesar (Beijing, China), with 97% purity
Sampling Frequency, Sampling Details, and Number of Replicates	Once after 12 hours; Beakers centrifuged, 1 mL supernatant and 5 g sediment analyzed; Not reported
pH, Test Temperature, Buffer, and Test Details	Not reported; 25±0.5°C; Not reported; 1000 mL beakers with Teflon lined caps, shaken at 150 rpm for 12 hrs
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Original sediment: 10.5-27% clay, 1.4-3.3% coarse silt, 11.3-28.5% medium silt, 49.1-63.8% fint silt, 0-13.6% sand, 3.36% organic carbon; Not reported
Bulk Density and Matrix Details	original sediment density: 1.1012 g/kg; 10 g surface sediment sample in Lake Chaohu, mineral group obtained from freeze-fried original sediment passed through a 60-mesh sieve, with organic matter removed
Media, Recovery, and Statistics	490 mL background solution: Test substance solution (0.1 to 10 mg/L mg/L in water:methanol), 0.01 M CaCl ₂ and Na ₃ solution; Not reported; Not reported
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NA; 150 rpm for 12 hours; Conducted, details NR
Reference Substance, Reference Substance Results, and Percent Adsorption	Controls with solutes without sediment; Loss < 1%, considered negligible; Not reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Koc (mineral group, no organic carbon); Not reported; Not Reported; Freundlich Kf = 0.622
Partition Coefficient Type and Partition Coefficient Results	Langmuir; K = 0.230
Partition Coefficient Phase and Partition Coefficient Results	sediment-water; Langmuir: R ² = 0.989, Gamma max = 8.53 mg/kg Freundlich: 1/n = 0.622, R ² = 0.968
Mass Balance	Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	Sorption controls were included and losses were negligible.
	Metric 4:	Test Substance Stability	Medium	The test substance preparation was reported, storage conditions were not reported.

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Study Citation:	Yang, S., Wang, S., Zheng, B., Wu, F., Fu, Q. (2015). Sorption-desorption characteristics of tetrabromobisphenol A on humin and sediment of Lake Chaohu, China. Environmental and Engineering Geoscience 21(2):91-99.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	4181948			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	The sediment characteristics were reported for the original sediment only, test conducted with modified sediments.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	Equilibrium times were determined in previous kinetics experiment, equilibrium was therefore established and the test substance was capable of maintaining test substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining Koc.
	Metric 12:	Test Substance Purity	High	The sampling methods analyzed the appropriate media and were collected with an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No notable sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was reported; the limits of detection and recovery were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The sorption models were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method, but the experiments were conducted with modified sediment and may not reflect sorption to natural sediment.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Yang, S., Wang, S., Zheng, B., Wu, F., Fu, Q. (2015). Sorption-desorption characteristics of tetrabromobisphenol A on humin and sediment of Lake Chaohu, China. Environmental and Engineering Geoscience 21(2):91-99.		
OECD Harmonized Template:	Adsorption and Desorption		
HERO ID:	4181948		
EXTRACTION			
Parameter	Data		
CASRN and Test Material	79-94-7; TBBPA		
Confidentiality, Type, Guideline	None; Experimental; other: Not reported; Batch equilibrium sorption-desorption		
Solvent, Reactivity, Storage, Stability	Water:methanol at 10:1 (v/v); NR; NR; NR		
Radiolabel, Source, State, Purity	NA; Sigma-Aldrich, Inc. (St. Louis, MO, USA); NR; 99.99% Notes: Industrial standard grade was obtained from Alfa Aesar (Beijing, China), with 97% purity		
Sampling Frequency, Sampling Details, and Number of Replicates	Once after 12 hours; Beakers centrifuged, 1 mL supernatant and 5 g sediment analyzed; Not reported		
pH, Test Temperature, Buffer, and Test Details	Not reported; 25±0.5°C; Not reported; 1000 mL beakers with Teflon lined caps, shaken at 150 rpm for 12 hrs		
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Original sediment: 10.5-27% clay, 1.4-3.3% coarse silt, 11.3-28.5% medium silt, 49.1-63.8% fint silt, 0-13.6% sand, 3.36% organic carbon; humin sediment: 6.74% organic carbon; Not reported		
Bulk Density and Matrix Details	original sediment density: 1.1012 g/kg; 10 g surface sediment sample in Lake Chaohu, 90% mineral group, obtained from freeze-fried original sediment passed through a 60-mesh sieve, with organic matter removed, mixed with 10% humin		
Media, Recovery, and Statistics	490 mL background solution: Test substance solution (0.1 to 10 mg/L mg/L in water:methanol), 0.01 M CaCl2 and NaN3 solution; Not reported; Not reported		
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NA; 150 rpm for 12 hours; Conducted, details NR		
Reference Substance, Reference Substance Results, and Percent Adsorption	Controls with solutes without sediment; Loss < 1%, considered negligible; Not reported		
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Koc (humin group, 90% mineral group with no organic carbon); 5,415; Not Reported; Freundlich Kf = 3.65		
Partition Coefficient Type and Partition Coefficient Results	Langmuir; K = 0.642		
Partition Coefficient Phase and Partition Coefficient Results	sediment-water; Langmuir: R^2 = 0.941, Gamma max = 10.86 mg/kgFreundlich: 1/n = 0.467, R^2 = 0.996		
Mass Balance	Not Reported		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The test substance was identified by name.
	Metric 2:	Test Substance Purity	High The test substance source and purity were reported.
Domain 2: Test Design			
	Metric 3:	Study Controls	High Sorption controls were included and losses were negligible.
	Metric 4:	Test Substance Stability	Medium The test substance preparation was reported, storage conditions were not reported.
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Study Citation:	Yang, S., Wang, S., Zheng, B., Wu, F., Fu, Q. (2015). Sorption-desorption characteristics of tetrabromobisphenol A on humin and sediment of Lake Chaohu, China. Environmental and Engineering Geoscience 21(2):91-99.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	4181948			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	The sediment characteristics were reported for the original sediment only, test conducted with modified sediments.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	Equilibrium times were determined in previous kinetics experiment, equilibrium was therefore established and the test substance was capable of maintaining test substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining Koc.
	Metric 12:	Test Substance Purity	High	The sampling methods analyzed the appropriate media and were collected with an acceptable frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No notable sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was reported; the limits of detection and recovery were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The sorption models were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method, but the experiments were conducted with modified sediment and may not reflect sorption to natural sediment.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Zhu, X., Li, L., Lu, Z., Zhu, J., Lu, L.,un, Wang, Z., Xiang, M., Lu, G., Dang, Z.,hi, Yu, Y. (2024). Insight into the interaction of tetrabromobisphenol A with sediment-derived dissolved organic carbon in a multiphase system by direct immersion solid phase microextraction. Science of the Total Environment 912:169037.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	12811989

EXTRACTION				
Parameter	Data			
CASRN and Test Material	NR; Tetrabromobisphenol A (TBBPA)			
Confidentiality, Type, Guideline	none; experimental; other: Liquid-liquid extraction or direct-immersion solid-phase microextraction (DI-SPME) method with LC-MS analysis studying humic acid effects			
Solvent, Reactivity, Storage, Stability	methanol solution (100 μ L, 5 mg/L); volatilized prior to experiment; NR; NR; NR			
Radiolabel, Source, State, Purity	13C-TBBPA; Cambridge Isotope Laboratories (USA); solution; NR			
Sampling Frequency, Sampling Details, and Number of Replicates	0.5, 1, 2, 3, 6, 9, 12, 16, 20, and 24 h; slurry centrifuged; phases extracted for analysis; 3 (for each pH; 7 groups tested in triplicate)			
pH, Test Temperature, Buffer, and Test Details	7; 25C; NaOH and HCl solutions; Sediment 0.5 g - TBBPA 1.0 μ g/g; constant temperature shaker			
Matrix, Clay Silts and Organic Carbon, and CEC	other; lake-type surface sediments; Sand: 76%, Silt: 15%, Clay: 9%, Organic carbon: 0.43 $\pm$ 0.02% dw; DOC 6.184 $\pm$ 0.376 mg/L; NR			
Bulk Density and Matrix Details	NR; Humic acid added at concentrations of 50, 100, 200, 400, 600, 800, and 1,000 mg OC/L; sediments were collected from Xinfengjiang Reservoir in Southern China; no detectable TBBPA in sediments prior to use			
Media, Recovery, and Statistics	water phase (solution containing 0.01 M CaCl2 and 0.1 g/L NaN3); water and sediment samples: 92.6 $\pm$ 6.03 % and 107 $\pm$ 11.2 %, respectively; overall recoveries of TBBPA in water–DOC–sediment 89.32–100.86%; average value computation, standard deviation (SD), regression, and Pearson correlation: IBM SPSS Statistics software (version 23.0) with the statistical significance set at p < 0.05; sorption kinetics and isotherm data: Origin software (version 2021).			
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NR; adsorption equilibrium reached within 12 h; NR			
Reference Substance, Reference Substance Results, and Percent Adsorption	NR; NR; NR			
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	NR; Amount of TBBPA adsorbed per unit weight of the adsorbent at equilibrium: qe (μ g/kg) ranged from ~0.988 (HA 50 mg OC/L) to ~0.993 (HA 1,000 mg OC/L) via LLE; effect minimally observed via SPME (fig. 3c).; Not Reported; NR			
Partition Coefficient Type and Partition Coefficient Results	NR; NR			
Partition Coefficient Phase and Partition Coefficient Results	water–sediment; NR			
Mass Balance	NR			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively by name.
	Metric 2:	Test Substance Purity	Medium	The source of the test substance was reported; however, its purity was not specified. This omission is not expected to have had a significant impact on the study results.

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Study Citation:	Zhu, X., Li, L., Lu, Z., Zhu, J., Lu, L.,un, Wang, Z., Xiang, M., Lu, G., Dang, Z.,hi, Yu, Y. (2024). Insight into the interaction of tetrabromobisphenol A with sediment-derived dissolved organic carbon in a multiphase system by direct immersion solid phase microextraction. Science of the Total Environment 912:169037.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	12811989			
Domain		EVALUATION		Comments
		Metric	Rating	
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results. Quality controls were appropriate.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was not a guideline method; however, it was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established. The system type and design were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations and percent recovery were reported and the analytical methods used were suitable for detection and quantification of the target chemical.

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Study Citation: Zhu, X., Li, L., Lu, Z., Zhu, J., Lu, L.,un, Wang, Z., Xiang, M., Lu, G., Dang, Z.,hi, Yu, Y. (2024). Insight into the interaction of tetrabromobisphenol A with sediment-derived dissolved organic carbon in a multiphase system by direct immersion solid phase microextraction. Science of the Total Environment 912:169037.				
OECD Harmonized Template: Adsorption and Desorption				
HERO ID: 12811989				
EVALUATION				
Domain		Metric	Rating	Comments
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination			High	

Study Citation:	Zhu, X., Li, L., Lu, Z., Zhu, J., Lu, L.,un, Wang, Z., Xiang, M., Lu, G., Dang, Z.,hi, Yu, Y. (2024). Insight into the interaction of tetrabromobisphenol A with sediment-derived dissolved organic carbon in a multiphase system by direct immersion solid phase microextraction. Science of the Total Environment 912:169037.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	12811989

