TSCA Section 5(a)(3) Determination for Premanufacture Notices (PMNs) P-20-0048 and P-20-0049

Numbers: P-20-0048 and P-20-0049
TSCA Section 5(a)(3) Determination: The chemical substances are not likely to present an unreasonable risk (5(a)(3)(C))

Chemical Names:
Generic:
P-20-0048: Reaction products of alkyl-terminated alkylaluminoxanes and dihalogeno(alkylcyclopentadienyl)(tetraalkylcyclopentadienyl)transition metal coordination compound
P-20-0049: Reaction products of alkyl-aluminoxanes and bis(alkylcyclodialkylene)dihalogenozirconium

Conditions of Use (intended, known, or reasonably foreseen)[1]:
Intended conditions of use (generic): Manufacture for use as and use as catalysts, consistent with the manufacturing, processing, use, distribution, and disposal information described in the PMN.
Known conditions of use: Applying such factors as described in footnote 1, EPA evaluated whether there are known conditions of use and found none.
Reasonably foreseen conditions of use: Applying such factors as described in footnote 1, EPA evaluated whether there are reasonably foreseen conditions of use and found none.

Summary: The chemical substances are not likely to present an unreasonable risk of injury to health or the environment, without consideration of costs or other nonrisk factors, including an unreasonable risk to a potentially exposed or susceptible subpopulation identified as relevant by the Administrator under the conditions of use, based on the risk assessment presented below. EPA estimated that the anions and the cations could have limited persistence and low potential for bioaccumulation, such that repeated exposures are not expected to cause food-chain effects

[1] Under TSCA § 3(4), the term "conditions of use" means "the circumstances, as determined by the Administrator, under which a chemical substance is intended, known, or reasonably foreseen to be manufactured, processed, distributed in commerce, used, or disposed of." In general, EPA considers the intended conditions of use of a new chemical substance to be those identified in the section 5(a) notification. Known conditions of use include activities within the United States that result from manufacture that is exempt from PMN submission requirements. Reasonably foreseen conditions of use are future circumstances, distinct from known or intended conditions of use, under which the Administrator expects the chemical substance to be manufactured, processed, distributed, used, or disposed of. The identification of "reasonably foreseen" conditions of use will necessarily be a case-by-case determination and will be highly fact-specific. Reasonably foreseen conditions of use will not be based on hypotheticals or conjecture. EPA's identification of conditions of use includes the expectation of compliance with federal and state laws, such as worker protection standards or disposal restrictions, unless case-specific facts indicate otherwise. Accordingly, EPA will apply its professional judgment, experience, and discretion when considering such factors as evidence of current use of the new chemical substance outside the United States, evidence that the PMN substance is sufficiently likely to be used for the same purposes as existing chemical substances that are structurally analogous to the new chemical substance, and conditions of use identified in an initial PMN submission that the submitter omits in a revised PMN. The sources EPA uses to identify reasonably foreseen conditions of use include searches of internal confidential EPA PMN databases (containing use information on analogue chemicals), other U.S. government public sources, the National Library of Medicine's Hazardous Substances Data Bank (HSDB), the Chemical Abstract Service STN Platform, REACH Dossiers, technical encyclopedias (e.g., Kirk-Othmer and Ullmann), and Internet searches.

via accumulation in exposed organisms. Although EPA estimated that the hydrolysis products, [claimed CBI] and aluminum oxides, could be very persistent, the substances do not bioaccumulate by lipophilic partitioning and there is low concern that they will accumulate in organisms by other mechanisms; thus, repeated exposures are not expected to cause food-chain effects via accumulation in exposed organisms. Based on EPA's TSCA New Chemicals Program Chemical Categories for Aluminum Compounds and [claimed CBI] Compounds,[2] test data on analogous chemical substances, and other structural information, EPA estimates that the chemical substances have high environmental hazard and potential for the following human health hazards: acute toxicity, skin corrosion, skin irritation, serious eye damage, reproductive toxicity, and specific target organ toxicity. EPA concludes that the new chemical substances are not likely to present an unreasonable risk under the conditions of use.

Fate: Environmental fate is the determination of which environmental compartment(s) a chemical moves to, the expected residence time in the environmental compartment(s) and removal and degradation processes. Environmental fate is an important factor in determining exposure and thus in determining whether a chemical may present an unreasonable risk. EPA estimated physical/chemical and fate properties of the anions and the cations using data for analogue(s) (highly reactive chemicals), and of the hydrolysis products, [claimed CBI] and aluminum oxides, using data for analogue(s) (metal oxides). In wastewater treatment, the anions and the cations are expected to be removed with an efficiency of 90% to 99% due to rapid hydrolysis; the hydrolysis products, [claimed CBI] and aluminum oxides, are expected to be removed with an efficiency of 90% due to sorption. Removal of the anions, the cations, and the hydrolysis products, [claimed CBI] and aluminum oxides, by biodegradation is negligible. Sorption of the anions and the cations to sludge is expected to be low; sorption of the hydrolysis products, [claimed CBI] and aluminum oxides, to sludge is expected to be strong and to soil and sediment is expected to be very strong. Migration of the anions and cations to groundwater is expected to be negligible due to hydrolysis, and migration of the hydrolysis products, [claimed CBI] and aluminum oxides, is expected to be negligible due to very strong sorption to soil and sediment. Due to low estimated vapor pressure and Henry's law constant, the anions, the cations, and the hydrolysis products, [claimed CBI] and aluminum oxides, are expected to undergo negligible volatilization to air. Overall, these estimates indicate that the anions, the cations, and the hydrolysis products, [claimed CBI] and aluminum oxides, have low potential to volatilize to air and low potential to migrate to groundwater.

Persistence[3]: Persistence is relevant to whether a new chemical substance is likely to present an unreasonable risk because chemicals that are not degraded in the environment at rates that prevent substantial buildup in the environment, and thus increase potential for exposure, may present a risk if the substance presents a hazard to human health or the environment. EPA

[2] TSCA New Chemicals Program (NCP) Chemical Categories. https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/chemical-categories-used-review-new.

[3] Persistence: A chemical substance is considered to have limited persistence if it has a half-life in water, soil or sediment of less than 2 months or if there are equivalent or analogous data. A chemical substance is considered to be persistent if it has a half-life in water, soil or sediments of greater than 2 months but less than or equal to 6 months or if there are equivalent or analogous data. A chemical substance is considered to be very persistent if it has a half-life in water, soil or sediments of greater than 6 months or if there are equivalent or analogous data. (64 FR 60194; November 4, 1999)

estimated degradation half-lives of the anions and the cations using data for analogue(s) (highly reactive chemicals), and of the hydrolysis products, [claimed CBI] and aluminum oxides, using data for analogues (metal oxides). EPA estimated that the anions' and the cations' hydrolysis half-life is < minutes and that the hydrolysis products, [claimed CBI] and aluminum oxides, have aerobic and anaerobic biodegradation half-lives of > 6 months. These estimates indicate that the anions and the cations may have limited persistence in aerobic environments (e.g., surface water) and anaerobic environments (e.g., sediments) due to hydrolysis. Further, these estimates indicate that the