EXTRACTION

Parameter	Data
CASRN and Test Material	NR; Tetrabromobisphenol A (TBBPA)
Confidentiality, Type, Guideline	none; experimental (Adsorption kinetics and isotherm); other: Liquid-liquid extraction or direct-immersion solid-phase microextraction (DI-SPME) method with LC-MS analysis
Solvent, Reactivity, Storage, Stability	methanol solution (100 μ L, 5 mg/L); volatilized prior to experiment; NR; NR; NR
Radiolabel, Source, State, Purity	13C-TBBPA; Cambridge Isotope Laboratories (USA); solution; NR
Sampling Frequency, Sampling Details, and Number of Replicates	0.5, 1, 2, 3, 6, 9, 12, 16, 20, and 24 h; slurry centrifuged; phases extracted for analysis; 3 (triplicate)
pH, Test Temperature, Buffer, and Test Details	7; 25C; NaOH and HCl solutions; adsorption kinetics experiment: Sediment (0.5 g) and TBBPA methanol solution (100 μ L, 5 mg/L); isotherm experiment: sediment (0.5 g) TBBPA methanol solution at 0.1, 0.2, 0.4, 0.6, 0.8, 1.0, and 1.2 μ g/g; constant temperature shaker
Matrix, Clay Silts and Organic Carbon, and CEC	other; Lake-type surface sediments; Sand: 76%, Silt: 15%, Clay: 9%, Organic carbon: $0.43 \pm 0.02\%$ dw; DOC 6.184 ± 0.376 mg/L; NR
Bulk Density and Matrix Details	NR; Sediments were collected from Xinfengjiang Reservoir in Southern China; no detectable TBBPA in sediments prior to use
Media, Recovery, and Statistics	water phase (solution containing 0.01 M CaCl ₂ and 0.1 g/L NaNO ₃); water and sediment samples: $92.6 \pm 6.03\%$ and $107 \pm 11.2\%$, respectively; overall recoveries of TBBPA in water–DOC–sediment 89.32–100.86%; Average value computation, standard deviation (SD), regression, and Pearson correlation: IBM SPSS Statistics software (version 23.0) with the statistical significance set at $p < 0.05$; sorption kinetics and isotherm data: Origin software (version 2021).
Transformation Products, Equilibrium	NR; adsorption equilibrium reached within 12 h; NR
Adsorption Details, and Equilibrium Desorption Details	
Reference Substance, Reference Substance Results, and Percent Adsorption	NR; NR; TBBPA adsorption:sediment, water, and DOC were $96.4 \pm 2.61\%$, $1.54 \pm 0.98\%$, and $2.04 \pm 1.64\%$, respectively
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Adsorption Isotherm; Langmuir K _L , Freundlich K _f , Linear K _d ; Adsorption Kinetics:k ₁ (h) = 2.83×10^{-3} (pseudo-first-order) k ₂ (g μ g ⁻¹ h ⁻¹) = 7.18×10^{-3} (pseudo-second-order kinetics)Adsorption Isotherm:K _L (L/mg) = Langmuir isotherm constantK _f (L/mg) = Freundlich sorption coefficient; Additional experiments were conducted to evaluate effects of pH, calcium ion content, HA content, and lead ion content of water–sediment systems on adsorption. General results:pH (fig. 3a): decreased adsorption observed as pH increased most notably above pH 7 where a greater portion of TBBPA is likely in ionized form (pK _{a1} and pK _{a2} of 7.5 and 8.5); minimal variation observed below pH 7 (pH tested at 4, 5, 6, 7, 8, 9, and 10).Calcium ion content (fig. 3b): The adsorption of TBBPA increased with increasing Ca ion concentration (ionic strength) when measured via SPME; effect minimally observed via LLE (fig. 3b).Humic acid (HA) (fig. 3c): a slight increase in adsorption of TBBPA was noted via LLE with an increase in HA concentration (HA concentrations up to 1,000 mg/L); Lead ion content (fig. 3d): no significant change of TBBPA adsorption was observed with the presence of lead ions (Pb concentrations up to 1,000 mg/L); q _e (μ g/kg) remained near ~0.998.; K _f = 68.8×10^{-3} L/mg (LLE), 59.2×10^{-3} L/mg (DI-SPME); K _L (L/mg) = 0.64×10^{-3} L/mg (LLE), 1.16×10^{-3} L/mg (DI-SPME) (presented in Table 2)
Partition Coefficient Type and Partition Coefficient Results	K _d , K _{oc} , K _{doc} ; Table 3: K _d = 8470 ± 731 (LLE), $13,040 \pm 679$ (DI-SPME)log K _d = 3.93 ± 0.29 (LLE), 4.12 ± 0.25 (DI-SPME)K _{oc} = $1,969,698 \pm 169,954$ (LLE), $3,030,302 \pm 157,884$ (DI-SPME)log K _{oc} = 6.29 ± 0.29 (DI-SPME), 6.48 ± 0.25 (DI-SPME)K _{doc} = $32,446 \pm 7032$ (LLE)log K _{doc} = 4.50 ± 0.10 (LLE)Authors state: TBBPA K _d was artificially reduced by a factor of 1.54x using LLE compared to DI-SPME because the sorption behavior of DOC was ignored.
Partition Coefficient Phase and Partition Coefficient Results	water–sediment; Equations from SI:K _d = solid–water partition coefficient (L/g) = C _s /C _w K _{oc} = organic carbon normalized partition coefficient = K _d /f _{oc} f _{oc} = fraction of organic carbon in the soilDoc = sediment–dissolved organic carbonK _{doc} = C _{Doc} /C _w -SPME x [DOC]
Mass Balance	NR

EVALUATION

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Study Citation:	Zhu, X., Li, L., Lu, Z., Zhu, J., Lu, L.,un, Wang, Z., Xiang, M., Lu, G., Dang, Z.,hi, Yu, Y. (2024). Insight into the interaction of tetrabromobisphenol A with sediment-derived dissolved organic carbon in a multiphase system by direct immersion solid phase microextraction. Science of the Total Environment 912:169037.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	12811989			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively by name.
	Metric 2:	Test Substance Purity	Medium	The source of the test substance was reported; however, its purity was not specified. This omission is not expected to have had a significant impact on the study results.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results. Quality controls were appropriate.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was not a guideline method; however, it was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established. The system type and design were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
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Study Citation:	Zhu, X., Li, L., Lu, Z., Zhu, J., Lu, L.,un, Wang, Z., Xiang, M., Lu, G., Dang, Z.,hi, Yu, Y. (2024). Insight into the interaction of tetrabromobisphenol A with sediment-derived dissolved organic carbon in a multiphase system by direct immersion solid phase microextraction. Science of the Total Environment 912:169037.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	12811989			
EVALUATION				
Domain		Metric	Rating	Comments
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations and percent recovery were reported and the analytical methods used were suitable for detection and quantification of the target chemical.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination			High	

Study Citation:	Zhu, X., Li, L., Lu, Z., Zhu, J., Lu, L.,un, Wang, Z., Xiang, M., Lu, G., Dang, Z.,hi, Yu, Y. (2024). Insight into the interaction of tetrabromobisphenol A with sediment-derived dissolved organic carbon in a multiphase system by direct immersion solid phase microextraction. Science of the Total Environment 912:169037.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	12811989

EXTRACTION	
Parameter	Data
CASRN and Test Material	NR; Tetrabromobisphenol A (TBBPA)
Confidentiality, Type, Guideline	none; experimental; other: Liquid-liquid extraction or direct-immersion solid-phase microextraction (DI-SPME) method with LC-MS analysis studying pH effects
Solvent, Reactivity, Storage, Stability	methanol solution (100 μ L, 5 mg/L); volatilized prior to experiment; NR; NR; NR
Radiolabel, Source, State, Purity	13C-TBBPA; Cambridge Isotope Laboratories (USA); solution; NR
Sampling Frequency, Sampling Details, and Number of Replicates	0.5, 1, 2, 3, 6, 9, 12, 16, 20, and 24 h; slurry centrifuged; phases extracted for analysis; 3 (for each pH; 7 groups tested in triplicate)
pH, Test Temperature, Buffer, and Test Details	4, 5, 6, 7, 8, 9, 10; 25C; NaOH and HCl solutions; Sediment 0.5 g - TBBPA 1.0 μ g/g; constant temperature shaker
Matrix, Clay Silts and Organic Carbon, and CEC	other; lake-type surface sediments; Sand: 76%, Silt: 15%, Clay: 9%, Organic carbon: 0.43 $\pm$ 0.02% dw; DOC 6.184 $\pm$ 0.376 mg/L; NR
Bulk Density and Matrix Details	NR; Sediments were collected from Xinfengjiang Reservoir in Southern China; no detectable TBBPA in sediments prior to use
Media, Recovery, and Statistics	water phase (solution containing 0.01 M CaCl ₂ and 0.1 g/L NaN ₃); water and sediment samples: 92.6 $\pm$ 6.03% and 107 $\pm$ 11.2%, respectively; overall recoveries of TBBPA in water–DOC–sediment 89.32–100.86%; average value computation, standard deviation (SD), regression, and Pearson correlation: IBM SPSS Statistics software (version 23.0) with the statistical significance set at p < 0.05; sorption kinetics and isotherm data: Origin software (version 2021).
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NR; adsorption equilibrium reached within 12 h; NR
Reference Substance, Reference Substance Results, and Percent Adsorption	NR; NR; NR
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	NR; Amount of TBBPA adsorbed per unit weight of the adsorbent at equilibrium: qe (μ g/kg) ranged from ~0.999 (pH 4-7) to 0.97 (pH 10) using both LLE and SPME methods (fig. 3a); Adsorption decreased as pH increased above pH 7 where a greater portion of TBBPA is likely in ionized form (pKa1 and pKa2 of 7.5 and 8.5); minimal variation observed below pH 7 (fig. 3a); NR
Desorption Type	NR; NR
Partition Coefficient Type and Partition Coefficient Results	NR; NR
Partition Coefficient Phase and Partition Coefficient Results	water–sediment; NR
Mass Balance	NR

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	High	The test substance was identified definitively by name.
	Metric 2:	Medium	The source of the test substance was reported; however, its purity was not specified. This omission is not expected to have had a significant impact on the study results.
Domain 2: Test Design			

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Study Citation:	Zhu, X., Li, L., Lu, Z., Zhu, J., Lu, L.,un, Wang, Z., Xiang, M., Lu, G., Dang, Z.,hi, Yu, Y. (2024). Insight into the interaction of tetrabromobisphenol A with sediment-derived dissolved organic carbon in a multiphase system by direct immersion solid phase microextraction. Science of the Total Environment 912:169037.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	12811989			
EVALUATION				
Domain		Metric	Rating	Comments
	Metric 3:	Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results. Quality controls were appropriate.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was not a guideline method; however, it was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established. The system type and design were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations and percent recovery were reported and the analytical methods used were suitable for detection and quantification of the target chemical.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).

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Study Citation:	Zhu, X., Li, L., Lu, Z., Zhu, J., Lu, L.,un, Wang, Z., Xiang, M., Lu, G., Dang, Z.,hi, Yu, Y. (2024). Insight into the interaction of tetrabromobisphenol A with sediment-derived dissolved organic carbon in a multiphase system by direct immersion solid phase microextraction. Science of the Total Environment 912:169037.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	12811989

		EVALUATION		
Domain	Metric	Rating		Comments
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination	High
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Study Citation:	Altarawneh, M., Dlugogorski, B. Z. (2014). Mechanism of thermal decomposition of tetrabromobisphenol A (TBBA). Journal of Physical Chemistry A 118(40):9338-9346.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5551246

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Calculation; Calculation
Solvent, Reactivity, Storage, Stability	NA; NA; NA; NA
Radiolabel, Source, State, Purity	NA; NA; NA; NA Notes: TBBA
Test Method Details, Test Condition Details, and Test Consistency Details	computations preformed to define thermochemical and kinetic properties. quadrature grid using 99 radial and 590 angular points. Cartesian coordinates, energies, and vibrational frequencies for all structures reported in supporting information.; Not Reported; not applicable
System Type Design	not applicable
Sampling Frequency and Sampling Details	not applicable; not applicable
Test Temperature	400-1500 K
Results Details	$k(T) = 2.09e10(T^{1.93}) \exp(-37000/T)/s$ for degradation reaction $TBBA \rightarrow M1 + CH3$
Analytical Method and Analytical Details	potential energy surface for the initial decomposition; Not Reported
Transformation Products, Statistics, and Kinetics	methane, hydrogen and bromine radicals; 23 other degradation products; maximum uncertainty limits in the calculated activation energy (Ea) to be within $\pm 1-3.0$ kcal/mol; $k(T(K)) = AT^n \exp(-Ea/RT)$
Reference Substance and Reference Substance Results	compared to analogous experimental decomposition reaction: $C6H5-C(CH3)2-C6H5 \rightarrow C6H5-C(CH3)-C6H5 + CH3$; $k(T(K)) = 5.01e15 \exp(-33000/T)/s$; $k(T(K)) = 3.0e13 \exp(-25300/T)/s$

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name and structure.
	Metric 2:	Test Substance Purity	N/A	The metric is not applicable to this study type.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to this study type.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	N/A	The metric is not applicable to this study type.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to this study type.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.

Domain 4: Test Organisms

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Study Citation:		Altarawneh, M., Dlugogorski, B. Z. (2014). Mechanism of thermal decomposition of tetrabromobisphenol A (TBBPA). Journal of Physical Chemistry A 118(40):9338-9346.		
OECD Harmonized Template:		Miscellaneous		
HERO ID:		5551246		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	N/A	The metric is not applicable to this study type.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the statistical techniques were considered and accounted for in data evaluation and all reported variability or uncertainty was not likely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Barontini, F., Marsanich, K., Cozzani, V. (2004). The use of TG-FTIR technique for the assessment of hydrogen bromide emissions in the combustion of BFRs. Journal of Thermal Analysis and Calorimetry 78(2):599-619.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5497678

Parameter		EXTRACTION		
CASRN and Test Material		79-94-7; Tetrabromobisphenol A		
Confidentiality, Type, Guideline		None; Experimental; Experimental		
Solvent, Reactivity, Storage, Stability		NR; NR; NR; NR		
Radiolabel, Source, State, Purity		NR; Aldrich (Milan, Italy); NR; NR Notes: TBBA; 58.8% bromine content		
Test Method Details, Test Condition Details, and Test Consistency Details		Thermogravimetric (TG); Time-temperature curve as described in ATSM E119 and ventilation 15 mol% O2 in N2; Test conditions were repeated		
System Type Design		Combustion conditions characteristic of selected types or stages of fire.		
Sampling Frequency and Sampling Details		continuous; closed system from combustion to analysis		
Test Temperature		varied		
Results Details		28% residual mass of TBBA; HBr was emitted at 34.6 g/100 g sample		
Analytical Method and Analytical Details		FTIR analysis done concurrent with study; TG to FTIR connector heated to 200°C; MCT detector for low volume gas cell		
Transformation Products, Statistics, and Kinetics		main product was hydrogenbromide; Results are mean of at least 3 runs with relative errors <5%. 58.2% of available Br was released as HBr. Maximum mass loss occurred at 416°C.; Analysis and quantification kinetics described		
Reference Substance and Reference Substance Results		not applicable; Not Reported		
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.

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Study Citation:	Barontini, F., Marsanich, K., Cozzani, V. (2004). The use of TG-FTIR technique for the assessment of hydrogen bromide emissions in the combustion of BFRs. Journal of Thermal Analysis and Calorimetry 78(2):599-619.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5497678			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were reported in the study
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range as defined by reference substance,
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Barontini, F., Marsanich, K., Cozzani, V. (2004). The use of TG-FTIR technique for the assessment of hydrogen bromide emissions in the combustion of BFRs. Journal of Thermal Analysis and Calorimetry 78(2):599-619.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5497678			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; Tetrabromobisphenol A			
Confidentiality, Type, Guideline	None; Experimental; Experimental			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; Aldrich (Milan, Italy); NR; NR Notes: TBBA; 58.8% bromine content			
Test Method Details, Test Condition Details, and Test Consistency Details	Thermogravimetric (TG); Time-temperature curve as described in ATSM E119 and ventilation 100% N2; Test conditions were repeated			
System Type Design	Combustion conditions characteristic of selected types or stages of fire.			
Sampling Frequency and Sampling Details	continuous; closed system from combustion to analysis			
Test Temperature	varied			
Results Details	27% residual mass of TBBA; HBr was emitted at 33.8 g/100 g sample			
Analytical Method and Analytical Details	FTIR analysis done concurrent with study; TG to FTIR connector heated to 200°C; MCT detector for low volume gas cell			
Transformation Products, Statistics, and Kinetics	main product was hydrogenbromide; Results are mean of at least 3 runs with relative errors <5%. 56.9% of available Br was released as HBr. Maximum mass loss occurred at 408°C.; Analysis and quantification kinetics described			
Reference Substance and Reference Substance Results	not applicable; Not Reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
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Study Citation:	Barontini, F., Marsanich, K., Cozzani, V. (2004). The use of TG-FTIR technique for the assessment of hydrogen bromide emissions in the combustion of BFRs. Journal of Thermal Analysis and Calorimetry 78(2):599-619.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5497678			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were reported in the study
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range as defined by reference substance,
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Barontini, F., Marsanich, K., Cozzani, V. (2004). The use of TG-FTIR technique for the assessment of hydrogen bromide emissions in the combustion of BFRs. Journal of Thermal Analysis and Calorimetry 78(2):599-619.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5497678

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich (Milan, Italy); NR; NR Notes: TBBA; 58.8% bromine content
Test Method Details, Test Condition Details, and Test Consistency Details	Thermogravimetric (TG); Time-temperature curve 10°C/minute increase and ventilation 15 mol% O ₂ in N ₂ ; Test conditions were repeated
System Type Design	Combustion conditions characteristic of selected types or stages of fire.
Sampling Frequency and Sampling Details	continuous; closed system from combustion to analysis
Test Temperature	varied
Results Details	35% residual mass of TBBA
Analytical Method and Analytical Details	FTIR analysis done concurrent with study; TG to FTIR connector heated to 200°C; MCT detector for low volume gas cell
Transformation Products, Statistics, and Kinetics	main product was hydrogenbromide; Results are mean of at least 3 runs with relative errors <5%. Maximum mass loss occurred at 337°C.; Analysis and quantification kinetics described
Reference Substance and Reference Substance Results	not applicable; Not Reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.

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Study Citation:	Barontini, F., Marsanich, K., Cozzani, V. (2004). The use of TG-FTIR technique for the assessment of hydrogen bromide emissions in the combustion of BFRs. Journal of Thermal Analysis and Calorimetry 78(2):599-619.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5497678			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were reported in the study
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range as defined by reference substance,
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Barontini, F., Marsanich, K., Cozzani, V. (2004). The use of TG-FTIR technique for the assessment of hydrogen bromide emissions in the combustion of BFRs. Journal of Thermal Analysis and Calorimetry 78(2):599-619.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5497678

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich (Milan, Italy); NR; NR Notes: TBBA; 58.8% bromine content
Test Method Details, Test Condition Details, and Test Consistency Details	Thermogravimetric (TG); Time-temperature curve 10°C/minute increase and ventilation 100% N2; Test conditions were repeated
System Type Design	Combustion conditions characteristic of selected types or stages of fire.
Sampling Frequency and Sampling Details	continuous; closed system from combustion to analysis
Test Temperature	varied
Results Details	31% residual mass of TBBA
Analytical Method and Analytical Details	FTIR analysis done concurrent with study; TG to FTIR connector heated to 200°C; MCT detector for low volume gas cell
Transformation Products, Statistics, and Kinetics	main product was hydrogenbromide; Results are mean of at least 3 runs with relative errors <5%. Maximum mass loss occurred at 337°C.; Analysis and quantification kinetics described
Reference Substance and Reference Substance Results	not applicable; Not Reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.

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Study Citation:	Barontini, F., Marsanich, K., Cozzani, V. (2004). The use of TG-FTIR technique for the assessment of hydrogen bromide emissions in the combustion of BFRs. Journal of Thermal Analysis and Calorimetry 78(2):599-619.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5497678			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were reported in the study
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range as defined by reference substance,
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Barontini, F., Marsanich, K., Petarca, L., Cozzani, V. (2004). The thermal degradation process of tetrabromobisphenol A. Industrial and Engineering Chemistry Research 43(9):1952-1961.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5622559

EXTRACTION	
Parameter	Data
CASRN and Test Material	not reported; tetrabromobisphenol A
Confidentiality, Type, Guideline	no; experimental; experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aldrich (Milan, Italy); NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Thermal degradation and quantitative characterization of decomposition products evaluated using thermogravimetric analyzer and a laboratory-scale fixed-bed reactor.; Both constant heating and isothermal runs conducted; constant heating rate of 10°C/min; sample weights 180-250 mg; pure nitrogen gas flow 80 mL/min; Not Reported
System Type Design	Not Reported
Sampling Frequency and Sampling Details	Not Reported; volatile products were transferred via nitrogen flow into cold traps and analyzed via FTIR
Test Temperature	isothermal runs: 180 to 300°C; constant runs: ambient to 800°C
Results Details	Overall endothermic heat = 119 J/g ($\pm 2\%$) was estimated, and ca. 12% initial TBBPA was recovered in the condensable fraction; preexponential factor = 3.76E13 s ⁻¹ and activation energy = 179.1 kJ/mol. Thermal degradation occurs predominantly between 240 and 350°C at a heating rate of 10°C/min; the end product is a black char which was 20% of the initial weight, at 450°C; bromine distribution in product fraction (wt%): fraction of initial mass 31% (gas), 49% (condensable), 20% (residue), fraction of initial bromine: 52% (gas), 45% (condensable), 1% (residue), bromine content: 99% (gas), 54% (condensable), 3% (residue)
Analytical Method and Analytical Details	Fourier transform infrared (FTIR) spectrometry, gas chromatography (GC), GC/mass spectrometry (MS), flame ionization detector (FID); Not Reported
Transformation Products, Statistics, and Kinetics	FTIR spectra between 240 and 350°C shows hydrogen bromide (2780-2400 cm ⁻¹), carbon dioxide (2400-2240 cm ⁻¹), carbon monoxide (2235-2030 cm ⁻¹), and phenolic compounds (3700-3500, 3150-2850, and 1630-700 cm ⁻¹); only HBr, CO, and CO ₂ were observed during loss at 370°C; products identified by GC/MS include non-brominated: phenol, biphenyl, dibenzofuran, α -methylstilbene, 1,3-diphenylpropane, ethylphenoxymethylene, α,α -dimethylbibenzyl, 4-(1-methyl-1-phenylethyl)phenol, bisphenol A; mono-brominated: 2-bromophenol, 4-bromophenol, bromotrimethylbenzene, 2-bromo-4-(1-methylethenyl)phenol, bromobisphenol A; di-brominated: 2,4-dibromophenol, 2,6-dibromophenol, 2,6-dibromo-4-methylphenol, dibromobisphenol A (two isomers); tri-brominated: 2,4,6-tribromophenol, and tribromobisphenol A. Quantitative product analysis (mol%, wt% in condensable fraction; mol%, wt% with respect to sample initial mass) - phenol: 3.7, 1.0; 2.9, 0.5, 2-bromophenol: 4.0, 2.0; 3.0, 1.0, 2,4-dibromophenol: 9.5, 6.9; 7.2, 3.4, 2,6-dibromophenol: 12.0, 8.7; 9.2, 4.2, 2,4,6-tribromophenol: 8.6, 8.1; 6.5, 4.0, bromobisphenol A: 2.6, 2.3; 2.0, 1.1, dibromobisphenol A (1): 9.5, 10.5; 7.3, 5.2, dibromobisphenol A (2): 1.9, 2.1; 1.5, 1.0, tribromobisphenol A: 18.5, 24.7; 14.2, 12.1, others: 7.8, 6.6; 5.9, 3.2, TBBPA: 15.3, 23.8; 11.7, 11.7.; values of standard deviation were c. 4%; Not Reported
Reference Substance and Reference Substance Results	Not Reported; Not Reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High

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Study Citation:	Barontini, F., Marsanich, K., Petarca, L., Cozzani, V. (2004). The thermal degradation process of tetrabromobisphenol A. Industrial and Engineering Chemistry Research 43(9):1952-1961.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5622559			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The metric is not applicable to this type of study.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to this type of study.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Low	Non-industrial, experimental process; however, transformation products reported.
	Metric 6:	Testing Conditions	High	Test conditions were reported.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to this type of study.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this type of study.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this type of study.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium	Some analytical details were omitted.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Calculations were clearly described.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this type of study.
Overall Quality Determination		High		

Study Citation:	Cheng, H., Hua, Z. (2018). Distribution, release and removal behaviors of tetrabromobisphenol A in water-sediment systems under prolonged hydrodynamic disturbances. Science of the Total Environment 636:402-410.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5519140

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Natural sediment; NR; Analytical standard: reagent grade Notes: TBBPA
Test Method Details, Test Condition Details, and Test Consistency Details	Aerobic biodegradation (removal after 34 days) in natural sediment from Nanfei River estuary in the west of Lake Chaohu (Oct 2015); TBBPA 632.7 ug/kg; Sediment: 10.12% clay, 73.45% silt, 16.43% sand; 1.51% TOC; pH = 7.94 (sediment); 8.56 (static conditions), 8.44 (weak hydrodynamics), 8.36 (strong hydrodynamics); dechlorinated tap water; DO (mg/L) = 6.58 (static conditions), 7.33 (weak hydrodynamics), 9.00 (strong hydrodynamics); mean longitudinal velocity (cm/s) = 0 (static conditions), 4.12 (weak hydrodynamics), 21.59 (strong hydrodynamics);
System Type Design	three parallel racetrack style flumes were used to simulate TBBPA environmental behaviors in a water sediment system under different hydrodynamic conditions: static, weak and strong hydrodynamic conditions
Sampling Frequency and Sampling Details	every three days; Day 0, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, and 33 at 10 am water and sediment (natural surface sediment) samples were collected
Test Temperature	15C
Results Details	Remaining TBBPA percent ranged from 11.3% (sediment:strong hydrodynamics) to 59.6% (SPM: static control); Water: Static control remaining percentage = 57.3%, rate constant = 0.02/day, half-life = 37.1 days, Weak hydrodynamic condition remaining percentage = 40.4%, rate constant = 0.03/day, half-life = 22.4 days; Strong hydrodynamic condition remaining percentage 20.5%, rate constant = 0.06/day, half-life = 12.6 days; SPM: Static control remaining percentage = 59.6% 0.02/day, half-life = 39.6 days, Weak hydrodynamic condition remaining percentage = 45.7%, rate constant = 0.03/day, half-life = 24.3 days, Strong hydrodynamic condition remaining percentage = 16.2%, rate constant = 0.06/day, half-life = 11.7 days; Sediment: Static control remaining percentage = 53.2%, rate constant = 0.02/day, half-life = 34.7 days, Weak hydrodynamic condition remaining percentage = 38.1%, rate constant = 0.03/day, half-life = 22.2 days, Strong hydrodynamic condition remaining percentage = 11.3%, rate constant = 0.07/day, half-life = 10.1 days
Analytical Method and Analytical Details	Ultra performance liquid chromatography; MDL for water: 10 ng/mL, for sediment and suspended particulate matter: 20 ng/g; Recovery from water samples: 86-109%, from sediment and suspended particulate matter: 80-112%
Transformation Products, Statistics, and Kinetics	Not reported; <10%; p<0.05; Half-life ranged from 10.1 days (sediment:strong hydrodynamics) to 39.6 days (SPM: static control)
Reference Substance and Reference Substance Results	Procedural blanks for every 12 samples.; No target compound was detected.

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High
	Metric 2:	Test Substance Purity	High
Domain 2: Test Design	Metric 3:	Study Controls	Medium
	Metric 4:	Test Substance Stability	N/A

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Study Citation:	Cheng, H., Hua, Z. (2018). Distribution, release and removal behaviors of tetrabromobisphenol A in water-sediment systems under prolonged hydrodynamic disturbances. Science of the Total Environment 636:402-410.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5519140			
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6:	Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 7:	Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	Microbial activity in sediments was not validated.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Cheng, H., Hua, Z., Wang, L., Wang, Y., Xie, Z., Zhu, T. (2019). Relative effects of wind-induced disturbances and vegetation on tetrabromobisphenol A cycling in shallow lakes: Direct and indirect effects. Environmental Pollution 252(Pt A):794-803.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5519135

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Elimination of TBBPA in water, suspended solids (SS), vegetation and sediment evaluated; the study also looked at influences by wind disturbances and vegetation in a shallow lake; Flumes with the rotational speeds of 0,10 and 140 rpm with sediment, water and atmosphere for 34 days, pH 8.36-8.85; 3 parallel flumes
System Type Design	annular flume, diagram in Figure 1
Sampling Frequency and Sampling Details	Water, sediment and vegetation sampled on 3 day interval; Water samples centrifuged and filtered through a 0.45-mm quartz fiber filter. Sediment was freeze-dried and filtered, plants were freeze dried and grinded.
Test Temperature	15 ± 0.5°C
Results Details	T1/2 in static control = 29.1 days in water and in sediment; 30.3 days in suspended solids and 30.7 days in vegetation. Half-lives decreased with faster wind conditions.
Analytical Method and Analytical Details	ultra-high performance liquid chromatograph and MS; Agilent Technologies, Waldbronn, Germany with an Agilent 6460 triple quadrupoleMS
Transformation Products, Statistics, and Kinetics	Not reported; likely available in supplementary information; several equations presented in the text
Reference Substance and Reference Substance Results	35 days sterile experiment; TBBPA concentrations in experimental sediment were stable

EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	The source of the test substance, sediment, was reported; however, no data was presented on the source of analytical standard.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	TBBPA sediment controls were used to monitor elimination in the absence of water and vegetation. Static controls were also used to determine influence on wind speeds.
	Metric 4:	Test Substance Stability	Medium	Some test substance preparation, stability and storage details were reported and the omissions are unlikely to have an impact on the study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some test conditions were not reported, but omissions aren’t likely to impact study results.

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Study Citation:	Cheng, H., Hua, Z., Wang, L., Wang, Y., Xie, Z., Zhu, T. (2019). Relative effects of wind-induced disturbances and vegetation on tetrabromobisphenol A cycling in shallow lakes: Direct and indirect effects. Environmental Pollution 252(Pt A):794-803.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5519135			
Domain	Metric	EVALUATION		Comments
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	Medium	The system may be capable of maintaining test substance concentrations and was assumed to establish equilibrium; however the system was not closed and all compartments were not monitored (air).
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	Low	Naturally occurring microbially activity inferred but no further information was provided.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	Low	There were competing routes of elimination in the reported studies.
	Metric 12:	Test Substance Purity	Medium	Sampling methods were clearly described and were appropriate.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium	Uncertainty and variability were discussed but not fully addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium	Extraction efficiency was not reported but its omission is unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic and statistical methods were clearly described or referenced to in the supporting information for this study.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

Study Citation:	Gong, H., Hu, J., Rui, X., Luo, J., Zhu, N. (2023). Unveiling the occurrence, distribution, removal, and environmental impacts of 65 emerging contaminants in neglected fresh leachate from municipal solid waste incineration plants. Journal of Hazardous Materials 460:132355.
OECD Harmonized Template:	Miscellaneous
HERO ID:	11312629

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A (TBBPA)
Confidentiality, Type, Guideline	none; experimental; experimental
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported Notes: monitoring study samples used for the test substance; details were not reported for the analytical standards or reference material
Test Method Details, Test Condition Details, and Test Consistency	Removal rate = % removal = ((C in - C out)/C in) x 100% where C in = concentration in fresh leachate = 2173.56 ng/LCout = concentration from ultrafiltration unit = 2122.41 ng/L; Leachate influent flow 300 m3/d; sludge production 900 kg/d dw; NR
Details	
System Type Design	municipal solid waste incineration plants located in Shanghai
Sampling Frequency and Sampling Details	NR; Sludge and leachate samples were extracted via standard methods published by the Ministry of Ecology and Environment of China.TBBPA (mg/d; table S17): mass in (min = influent): 652.068mass out (mout = ultrafiltration effluent): 636.723mass (mx = volatilization, microbial degradation, photolysis, hydrolysis, autolysis and other losses): -31.212mass absorbed by sludge (msor): 46.557min = mout + mx + msor assume ambient air temperature of Shanghai (with an approx. range of 0°C to 40°C)
Test Temperature	
Results Details	TBBPA was not effectively removed throughout the treatment process
Analytical Method and Analytical Details	HPLC-TQ-MS; LOD 0.4 ng/L, LOQ 1.2 ng/L (leachate); LOD 10 ng/L, LOQ 30 ng/L (sludge) (reported in suppl file)
Transformation Products, Statistics, and Kinetics	NR; Pearson and Spearman correlation analyses and significant differences (p<0.05 or p<0.01) were conducted using IBM SPSS Statistics 23 [31]. Normal distribution test using Shapiro-Wilk (S-W).; removal rate = 2.35% (removal from leachate)
Reference Substance and Reference Substance Results	NR; NR

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively by name.
	Metric 2: Test Substance Purity	Medium	The test substance purity and the reference standards used were not reported; however, the omissions were not likely to have a substantial impact on the study results.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	N/A	The metric is not applicable to the study type.
	Metric 6: Testing Conditions	High	Treatment conditions were reported.
	Metric 7: Testing Consistency	N/A	The metric is not applicable to the study type.

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Study Citation:	Gong, H., Hu, J., Rui, X., Luo, J., Zhu, N. (2023). Unveiling the occurrence, distribution, removal, and environmental impacts of 65 emerging contaminants in neglected fresh leachate from municipal solid waste incineration plants. Journal of Hazardous Materials 460:132355.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	11312629			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	High	Equilibrium may be assumed in this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Analytical methods used were suitable for detection and quantification of the target chemical.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination		High		

Study Citation:	Grause, G., Furusawa, M., Okuwaki, A., Yoshioka, T. (2008). Pyrolysis of tetrabromobisphenol-A containing paper laminated printed circuit boards. Chemosphere 71(5):872-878.
OECD Harmonized Template:	Miscellaneous
HERO ID:	2883108

Parameter		EXTRACTION		
CASRN and Test Material		Not Reported; tetrabromobisphenol-A		
Confidentiality, Type, Guideline		None; experimental; experimental		
Solvent, Reactivity, Storage, Stability		NA; NA; NA; NA		
Radiolabel, Source, State, Purity		None; Hitachi Chemical Co., Ltd.; printed circuit board containing TBBPA; NA Notes: TBBA		
Test Method Details, Test Condition Details, and Test Consistency Details		degradation was carried out by thermo gravimetry (TGA) and quartz tube (QT).; TGA- 10 mg of the sample on the TG balance, quenched with helium, furnace heated from 40-1000 deg C at different heating rates. QT- 1 piece of PCB in quartz crucible connected to a thermo-couple all placed inside quartz tube heated 50-800 deg C at a rate of 10 K/min; Not Reported		
System Type Design		gravimetric balance; electric heated quartz tube		
Sampling Frequency and Sampling Details		continuous; TGA-coupled with GC-MS; QT-volatile products collected in gas wash bottles		
Test Temperature		40-1000; 50-800 deg C		
Results Details		C/H ratio increased from 0.74 to 3.1; bromine content decreased from 3.6 to 0.19 wt%		
Analytical Method and Analytical Details		GC-MS (organic products); GC-ECD (brominated main products); IC (HBr); GC-MS: split mode, determination of low volatile products was limited by the temperature of the transfer line (300 deg C).; GC-ECD: split mode, 2- bromophenol, 2,4-dibromophenol, 2,6-dibromophenol, 2,4,6-tribromophenol used as standards; IC: conductivity detector		
Transformation Products, Statistics, and Kinetics		methylated phenols; methylated benzene derivatives; 2-bromophenol; 2,4-dibromophenol; 2,6-dibromophenol; 2,4,6-tribromophenol; HBr;; 87% of bromine released as HBr; 14% as brominated aromatics (3.2% 2-bromophenol; 2.7% 2,4-dibromophenol; 2.8% 2,6-dibromophenol; 5.3% 2,4,6-tribromophenol); 1.8% as residual char; Thermal decomposition appeared as 3 step: step 1: 247-263 deg C w/6% weight loss; step 2: 255-286 deg C w/65% weight loss; step 3: 373-402 deg C with 35% weight loss.		
Reference Substance and Reference Substance Results		not applicable; Not Reported		
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name and structure.
	Metric 2:	Test Substance Purity	High	The full chemical composition of the formulation was reported.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to this study type.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent.
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Study Citation:	Grause, G., Furusawa, M., Okuwaki, A., Yoshioka, T. (2008). Pyrolysis of tetrabromobisphenol-A containing paper laminated printed circuit boards. Chemosphere 71(5):872-878.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	2883108			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation and all reported variability or uncertainty was not likely to influence the outcome assessment.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical and transformation product concentrations were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were expected.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Hou, X., Yu, M., Liu, A., Li, Y., Ruan, T., Liu, J., Schnoor, J. L., Jiang, G. (2018). Biotransformation of tetrabromobisphenol A dimethyl ether back to tetrabromobisphenol A in whole pumpkin plants. Environmental Pollution 241:331-338.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5496890

EXTRACTION

Parameter	Data
CASRN and Test Material	74-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR
Radiolabel, Source, State, Purity	13-C-12 TBBPA (50µg/mL in methanol, 99%); Alfa Aesar (Ward Hill, MA, USA); Solid; 97% Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Pumpkin seeds (Cucurbita maxima x C. moschata, Taiguo Yinong Seed Co., Ltd. Shanxi Province, China); Seeds were germinated on sterile gauze and cultivated on perlite beds (25°C, 16h light followed by 22°C, 8h darkness) until shoots reached 4-5cm. After 2 days of cultivation in sterile water, plants were exposed to TBBPA.; Not reported
System Type Design	Plants were exposed to TBBPA at 100ng/mL in sterile water, pH = 5.51 ± 0.05. Blank and unplanted controls were used.
Sampling Frequency and Sampling Details	Samples were conducted in triplicate (3 seeds for each exposure).; Samples were collected on days 2, 4, 6, 9, 12, and 15.
Test Temperature	25°C during 16 hours light and 22°C during 8h darkness.
Results Details	The concentrations of TBBPA in roots and stems reached equilibrium after approximately 5 days. The initial concentration of TBBPA in the solution was reduced by roughly 80%. At equilibrium, the total mass of TBBPA in the roots and stems was 2200 and 1.0 ng, respectively. Volatilization, phytovolatilization, and chemical transformation did not occur in blank or unplanted controls.
Analytical Method and Analytical Details	Agilent GC-MS used for detection. LC-MS-MS for quantification.; Method detection limit in solution: 0.7 pg/mL; in leaves: 230 pg/g; in stems and root: 580 pg/g.
Transformation Products, Statistics, and Kinetics	TBBPA dimethyl ether (TBBPA DME) and TBBPA monomethyl ether (TBBPA MME); R2 for regressions of solution, root, and stem concentrations was 0.975, 0.967, and 0.854.; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Appropriate blank and unplanted controls were used.
	Metric 4: Test Substance Stability	High	The test substance preparation and storage conditions were reported and appropriate.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	The testing conditions were reported and appropriate.
	Metric 7: Testing Consistency	High	The testing conditions were consistent across study groups.

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Study Citation:	Hou, X., Yu, M., Liu, A., Li, Y., Ruan, T., Liu, J., Schnoor, J. L., Jiang, G. (2018). Biotransformation of tetrabromobisphenol A dimethyl ether back to tetrabromobisphenol A in whole pumpkin plants. Environmental Pollution 241:331-338.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5496890			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 8:	System Type and Design	High	Equilibrium was established and the system was capable of maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	The test organism was reported and is appropriate for the study endpoint.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methodology was reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	The ranges of TBBPA mass in each compartment were reported and the variation was unlikely to have an impact on the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Total TBBPA concentrations were reported by total mass in each compartment rather than per unit mass.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5348243

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich Canada; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	3 parallel membrane bioreactors: solid residence times of 24, 28, 29 d; hydraulic retention time 6 h; Chemical Oxygen Demand 334 mg/L; Total Organic Carbon 26.5 mg/L total nitrogen 33 mg/L; pH 7.2-7.6; appropriate
System Type Design	Influent concentration 32.7±9.4 ng/L
Sampling Frequency and Sampling Details	not reported; collected in amber glass; influent samples were composite. pH, temperature and DO were measured
Test Temperature	measured
Results Details	76.0% removal
Analytical Method and Analytical Details	Solid phase extraction; liquid-liquid extraction clean up followed by GC-NCI-MS analysis; method detection limit 2.4 ug/L; method recovery is 81%; DDT internal standard
Transformation Products, Statistics, and Kinetics	not reported; ±6.2%; Effluent concentrations were 8.8±2.0, 6.7±1.4, 6.6±1.1 ng/L for the 3 reactors.
Reference Substance and Reference Substance Results	not applicable; Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name and CASRN.
	Metric 2: Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4: Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported, and were appropriate for the study.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7: Testing Consistency	High	Test conditions were consistent.
	Metric 8: System Type and Design	High	The system type and design were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms			

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Study Citation:	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5348243			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types and appropriate for the study method or route.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5348243			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	None; Experimental; Experimental			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich Canada; NR; NR Notes: NR			
Test Method Details, Test Condition Details, and Test Consistency	The wastewater undergoes multiple stages of treatment consisting of primary, secondary, tertiary and disinfection.; MLSS 2500 mg/L; Solid residence time 12 d; Hydraulic retention time 6-9 h; water content average of 70%.; Significant variability of TBBPA concentration in the influent was observed due to the daily and seasonal variation.			
System Type Design	Influent concentration 10-145 ng/L			
Sampling Frequency and Sampling Details	not reported; collected in amber glass; influent samples were composite. pH, temperature and DO were measured			
Test Temperature	measured			
Results Details	83.0% removal			
Analytical Method and Analytical Details	Solid phase extraction; liquid-liquid extraction clean up followed by GC-NCI-MS analysis; method detection limit 2.4 ug/L; method recovery is 81%; DDT internal standard			
Transformation Products, Statistics, and Kinetics	not reported; ±5.7%; Effluent concentrations were 2.4-8.0 ng/L.			
Reference Substance and Reference Substance Results	not applicable; Not Reported			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name and CASRN.
	Metric 2:	Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported, and were appropriate for the study.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	The system type and design were capable of appropriately maintaining substance concentrations.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types and appropriate for the study method or route.
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Study Citation:	Islam MS (2015). Investigation of biodegradation and environmental fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5348243			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Islam, M. S., Zhou, H., Zytner, R. G. (2014). Comparison of behaviour and fate of tetrabromobisphenol A (TBBPA) in membrane bioreactors and conventional activated sludge process. Journal of Water Reuse and Desalination 4(3):164-173.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5496627

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich Canada; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Analysis of TBBPA conc. in pilot-scale membrane bioreactors and conventional activated sludge process at City of Guelph Wastewater Treatment Plant; Solids retention times for the system was 12 d, with an hydraulic retention times of 6 to 9 hours; Not applicable
System Type Design	Guelph Wastewater Treatment Plant March-May 2013
Sampling Frequency and Sampling Details	An auto-sampler collected samples over a 24 hour period, every half an hour and then combined; water samples collected from different points of the treatment process and 3 membrane bioreactors
Test Temperature	Not reported
Results Details	membrane bioreactors = 76% removal efficiency; Conventional activated sludge system = 83% removal efficiency
Analytical Method and Analytical Details	GC-NCI-MS; negative ion chemical ionization MS in select ion monitoring mode; method detection level (MDL) was determined per Standard Methods - APHA, 2012.
Transformation Products, Statistics, and Kinetics	Not applicable; Standard deviations and Student's t-factor for seven replicates with six degrees of freedom at the 99% confidence reported; Not applicable
Reference Substance and Reference Substance Results	Not applicable; Not applicable

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2: Test Substance Purity	High	The source of the test substance was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to this study type.
	Metric 4: Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6: Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 7: Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 8: System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Islam, M. S., Zhou, H., Zytner, R. G. (2014). Comparison of behaviour and fate of tetrabromobisphenol A (TBBPA) in membrane bioreactors and conventional activated sludge process. Journal of Water Reuse and Desalination 4(3):164-173.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5496627			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Kim, U. J., Lee, I. S., Oh, J. E. (2016). Occurrence, removal and release characteristics of dissolved brominated flame retardants and their potential metabolites in various kinds of wastewater. Environmental Pollution 218:551-557.
OECD Harmonized Template:	Miscellaneous
HERO ID:	3545985

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; NR; NR
Radiolabel, Source, State, Purity	NA; Samples collected from WWTPS in Ulsan and Busan, Korea; Liquid; NA
Test Method Details, Test Condition Details, and Test Consistency Details	Aerobic study using influents/effluents of six treatment plants. Sources included: Sewage + wastewater, sewage + wastewater + livestock wastewater, Human waste (feces and urine), and sewage; Samples were composites over 24-48 hour periods based on the hydraulic retention time of each plant.; Differences between wastewater treatment plants reported
System Type Design	Treatment system types included: Conventional-activated sludge process; SYMIO; Bio-Best-Bacillus process; Aerobic digestion (bacillus sp.); Modified Ludzach-Ettinger.
Sampling Frequency and Sampling Details	3 samples from waste water treatment plants. 4 samples from sewage treatment plants and human waste treatment plants.; Collected in June, September and October, 2010 in amber bottles
Test Temperature	Not applicable
Results Details	48.7% removal efficiency; TBBPA [Effluent]/[Influent]: Human waste treatment plant = 0.38-0.78; sewage treatment plant = 0.59-0.98; waste water treatment plant = 0.34-0.79.
Analytical Method and Analytical Details	400 mL influent samples and 600 mL effluent samples were extracted using HLB solid-phase extraction cartridges and eluted with methanol and dichloromethane. Extracted samples were analyzed via LC/MS/MS using a reversed phase column; LOQ 0.03 - 0.3 ng/L; Multi-level calibration curve created for TBBPA quantification, R ² : >0.998. Recovery 64.3-121.2%
Transformation Products, Statistics, and Kinetics	Not applicable; Data reported in figures; Not reported
Reference Substance and Reference Substance Results	Not applicable; Not applicable

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance was identified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Control groups were not used; however, this was not likely to have affected the study results.
	Metric 4:	Test Substance Stability	High	Detailed procedure presents no issues involving preparation and process of test samples.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Kim, U. J., Lee, I. S., Oh, J. E. (2016). Occurrence, removal and release characteristics of dissolved brominated flame retardants and their potential metabolites in various kinds of wastewater. Environmental Pollution 218:551-557.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3545985			
Domain	Metric	EVALUATION		Comments
	Metric 6:	Testing Conditions	Medium	Testing controls were not reported in depth for each treatment plant; however, the types of treatment used and sewage sources at each plant were given so study results were useful.
	Metric 7:	Testing Consistency	High	Differences between treatment plants and any sampling or processing were reported.
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	Inoculum sources were reported for all test groups.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The concentration of TBBPA in the effluent and influent of the treatment plants was an appropriate outcome to monitor.
	Metric 12:	Test Substance Purity	Medium	Composite samples were said to be taken over a 24-48-hour period; however, whether this was a continuous sampling or done in intervals is unknown; unlikely to have substantially impacted study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of uncertainty between study groups were not noted; however, this was unlikely to have impacted the study results as overall removal percentages were investigated, and treatments were not being compared directly to one another.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Analytical method was suitable for identifying and quantifying the parent compound.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Simple kinetic calculations based on the concentration of the parent compound in the influent and effluent were made.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			Medium	

Study Citation:	Kim, U., Oh, E. (2018). Mass-flow-based removal and transformation potentials for TBBPA, HBCDs and PBDEs during wastewater treatment processes. Journal of Hazardous Materials 355:82-88.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5622549

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	Internal standard: 13C12-labeled TBBPA from Wellington Laboratories; waste water; NR; NR Notes: TBBPA
Test Method Details, Test Condition Details, and Test Consistency Details	wastewater treatment was performed using a modified Ludzack–Ethinger (MLE) process followed by UV disinfection; urban area sewage treated at an operating capacity of 2.79E5 m3/d; sludge production rate: 35,994 t/yr; wastewater inflow was from the sewage of nearby domestic housing for 1,094,000 people
System Type Design	MLE process uses the same principle as conventional activated sludge process with the addition of an anaerobic zone upstream of the aerobic zone and internal recycling
Sampling Frequency and Sampling Details	domestic STP collected September and October 2010 and in January and June 2011 at the five major stages in the system.; Samples from influent, wastewater in the primary settling basin, treated water from between the MLE process and the clarifier, wastewater from the secondary settling basin, and effluent; samples passed through 1.0 µm pore glass-fiber filters under vacuum
Test Temperature	Not reported
Results Details	approximate TBBPA distribution in dissolved phase = 27%, particulate phase = 17%, sludge = 15%, whole WW = 35%; estimated mass loss was greater than 64%±32%,
Analytical Method and Analytical Details	Agilent 1200/6460 QQQ MSD liquid chromatograph tandem mass spectrometer (Agilent Technologies); Method limit of quantification (LOQ) 0.001-0.25 ng/L; recovery ranged from 49.3-102.7% RSD 13.5%
Transformation Products, Statistics, and Kinetics	Not reported; Multi-level calibration curves covering the range of concentrations found in the samples were prepared, r-squared >0.998; Not reported
Reference Substance and Reference Substance Results	Not applicable; Air samples were not collected, it was assumed that because of the low VP of TBBPA loss due to volatilization was minor

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified clearly.
	Metric 2: Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 2: Test Design			
	Metric 3: Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 4: Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6: Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 7: Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Kim, U., Oh, E. (2018). Mass-flow-based removal and transformation potentials for TBBPA, HBCDs and PBDEs during wastewater treatment processes. Journal of Hazardous Materials 355:82-88.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5622549			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	This metric met the criteria for medium confidence as expected for this type of study.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	This metric is not applicable to this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		High		

Study Citation:	Li, Y., Zhou, Q., Wang, Y., Xie, X. (2011). Fate of tetrabromobisphenol A and hexabromocyclododecane brominated flame retardants in soil and uptake by plants. Chemosphere 82(2):204-209.
OECD Harmonized Template:	Miscellaneous
HERO ID:	1927658

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	Stock solutions prepared in methanol; NR; Stock solutions stored at -20C; NR
Radiolabel, Source, State, Purity	13C12-labeled TBBPA used as a standard; Sigma-Aldrich Co. (Dorset, England); NR; NR
Test Method Details, Test Condition Details, and Test Consistency Details	Cabbage and radish were planted in TBBPA spiked soil; Soil samples collected from 0-20 cm in an uncultivated and unpolluted field in an arboretum in Tianjin, China. Soil: 3.86% organic matter, 0.142% total N, pH 6.50, 199 mmol/kg; plants were watered daily and harvested after 8 wks.; Cabbage and radish seeds were planted in the same soils; conditions were consistent
System Type Design	Plant seeds were soaked, washed, and sterilized before planting in filter paper-lined pots with 300 g dry weight. 8 treatments consisting of 8 replicates.
Sampling Frequency and Sampling Details	Soils were sampled after 8 weeks; Plant and soils samples washed with deionized water, freeze-dried, ground and stored at -4C; after addition of internal standard, samples were Soxhlet extracted for 24h with 1:1 acetone-hexane.
Test Temperature	25±2C day; 14±2C night
Results Details	TBBPA concentrations were detected in all plant tissues after 8 weeks; cabbage = 18 µg/kg, radish = 5 µg/kg; cabbage roots contained thrice as much TBBPA as radish roots but showed poor ability to translocate and accumulate TBBPA. Sorption to soil matrix was indicated as a significant factor in TBBPAs short term fate in soils
Analytical Method and Analytical Details	HPLC-ESI-MS-MS Quattro micro triple-quadrupole mass spectrometer coupled with a Waters 2695 HPLC; concentrations determined by internal quantification using a radiolabeled standard.; LOD = 0.6 mg/kg; 13C12 labeled TBBPA = 90±8%
Transformation Products, Statistics, and Kinetics	Not reported; SPSS 12.0 software was used to analyze the data; Note: just a fraction of the soil volume was impacted by plant roots and the bioavailable portion within that fraction was likely to be minimal; mobilization and uptake of pollutants appeared to be highly species specific
Reference Substance and Reference Substance Results	Controls; 10 g of spiked soil placed in glass tubes and kept in dark (autoclaved and dry treatments were included); concentrations of TBBPA were less than 60 µg/kg after 8 weeks indicating a 90% decrease from initial concentration

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2: Test Substance Purity	Medium	Source was reported; the purity was not reported.
Domain 2: Test Design	Metric 3: Study Controls	High	Controls were included.
	Metric 4: Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6: Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 7: Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Li, Y., Zhou, Q., Wang, Y., Xie, X. (2011). Fate of tetrabromobisphenol A and hexabromocyclododecane brominated flame retardants in soil and uptake by plants. Chemosphere 82(2):204-209.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	1927658			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 8:	System Type and Design	Medium	The system and design were not reported.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. Environmental Science and Pollution Research 23(16):16406-16416.
OECD Harmonized Template:	Miscellaneous
HERO ID:	3359132

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	Isooctane; NR; Opaque bottles at -20°C; NR
Radiolabel, Source, State, Purity	NA; AccuStandard Inc., CT, USA; Liquid; >98%
Test Method Details, Test Condition Details, and Test Consistency Details	The study examined temperature effects on degradation and transformation of the test substance in soil.; Test substance mixed into clean soil samples collected from grassland by university in Guangzhou, China, were incubated to determine temperature effects on removal.; Soil pH 7.58; Conducted in the dark to avoid photodegradation; soil sterilized to prevent biodegradation
System Type Design	Not reported
Sampling Frequency and Sampling Details	1, 2, 3, 4, 5, 12, 18, 24, and 30 d; Not reported
Test Temperature	25 and 40°C
Results Details	Removal: 18.72%/30d at 25°C; 38.05%/30d at 40°C
Analytical Method and Analytical Details	GC-MS operated in electron impact ionization mode; LOD 3 ng/g; Samples extracted by ultrasonic extraction with acetone:n-hexane, concentrated by rotary evaporator, cleaned on column, concentrated again, reduced by N2 stream; recovery 82-95%
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	High	The study included a blank control.
	Metric 4:	Test Substance Stability	High	The test substance preparation and storage conditions were reported and appropriate.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Temperature and pH were reported, limited soil characteristics or details on system design were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				

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Study Citation:	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. Environmental Science and Pollution Research 23(16):16406-16416.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3359132			
EVALUATION				
Domain		Metric	Rating	Comments
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling frequency was appropriate, however rates were not calculated.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Possible test substance disappearance mechanisms were not discussed in depth.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Percent recovery and limits of detection were reported, the analytical method was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical calculations were not explicitly applied.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Results were qualitatively comparable to previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. Environmental Science and Pollution Research 23(16):16406-16416.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3359132			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	None; Experimental; Experimental			
Solvent, Reactivity, Storage, Stability	Isooctane; NR; Opaque bottles at -20°C; NR			
Radiolabel, Source, State, Purity	NA; AccuStandard Inc., CT, USA; Liquid; >98%			
Test Method Details, Test Condition Details, and Test Consistency Details	The study examined pH effects on degradation and transformation of the test substance in soil.; Test substance mixed into clean soil samples collected from grassland by university in Guangzhou, China, were pH adjusted to 2.0, 5.0, and 9.0; Conducted in the dark to avoid photodegradation; soil sterilized to prevent biodegradation			
System Type Design	Petri dish			
Sampling Frequency and Sampling Details	1, 2, 3, 4, 5, 12, 18, 24, and 30 d; Not reported			
Test Temperature	25°C			
Results Details	Removal: approx. 58%/30d at pH 2; approx.72%/30d at pH 5 ;77.42 %/30d at pH 9.0 Removal pH 9.0 > pH 5.0 > pH 2.0 > pH 7.0			
Analytical Method and Analytical Details	GC-MS operated in electron impact ionization mode; LOD 3 ng/g; Samples extracted by ultrasonic extraction with acetone:n-hexane, concentrated by rotary evaporator, cleaned on column, concentrated again, reduced by N2 stream; recovery 82-95%			
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported			
Reference Substance and Reference Substance Results	Blank at pH 7; 18.5%/30 d			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	The study included a blank control.
	Metric 4:	Test Substance Stability	High	The test substance preparation and storage conditions were reported and appropriate.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Temperature and pH were reported, limited soil characteristics or details on system design were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
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Study Citation:	Liu, C., Niu, X., Song, X. (2016). A simulation research on the natural degradation process of tetrabromobisphenol A in soil under the atmospheric different environments. Environmental Science and Pollution Research 23(16):16406-16416.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3359132			
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling frequency was appropriate, however rates were not calculated.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Possible test substance disappearance mechanisms were not discussed in depth.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Percent recovery and limits of detection were reported, the analytical method was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical calculations were not explicitly applied.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Results were qualitatively comparable to previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Luo, X. J., Zhang, X. L., Chen, S. J., Mai, B. X. (2010). Free and bound polybrominated diphenyl ethers and tetrabromobisphenol A in freshwater sediments. Marine Pollution Bulletin 60(5):718-724.
OECD Harmonized Template:	Miscellaneous
HERO ID:	4182593

EXTRACTION				
Parameter	Data			
CASRN and Test Material	74-94-7; Tetrabromobisphenol A			
Confidentiality, Type, Guideline	None; Experimental; Experimental			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	13-C-TBBPA (50µg/mL); Dr. Ehrenstorfer (Augsburg, Germany); NR; 99%			
Test Method Details, Test Condition Details, and Test Consistency Details	Samples were Soxhlet extracted with hexane/acetone to remove the unbound TBBPA. The sediment was then saponified with KOH in MeOH/water (90:10 v/v) at 100°C, decanted of supernatant, extracted with DCM, and reextracted at pH < 3 with Hexane:MTBE.; TOC % ranged from 0.15-7.15 (average: 1.5); Black carbon % ranged from 0.04-1.13 (average: 0.4); Not reported			
System Type Design	Not reported			
Sampling Frequency and Sampling Details	Not reported; Surface sediment (0-5cm) and two cores from the Dongjiang River were collected and stored at -20°C.			
Test Temperature	Not reported			
Results Details	Average mass of bound TBBPA/total TBBPA: 27% (ranged 6.5-48%). In core samples 1 and 14, this range was 39-59% and 22-92%. Significant correlation between TOC and free TBBPA was observed; however, if the datapoint from one site at the highest concentration was removed, the correlation was no longer significant.			
Analytical Method and Analytical Details	GC-MS with electron impact in SIM mode.; Method detection limit: 4.2 pg/g. Mean recoveries for spiked blanks for the free and bound fractions were 80 and 105%, respectively.			
Transformation Products, Statistics, and Kinetics	Not reported; Person correlation analysis conducted by SPSS 11.5.; Not reported			
Reference Substance and Reference Substance Results	Laboratory blanks for both free and bound fractions, spiked blanks; Not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate controls were used to correct the final results.
	Metric 4:	Test Substance Stability	High	The storage and preparation of the test sample containing the test substance was reported and appropriate.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	There were not reported changes in the testing conditions or treatment between the sample groups.

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Study Citation:	Luo, X. J., Zhang, X. L., Chen, S. J., Mai, B. X. (2010). Free and bound polybrominated diphenyl ethers and tetrabromobisphenol A in freshwater sediments. Marine Pollution Bulletin 60(5):718-724.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	4182593			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 8:	System Type and Design	High	As a field sampling study, the system was at equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	The sediment was appropriately characterized.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Uncertainty in the concentration measurements was not reported but the omission is unlikely to have a substantial impact on the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The concentrations of the target chemical were reported and the analytical method was suitable.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Mcphedran, K., Seth, R., Song, M.,in, Chu, S., Letcher, R. J. (2013). Fate and mass balances of triclosan (TCS), tetrabromobisphenol A (TBBPA) and tribromobisphenol A (tri-BBPA) during the municipal wastewater treatment process. Water Quality Research Journal of Canada 48(3):255-265.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5622779

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	¹³ C12-labeled TBBPA prepared in methanol; from Cambridge Isotope Laboratories (Andover, MA, USA); waste water; analytical standard from Aldrich Chemical Co. (WI, USA); NR; Minimum of 97% Notes: TBBPA
Test Method Details, Test Condition Details, and Test Consistency	Municipal wastewater treatment plant; Municipal sewage treated at an operating capacity of 60,000 m3/d; flow rates during sampling period ranged from 24,480 to 33,600 m3/d; primary settling tank, aeration tank and secondary settling tank volumes = 6314, 6620 and 5399 m3, respectively; All grab samples were collected in pre-cleaned glass bottles or jars
System Type Design	Primary settling tank (PST), aeration tank (AT), secondary settling tank (SST)
Sampling Frequency and Sampling Details	Three sets of grab samples collected on separate days between 9am-12pm under normal dry weather conditions over 6-wk period between March–May 2004.; The five sampling sites were: (1) influent to the primary sedimentation tanks (IN); (2) primary sedimentation tank effluent (PE); (3) finaleffluent (FE); (4) primary sludge (PS); and (5) waste activated sludge (AS).
Test Temperature	Not reported
Results Details	Mean concentrations of TBBPA in influent = 5.27±2.13 ng/L (range 2.81-6.51), final effluent 0.70±0.30 ng/L (range 0.50-1.05); sludge 36.3±17.8 ng/g dw (range 19.9-57.8)
Analytical Method and Analytical Details	Agilent GC 6890 equipped with a 5,973 quadrupole MSD; limit of detection 0.05 ng/L (influent and effluent); 0.02 ng/g dw (sludge)
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Based on mass balances reduction of TBBPA were estimated as 91%; PST 61% removal, SST 30% removal
Reference Substance and Reference Substance Results	Not applicable; Not applicable

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified clearly.
	Metric 2: Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 2: Test Design			
	Metric 3: Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 4: Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6: Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 7: Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 8: System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Mcphe dran , K., Seth, R., Song, M.,in, Chu, S., Letcher, R. J. (2013). Fate and mass balances of triclosan (TCS), tetrabromobisphenol A (TBBPA) and tribromobisphenol A (tri-BBPA) during the municipal wastewater treatment process. Water Quality Research Journal of Canada 48(3):255-265.				
OECD Harmonized Template:	Miscellaneous				
HERO ID:	5622779				
Domain		Metric	EVALUATION Rating		Comments
Domain 4: Test Organisms					
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.	
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.	
Domain 5: Outcome Assessment					
	Metric 11:	Test Substance Identity	Medium	This metric met the criteria for medium confidence as expected for this type of study.	
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.	
Domain 6: Confounding/Variable Control					
	Metric 13:	Confounding Variables	N/A	This metric is not applicable to this type of study.	
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.	
Domain 7: Data Presentation and Analysis					
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.	
Domain 8: Other					
	Metric 17:	Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.	
Overall Quality Determination			High		

Study Citation:	Morris, S., Allchin, C. R., Zegers, B. N., Haftka, J. J., Boon, J. P., Belpaire, C., Leonards, P. E., Van Leeuwen, S. P., De Boer, J. (2004). Distribution and fate of HBCD and TBBPA brominated flame retardants in North Sea estuaries and aquatic food webs. Environmental Science & Technology 38(21):5497-5504.
OECD Harmonized Template:	Miscellaneous
HERO ID:	1927817

Parameter		EXTRACTION		
CASRN and Test Material		79-94-7; TBBPA		
Confidentiality, Type, Guideline		None; Experimental; Experimental		
Solvent, Reactivity, Storage, Stability		NR; NR; NR; NR		
Radiolabel, Source, State, Purity		13C-TBBPA; NR; NR; NR		
Test Method Details, Test Condition Details, and Test Consistency		Sediment and food web sample analysis of marine and sediment samples from rivers and estuaries.; Extraction and analysis of TBBP in invertebrates, fish, and marine mammals from the North Sea; Samples taken from 19 locations in the Western Scheldt; 9 Dutch Rivers (collected in 1999); river sediments and marine biota from the North Sea, river sediment and biota from the U.K., sewage sludge and landfill leachates from the UK.		
Details		Sample collection, storage, extraction, and analysis.		
System Type Design		Scheldt Basin, Belgium and Western Scheldt, Netherlands taken in 2000; North Sea biota samples collected from research vessel (Aug-Sept 1999); UK sediment samples taken in 2000 and biota samples ranged from 1998-2001; Sewage sludge taken in 2002.; Sampling details reported in supplemental information.		
Sampling Frequency and Sampling Details		Not reported		
Test Temperature		Concentration data given for selected biotic and abiotic samples (reported in tables). Mean TBBPA levels ranged from 0.3±0.5 (Netherlands rivers) to 136±125 (whiting muscle) µg/kg-lipid wt. Mean TBBPA in effluent ranged from N.D. to 42±24 µg/kg-dw. Mean TBBPA in influent ranged from N.D. 7.5±8 µg/kg-dw. Mean TBBPA in sludge ranged from 59±41 to 95±85 µg/kg-dw. Mean landfill leachate water particulates: 54±108 µg/kg-dw. Estuarine and riverine sediments: 1±1 to 451±2077 µg/kg-dw.		
Results Details		LC-MS and a Platform II single quadrupole MS coupled to an HP1050 LC with ESI; 13C-TBBPA was added to extracts as a standard; lowest limits of quantitation: 0.05 ng on column. LOD 0.5 µg/kg. Recoveries for TBBPA not reported.		
Analytical Method and Analytical Details		Not applicable; A poor correlation was observed for the spatial distribution of TBBPA residues in eel tissues and those found in sediments from the Scheldt basin. TBBPA in eel samples was generally low with a maximum concentration of 13 µg/kg.; Authors suggested that metabolism and elimination may reduce bioaccumulation potential when compared to HBCD.		
Transformation Products, Statistics, and Kinetics		Samples taken from three reference sites (a: Warnebeek, Achel-khuis; b: Grote Beverdijk, Lo-Reninge; c: R. IJzer, Nieuwpoort); Not Reported		
Reference Substance and Reference Substance Results				
Domain		EVALUATION		
Metric		Rating		Comments
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	The chemical of interest was identified by name.	
Metric 2:	Test Substance Purity	Low	Field sample sources reported; analytical standard source and purity not reported.	
Domain 2: Test Design				
Metric 3:	Study Controls	Medium	Procedural blanks were not included.	
Metric 4:	Test Substance Stability	Low	Sample storage and preparation were not reported.	
Domain 3: Test Conditions				
Metric 5:	Test Method Suitability	High	The monitoring study method was appropriate for the chemical of interest.	

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Study Citation:	Morris, S., Allchin, C. R., Zegers, B. N., Haftka, J. J., Boon, J. P., Belpaire, C., Leonards, P. E., Van Leeuwen, S. P., De Boer, J. (2004). Distribution and fate of HBCD and TBBPA brominated flame retardants in North Sea estuaries and aquatic food webs. Environmental Science & Technology 38(21):5497-5504.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	1927817			
Domain		Metric	EVALUATION	
			Rating	Comments
	Metric 6:	Testing Conditions	Medium	No environmental conditions were reported.
	Metric 7:	Testing Consistency	N/A	This metric is not applicable to this type of study.
	Metric 8:	System Type and Design	High	Field samples are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	Medium	Organism species were reported; specific details were not always reported for individual species.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	The outcome assessment did not quantify accumulation or trophic magnification.
	Metric 12:	Test Substance Purity	High	Sampling focused on appropriate species with acceptable sample sizes, and processing was appropriate. The same tissues for fish were analyzed across species.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	This metric is not applicable to this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method detail was limited, percent recoveries were reported, the limit of detection was reported. Lipid contents were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable however trophic magnification factors were not reported.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**Low**

* Related References: This study's overall score was downgraded.

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	6300802			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	None; Experimental; Experimental			
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR			
Radiolabel, Source, State, Purity	NR; NR; NR; NR			
Test Method Details, Test Condition Details, and Test Consistency	Guelph Municipal Wastewater Treatment Plant, Canada; Influent: 10 - 45 ng/L test substance; Not reported			
Details				
System Type Design	Not reported			
Sampling Frequency and Sampling Details	Not reported; Not reported			
Test Temperature	Not reported			
Results Details	Removal efficiency: 76 - 83%			
Analytical Method and Analytical Details	Not reported; Not reported			
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported			
Reference Substance and Reference Substance Results	Not reported; Not reported			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 4:	Test Substance Stability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 6:	Testing Conditions	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 7:	Testing Consistency	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 8:	System Type and Design	Medium	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	This metric does not apply to this type of study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
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Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 6618Tetrabromobisphenol A.				
OECD Harmonized Template:	Miscellaneous				
HERO ID:	6300802				
Domain	Metric	EVALUATION		Rating	Comments
Domain 5: Outcome Assessment					
	Metric 11:	Test Substance Identity	Medium	Not reported in this secondary source; the primary source likely contains more detail.	
	Metric 12:	Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.	
Domain 6: Confounding/Variable Control					
	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.	
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.	
Domain 7: Data Presentation and Analysis					
	Metric 15:	Data Reporting	Medium	Not reported in this secondary source; the primary source likely contains more detail.	
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.	
Domain 8: Other					
	Metric 17:	Verification or Plausibility of Results	Medium	The results are reasonable based on the data’s inclusion in a peer- reviewed/recognized database or other secondary source.	
	Metric 18:	QSAR Models	N/A	This metric does not apply to this type of study.	

Overall Quality Determination

Medium

* Related References: Islam M; Investigation of Biodegradation and Environmental Fate of Tetrabromobisphenol A (TBBPA) in Guelph Municipal Wastewater. Univ of Guelph, Theses & Dissertations; <https://atrium.lib.uoguelph.ca/xmlui/handle/10214/8859>

Study Citation:	Ortuño, N., Moltó, J., Conesa, J. A., Font, R. (2014). Formation of brominated pollutants during the pyrolysis and combustion of tetrabromobisphenol A at different temperatures. Environmental Pollution 191:31-37.
OECD Harmonized Template:	Miscellaneous
HERO ID:	2539552

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; 4,4'-Isopropylidenebis(2,6-dibromophenol)
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Alfa Aesar GmbH & Co.; NR; Elemental analysis: 33.9% C, 2.2% H, 0.31% N <0.01% S; 55.3% bromine, 0.03% chlorine, <0.01% fluorine. Notes: TBBPA
Test Method Details, Test Condition Details, and Test Consistency Details	Pyrolysis and combustion in a laboratory reactor under different operating conditions for analysis of TBBPA decomposition products.; 50 mg of sample introduced at 1 mm/s under nitrogen (pyrolysis) or synthetic air (combustion); 4 runs performed for each set of conditions
System Type Design	Tubular quartz reactor in a horizontal laboratory furnace
Sampling Frequency and Sampling Details	Not reported; semi volatile compounds and PBDD/Fs collected with XAD-2 resins placed at the outlet of the furnace
Test Temperature	650°C, 800°C
Results Details	Over 100 semi volatile compounds were identified; HBr (the main decomposition product, accounting for >40% under all conditions except pyrolysis at 600°C) and brominated light hydrocarbons levels increased with temp and O2; PAHs formed at higher temps; high levels of 2,4-, 2,6- and 2,4,6- bromophenols observed; most abundant isomer from pyrolysis was 2,4,6,8-TeBDF and from combustion was 1,2,3,7,8-PeBDF; amount of CO and CO2 increase with temp; most abundant hydrocarbons: methane, n-butane, 1-butyne, 1-heptene, isooctane, toluene and xylenes; Max PAH occurs in pyrolysis at high temps, most abundant: naphthalene, phenanthrene, fluoranthene and chrysene, all show a decrease in formation in the presence of O2.
Analytical Method and Analytical Details	GC/MS; HRGC/HRMS (High Resolution); Bromide levels measured by ion chromatography (Dionex DX500); non-condensable gases analyzed by GC/MS; XAD-2 resins extracted and analyzed by HRGC-HRMS
Transformation Products, Statistics, and Kinetics	Pyrolysis and combustion product identification and concentrations reported in document tables.; Not reported; Not reported
Reference Substance and Reference Substance Results	Blanks included; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	High	The source was reported; elemental analysis performed.
Domain 2: Test Design	Metric 3: Study Controls	High	Blanks included; meets the criteria for high confidence as expected for this type of study.
	Metric 4: Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6: Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Ortuño, N., Moltó, J., Conesa, J. A., Font, R. (2014). Formation of brominated pollutants during the pyrolysis and combustion of tetrabromobisphenol A at different temperatures. Environmental Pollution 191:31-37.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	2539552			
Domain		Metric	EVALUATION Rating	Comments
	Metric 7:	Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Results consistent with related physical/chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Potvin, C. M., Long, Z., Zhou, H. (2012). Removal of tetrabromobisphenol A by conventional activated sludge, submerged membrane and membrane aerated biofilm reactors. Chemosphere 89(10):1183-1188.
OECD Harmonized Template:	Miscellaneous
HERO ID:	2020962

EXTRACTION

Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol-A
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; wastewater; NR; Not Reported Notes: TBBPA
Test Method Details, Test Condition Details, and Test Consistency Details	WWTP operations: conventional activated sludge (CAS) plant with sand filter tertiary treatment, before outflow effluent disinfected by chlorination and then dechlorinated; CAS Sludge retention time 12 days, hydraulic retention time 5-9 hours; Not reported
System Type Design	CAS: avg. COD 190±18mg/L, avg. filtered influent TOC 59±19 mg/L, pH 8-8.1
Sampling Frequency and Sampling Details	Not reported; CAS: grab samples from influent, effluent and outflow
Test Temperature	Not reported
Results Details	Removal of TBBPA in the conventional activated sludge plant varied from 91% to 100%; influent sample concentrations = 13, 25, and 29 ng/L, corresponding effluent concentrations = <0.1, 2.2, <0.1 ng/L
Analytical Method and Analytical Details	not reported - described in Potvin (2012); Not reported
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified clearly.
	Metric 2: Test Substance Purity	Medium	The test substance source and purity were not reported.
Domain 2: Test Design	Metric 3: Study Controls	N/A	This metric is not applicable to this type of study.
	Metric 4: Test Substance Stability	N/A	This metric is not applicable to this type of study.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	Some operational details were omitted; however, this is not likely to have a substantial impact on the results.
	Metric 7: Testing Consistency	N/A	This metric is not applicable to this type of study.
	Metric 8: System Type and Design	High	The system type and design were appropriate.
Domain 4: Test Organisms			

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Study Citation:	Potvin, C. M., Long, Z., Zhou, H. (2012). Removal of tetrabromobisphenol A by conventional activated sludge, submerged membrane and membrane aerated biofilm reactors. Chemosphere 89(10):1183-1188.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	2020962			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Sampling details were limited; however, this is not likely to have a substantial impact on the results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	No confounding variables were noted or identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical detection limits and extraction efficiency details were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Takata, M., Watanabe, N., Yamamoto, S. (2015). Destruction of organic Cl and Br compounds through incineration enhanced by alkali and alumina addition. Journal of Material Cycles and Waste Management 17(2):282-289.
OECD Harmonized Template:	Miscellaneous
HERO ID:	2942977

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; TCI; Solid; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Incineration in a horizontal quartz tube heated via 3 serial furnaces performing solvent volatilization (120°C), boat combustion (600°C), and gas combustion (800, 900, 1100°C); Off-gas washed with 60 mL 3% H ₂ O ₂ aq. in a gas bubbler followed by dehumidification using a corrugated glass tube immersed in iced water.; Duplicates run; details not reported
System Type Design	horizontal quartz tube for incineration; laboratory made elemental selective detector using helium plasma via thermal desorption
Sampling Frequency and Sampling Details	Not reported; Off-gas was introduced into Tenax TA and Carboxen 569 collection tubes
Test Temperature	800°C, 900°C, 1100°C
Results Details	Organic Halogen Residual Ratio OX-RR (no additives) at 800°C = ca. 8100, 6000 µg Br/Br, at 900°C = ca. 955, 950 µg Br/Br, at 1100°C value very close to 0 µg Br/Br. OX-RR (alkali + alumina) at 800°C <300 µg Br/Br, at 900°C < 100 µg Br/Br, at 1100°C value very close to 0 µg Br/Br. At 800°C TBBPA was not effectively destructed, at 1100°C TBBPA was nearly completely destructed. The addition of alkali (NaOH) and alumina noticeably increased the destruction at 800 and 900°C.
Analytical Method and Analytical Details	Concentrations of volatile organic Br residues were quantified by using atmospheric pressure helium–radiofrequency barrier discharge–atomic emission spectroscopy; Thermally desorbed organic Br compounds from the off-gas collection tubes were introduced into the helium discharge tube and the optical emission was monitored using a spectrometer (Br at 827.2 nm; MDL 0.4 ng).
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Organic Halogen Residual Ratio OX-RR [ug Br/Br] is the ratio of the amounts of “the remaining original target compound + byproduct” and the input material
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified clearly.
	Metric 2: Test Substance Purity	Medium	The purity was not reported or verified.
Domain 2: Test Design	Metric 3: Study Controls	High	Controls were appropriate for this type of study.
	Metric 4: Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6: Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Takata, M., Watanabe, N., Yamamoto, S. (2015). Destruction of organic Cl and Br compounds through incineration enhanced by alkali and alumina addition. Journal of Material Cycles and Waste Management 17(2):282-289.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	2942977			
EVALUATION				
Domain		Metric	Rating	Comments
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to this study type.
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Experimental treatment technology.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	No confounding variables were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (1985). Chemical property and environmental behavior estimates for tetrabromobisphenol a - (TBBPA).			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5547574			
EXTRACTION				
Parameter	Data			
CASRN and Test Material	79-94-7; TBBPA			
Confidentiality, Type, Guideline	no; not specified; not specified			
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported			
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported			
Test Method Details, Test Condition Details, and Test Consistency	Not Reported; Not Reported; Not Reported			
Details				
System Type Design	Not Reported			
Sampling Frequency and Sampling Details	Not Reported; Not Reported			
Test Temperature	Not Reported			
Results Details	Mass distribution was estimated as Air: 0.0452-0.0390; Water=0.9533-0.8511; Soil=0.0015-0.1099; estimated environmental persistence: 50% mass reduction in 3.6-3 months			
Analytical Method and Analytical Details	Not Reported; log Koc, atmospheric half-life and BCD values were estimated; (possibly stated as input parameters for the environmental persistence estimate; but its unclear). log Koc=5.21-4.29; atmospheric half-life= 1.79 days; BCF in fish= 1.27E5-1.48E3 mg/kg			
Transformation Products, Statistics, and Kinetics	Not Reported; Not Reported; Not Reported			
Reference Substance and Reference Substance Results	Not Reported; Not Reported			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity were not reported
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	N/A	Not relevant to this type of study
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Uninformative	The test method is unclear, as such, the outcome of interest is unclear
	Metric 6:	Testing Conditions	Low	Testing conditions were not reported
	Metric 7:	Testing Consistency	Uninformative	Testing consistency is unknown
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Rating of this factor is not applicable to this kind of information.
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Study Citation:	U.S. EPA, (1985). Chemical property and environmental behavior estimates for tetrabromobisphenol a - (TBBPA).			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5547574			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 10:	Sampling Methods	N/A	Rating of this factor is not applicable to this kind of information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Uninformative	The outcome assessment methodology is unknown
	Metric 12:	Test Substance Purity	N/A	Not relevant to this type of study
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty were not reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Limited data is reported, these omissions were likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not reported
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Uninformative	An unclear test method makes the results unusable
	Metric 18:	QSAR Models	Low	Algorithm is not publicly available to verify or reproduce the predictions
Overall Quality Determination		Uninformative		

* Related References: no references citedSource contains no data, only estimates.

Study Citation:	U.S. EPA, (2019). Proposed designation of 4,4'-(1-methylethylidene)bis [2,6-dibromophenol] (CASRN 79-94-7) as a high-priority substance for risk evaluation.
OECD Harmonized Template:	Miscellaneous
HERO ID:	6305896

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	none; experimental; experimental
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	Not Reported; Not Reported; Not Reported; Not Reported
Test Method Details, Test Condition Details, and Test Consistency Details	Conventional activated sludge and bioreactor systems.; Wastewater influent containing 2,2',6,6'-TBBPA concentration range of 10-145 ng/L.; Not Reported
System Type Design	Not Reported
Sampling Frequency and Sampling Details	Not Reported; Not Reported
Test Temperature	Not Reported
Results Details	Removal = 76–83%
Analytical Method and Analytical Details	Not Reported; Not Reported
Transformation Products, Statistics, and Kinetics	Not Reported; Not Reported; Not Reported
Reference Substance and Reference Substance Results	Not Reported; Not Reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	Information not provided in this secondary source but may be in the primary source.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	Not applicable for this type of study.
	Metric 4:	Test Substance Stability	Medium	Information not provided in this secondary source but may be in the primary source.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	Method was suitable.
	Metric 6:	Testing Conditions	Medium	Information not provided in this secondary source but may be in the primary source.
	Metric 7:	Testing Consistency	Medium	Information not provided in this secondary source but may be in the primary source.
	Metric 8:	System Type and Design	Medium	Information not provided in this secondary source but may be in the primary source.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable for this type of study

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Study Citation:	U.S. EPA, (2019). Proposed designation of 4,4'-(1-methylethylidene)bis [2,6-dibromophenol] (CASRN 79-94-7) as a high-priority substance for risk evaluation.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	6305896			
Domain		Metric	EVALUATION Rating	Comments
	Metric 10:	Sampling Methods	N/A	Not applicable for this type of study
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Information not provided in this secondary source but may be in the primary source.
	Metric 12:	Test Substance Purity	Medium	Information not provided in this secondary source but may be in the primary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Information not provided in this secondary source but may be in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable for this type of study
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Information not provided in this secondary source but may be in the primary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Information not provided in this secondary source but may be in the primary source.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Information not provided in this secondary source but may be in the primary source.
	Metric 18:	QSAR Models	N/A	Not applicable for this type of study
Overall Quality Determination			Medium	

* Related References: Cites: Islam, M. (2015) Investigation of biodegradation and environmental fate of tetrabromobisphenol A (TBBPA) in Guelph municipal wastewater. (Doctor of Philosophy). The University of Guelph, Ontario, Canada. (HERO ID 5348243)

Study Citation:	Velsicol Chem Corp, (1979). Photolysis of firemaster BP-4A.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5546497

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Tetrabromobisphenol A
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	Acetone; NR; NR; NR
Radiolabel, Source, State, Purity	tetrabromobisphenol A (phenyl-UL-14C); specific activity 9.32 mCi/mM; radiochemical purity >98%; synthesized by Midwest Research Institute, Kansas City, Mo; Midwest Research Institute, Kansas City, Mo; NR; radiochemical purity >98% Notes: 14C Firemaster (FM) BP-4A
Test Method Details, Test Condition Details, and Test Consistency Details	5 uL of acetone solution with 2.68 ug of test substance (30 ug for product isolation test) was applied to a silica gel TLC plate and the plate was exposed to short UV light; Duration: irradiation time: 0, 0.04, 0.21 1.0, 1.25, 2, 3, and 5 days; Two 15-watt lamps (254 nm); Not applicable
System Type Design	developed with solvent system(methylene chloride/n-propanol 95:5) and subjected to radioautography using Kodak no-screen X-ray film; one spot on the TLC plate was covered with foil to act as a control
Sampling Frequency and Sampling Details	Not reported; Not reported
Test Temperature	Not reported
Results Details	14C recovery of 46% after 5 days, with 30% remaining as TBBPA and the remainder presumably lost to volatilization
Analytical Method and Analytical Details	Liquid Scintillation; counting efficiency was between 70-85%
Transformation Products, Statistics, and Kinetics	8 degradations products identified by TLC analysis; Not reported; half-life during initial phase = 0.12 days and decreased after 0.25 days, second phase half-life = 1.1 days
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name
	Metric 2:	Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3:	Study Controls	Low	A control was not included.
	Metric 4:	Test Substance Stability	Medium	Storage and test substance preparation were not reported.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	Medium	Non-standard method; relevance to environmental photodegradation limited.
	Metric 6:	Testing Conditions	Low	Limited test condition details were reported.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across samples and study groups
	Metric 8:	System Type and Design	N/A	This metric is not applicable to this study type.
Domain 4: Test Organisms				

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Study Citation:	Velsicol Chem Corp, (1979). Photolysis of firemaster BP-4A.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5546497			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcomes of interest
	Metric 12:	Test Substance Purity	Medium	Limited details on sampling methods were reported
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Confounding variables and sources of uncertainty, such as loss due to volatilization, were not accounted for.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited information on analytical method were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Calculations were not described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this study type.
Overall Quality Determination		Medium		

Study Citation:	Verslycke, T. A., Vethaak, A. D., Arijs, K., Janssen, C. R. (2005). Flame retardants, surfactants and organotins in sediment and mysid shrimp of the Scheldt estuary (The Netherlands). Environmental Pollution 136(1):19-31.
OECD Harmonized Template:	Miscellaneous
HERO ID:	1417731

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; Di-2-ethylhexyl phthalate
Confidentiality, Type, Guideline	none; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Sampling locations: Schaar van Waarde, Overloop van Valkenisse, Bath; Mysid, water, and sediment samples were collected at each site; Not reported
System Type Design	Not reported
Sampling Frequency and Sampling Details	Not reported; Samples collected in November 2001
Test Temperature	Not reported
Results Details	Concentration of TBBPA (ng/g lipid weight): Mysid = <7.7, sediment = <0.1 at Schaar van Waarde; Mysid = 0.8, sediment = <0.1 Overloop van Valkenisse; Mysid = 0.9, sediment = <0.1 Bath
Analytical Method and Analytical Details	GC-NCI-MS; Details of method cited. All data were corrected for dry weight or lipid content in case of the flame retardant concentrations in mysids of the sample.
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance was identified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	Low	No details about the analytical standard were reported.
	Metric 4:	Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6:	Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 7:	Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				

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Study Citation:	Verslycke, T. A., Vethaak, A. D., Arijs, K., Janssen, C. R. (2005). Flame retardants, surfactants and organotins in sediment and mysid shrimp of the Scheldt estuary (The Netherlands). Environmental Pollution 136(1):19-31.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	1417731			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	No quantitative partitioning factors were reported.
	Metric 12:	Test Substance Purity	Medium	Some details were limited; however, this did not limit the interpretation of the results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some details were lacking, but this was not likely to have affected interpretation of the results reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Wang, S., Wu, X., Guo, R., Wang, Q., Guo, H., Corvini, P. F. X., Sun, F., Ji, R. (2021). Long-term field study on fate, transformation, and vertical transport of tetrabromobisphenol A in soil–plant systems. <i>Environmental Science & Technology</i> 55(8):4607-4615.
OECD Harmonized Template:	Miscellaneous
HERO ID:	10113630

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-97-4; TBBPA
Confidentiality, Type, Guideline	no; experimental; experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich (Shanghai, China); NR; 97%
Test Method Details, Test Condition Details, and Test Consistency Details	Vertical Movement of TBBPA in the soil. Experimental field in China planted with seeds of rice (<i>Oryza sativa</i>), wheat (<i>Themeda australis</i>), and common reed (<i>Phragmites australis</i>) obtained from Nanjing Agriculture University, China. June 2012 to May 2013 (~365 days).; haplic stagnic anthrosol soil pH = 7.4 (0-20 cm), 6.6 (20-40 cm), 6.7 (40-80cm); CEC = 46.2, 45.9, 42.3, and 47.5 cmol (+)/kg at 0-20 cm, 20-40 cm, 40-60 cm, and 60-80 cm, respectively; surface soil organic carbon (SOC) content = 5.5% (60-80 cm) - 6.7% (0-20 cm); upper (0-20 cm) silt clay soil, contained 7.0% sand, 51.1% silt, and 41.9% clay; lower soil (20-40 cm to 60-80 cm) contained 11.3-20.6% sand, 42.7-47.7% silt, and 36.7-41.0% clay; annual mean precipitation 1106.5 mm; Groundwater level ranged from ~20 cm deep in the rainy season (~15 cm from May to October) to ~100 cm deep during the dry season.; initial concentrations of TBBPA in the topsoil of unplanted, rice–wheat rotationally planted, and reed-planted plots (three plots each) were 99.7 ± 3.3 , 96.5 ± 5.6 , and 96.6 ± 2.7 mg/kg, respectively
System Type Design	field study
Sampling Frequency and Sampling Details	sampling time of each treatments was according to the growth period of rice/wheat; Most TBBPA remained in the surface soil (0–20 cm), while obvious leaching occurred in lower soil layers; TBBPA concentration in the 20–40 cm soil layer of the unplanted field was 19.5, 11.9, 10.3, and 5.8 mg/kg on day 4, 36, 61, and 92, respectively. In the unplanted field on day 4, 36, and 61, TBBPA was detected in trace amounts in the 40–60 cm soil layer (0.46, 0.44, and 0.67 mg/kg, respectively) and in the 60–80 cm soil layer (0.55, 0.22, and 0.63 mg/kg, respectively). TBBPA concentrations in deeper soil layers during the flooded season were attributed to a wash-out effect and a higher sand content in the 20–60 cm soil profile.
Test Temperature	ambient
Results Details	TBBPA was not detected in the deeper soil layers (20–40, 40–60, and 60–80 cm) of the three treatments after 130 days
Analytical Method and Analytical Details	HPLC for soil analysis of TBBPA; LQD of TBBPA was 500 ng/g; soil extraction efficiency ($96.9 \pm 2.7\%$)
Transformation Products, Statistics, and Kinetics	Tribromobisphenol A (triBPA) observed on sampling days 61, 220, and 342 in unplanted, rice–wheat planted, and reed-planted soils; Bisphenol A (BPA) observed on sampling days 342 in unplanted soils, day 220 in rice-wheat planted soils, and days 220 and 342 in reed planted soils; Tetrabromobisphenol A dimethylether (diMeO-TBBPA) observed on sampling days 342 in unplanted and rice-wheat planted soils, and days 220 and 342 in reed planted soils; 1,3-Dibromo-5-isopropyl-2-methoxybenzene observed on sampling days 61, 220, and 342 in unplanted, rice–wheat planted, and reed-planted soils; 2,6-Dibromo-4-(2-propyl)-phenol observed on sampling days 220 in unplanted soils, day 342 in rice-wheat planted soils, and days 220 and 342 in reed planted soils.; NR; Not Reported
Reference Substance and Reference Substance Results	NR; NR

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High The source and purity of the test substance was reported.

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Study Citation:	Wang, S., Wu, X., Guo, R., Wang, Q., Guo, H., Corvini, P. F. X., Sun, F., Ji, R. (2021). Long-term field study on fate, transformation, and vertical transport of tetrabromobisphenol A in soil–plant systems. Environmental Science & Technology 55(8):4607-4615.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	10113630			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	Equilibrium assumed in field studies.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Date reporting was appropriate for the study.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to the study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination**High**

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OECD Harmonized Template:	Miscellaneous
HERO ID:	10113630

		EVALUATION	
Domain	Metric	Rating	Comments

Study Citation:	Yang, S., Wang, S., Liu, H., Yan, Z. (2012). Tetrabromobisphenol A: tissue distribution in fish, and seasonal variation in water and sediment of Lake Chaohu, China. Environmental Science and Pollution Research 19(9):4090-4096.
OECD Harmonized Template:	Miscellaneous
HERO ID:	1447752

EXTRACTION	
Parameter	Data
CASRN and Test Material	79-94-7; TBBPA
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	13C12-TBBPA (99%, 50 g/mL in methanol) from Cambridge Isotope Laboratories Andover, MA, USA; Sigma-Aldrich Inc., USA; NR; environmental analytical grade Notes: TBBPA
Test Method Details, Test Condition Details, and Test Consistency Details	TBBPA was measured in lake water, three-layer sediment sample, and different organs and tissues from C. carpio, S. asotus, C. alburnus and C. auratus; Lake Chaohu water sampled in July, September, and November 2008; Sediments sampled in March, July, September, and November 2008 and May 2009.; Sediment samples were collected from all ten sites, water samples from seven sites, and all fish samples were captured from the center part of the lake.
System Type Design	Samples of water, sediment, and fish collected from Lake Chaohu in Anhui Province in eastern China
Sampling Frequency and Sampling Details	Water samples collected July, September, November 2008; sediment samples collected March, July, September, November 2008 and May 2009; Culter alburnus, Cyprinus carpio, Carassius auratus, and Silurus asotus captured near site no. 2 in May 2009; 2 liters of lake water was sampled at each site; sediment cores were sampled by a Beaker sampler
Test Temperature	average surface water temperature of Lake Chaohu was 29.5°C, pH ranged from 9 to 11
Results Details	distribution coefficient among water, fish, and sediment = 1:28:117
Analytical Method and Analytical Details	HPLC; LC-MS/MS; MDL 20 ng/mL; MQL 40 ng/L water, 60 ng/g sediment and fish; RSD less than 10.0%; mean recoveries 98%
Transformation Products, Statistics, and Kinetics	Not reported; one-way analysis of variance; a value of P<0.05 was considered significant; Pearson's or Spearman's correlation coefficients were computed for determining associations among variables; software SPSS 11.0; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2:	Test Substance Purity	High	The test substance was identified by analytical means.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	Controls were not specified.
	Metric 4:	Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6:	Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 7:	Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Yang, S., Wang, S., Liu, H., Yan, Z. (2012). Tetrabromobisphenol A: tissue distribution in fish, and seasonal variation in water and sediment of Lake Chaohu, China. Environmental Science and Pollution Research 19(9):4090-4096.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	1447752			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Zhou, X., Guo, J., Lin, K., Huang, K., Deng, J. (2013). Leaching characteristics of heavy metals and brominated flame retardants from waste printed circuit boards. Journal of Hazardous Materials 246-247:96-102.
OECD Harmonized Template:	Miscellaneous
HERO ID:	1789485

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not Reported; TBBPA
Confidentiality, Type, Guideline	no; experimental; experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	3C12-TBBPA - internal analytical standard; NR; NR; NR Notes: TBBPA as a component of WPCBs: domestically generated and internationally imported waste printed circuit boards
Test Method Details, Test Condition Details, and Test Consistency Details	Leaching characteristics evaluated in raw and treated landfill leachates; leachates collected from the Laogang landfill site in Shanghai, China; 40:1 liquid-to-solid ratio used for tests; potential maximum leaching concentrations were calculated assuming first-order exponential decay according to $C = C_{max} \times [1 - \exp(-kt)]$, where C_{max} represents the potential maximum leaching concentrations of TBBPA in the extracts (ug/L), k = rate coefficient (d-1), and t = extraction period.; Not Reported
System Type Design	amber glass bottles
Sampling Frequency and Sampling Details	regular sampling over 90 day test; solvent extractable TBBPA in raw leachate (n=5): 15.41 ± 1.25 ug/L and treated leachate (n=5): <4.50 ug/L, and 3 WPCB samples: 127 ± 6 , 108 ± 9 , and 101 ± 3 mg/kg.
Test Temperature	$25 \pm 2^\circ\text{C}$
Results Details	raw leachates: $C_{max} = 12.27$ ug/L, $k = 0.11$ d-1 (r-squared: 0.9709); treated leachates: $C_{max} = 3.57$ ug/L, $k = 0.068$ d-1 (r-squared: 0.9965)
Analytical Method and Analytical Details	soxhlet extraction, surrogate and internal standards, GC-MS using negative ionization in selected ion monitoring mode; LOD 4.50 ng/g; recoveries ranged from 83.10-106.32%
Transformation Products, Statistics, and Kinetics	NR; TBBPA calculated leaching rates (R) from WPCBs with different specific surface areas in raw and treated leachate TBBPA 1.00% in raw landfill leachate tests and 0.01 and 0.45% in treated landfill leachate tests.; TBBPA calculated leaching rates (R) from WPCBs with different specific surface areas were 1.00% in raw landfill leachate tests and 0.45% in treated landfill leachate tests.
Reference Substance and Reference Substance Results	NR; NR

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	The test substance source was not reported; however, analytical methods with internal standards were used.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				

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Study Citation:	Zhou, X., Guo, J., Lin, K., Huang, K., Deng, J. (2013). Leaching characteristics of heavy metals and brominated flame retardants from waste printed circuit boards. Journal of Hazardous Materials 246-247:96-102.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	1789485			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Low	Test conditions for the study method were not fully reported and leachate characteristics were not provided; a citation for the method was provided.
	Metric 7:	Testing Consistency	Low	Details regarding this metric for the study groups were not reported.
	Metric 8:	System Type and Design	High	Equilibrium was reported as established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of uncertainty in the measurements were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were not fully reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Calculations were clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable but limited by the lack of matrix characterization.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination		High		

List of Abbreviations and Acronyms for Data Quality Evaluation and Extraction Tables

Term	Definition
BAF	Biaccumulation Factor
BCF	Bioconcentration Factor
BMF	Biomagnification Factor
BSAF	Biota-sediment Accumulation Factor
C	Concentration
CASRN	Chemical Abstract Service registry number
DOC	Dissolved Organic Carbon
dw	Dry weight
DW	Drinking Water
DWTP	Drinking Water Treatment Plant
EPA	Environmental Protection Agency
ESI	Electrospray Ionisation
FID	Flame Ionisation Detector
FPD	Flame Photometric Detector
GC	Gas Chromatography
g/L	Grams per Liter
HLC	Henry's Law Constant
HPLC	High-performance liquid chromatography
ISO	International Organization for Standardization
K _{oa}	Octanol-Air partition coefficient
K _{oc}	Organic carbon-water partition coefficient
K _{ow}	Octanol-Water partition coefficient
L/d	Liters per day
LOD	Limit of Detection
LOQ	Limit of Quantification
lw	Lipid weight
M	Molarity (mol/L = moles per Liter)
mL/min	Milliliters per minute
mM	Millimolar
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
mg/m ³	Milligrams per cubic meter
MRL	Method Reporting Limit
MS	Mass Spectrometry
n	Sample Size
N/A	Not applicable
ND	Non-Detection
ng/L	Nanograms per Liter

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Term	Definition
nm	Nanometers
NR	Not Reported
OECD	Organisation for Economic Co-operation and Development
· OH	Hydroxyl radical
OPE	Organophosphate Ester
pg/L	Picograms per Liter
ppm	parts per million
QSAR	Quantitative Structure Activity Relationship
RSD	Relative Standard Deviation
SI	Supplemental Information
SIM	Selected Ion Monitoring
SPE	Solid Phase Extraction
STP	Sewage Treatment Plant
TMF	Trophic Magnification Factor
TOC	Total Organic Carbon
TOF	Time of Flight
µg/L or µg/mL	micrograms per liter or per milliliter
UPLC	Ultra-performance liquid chromatography
US or USA	United States of America
UV (UV-Vis)	Ultra Violet (Visible)
ww	Wet Weight
WWTP	Wastewater Treatment Plant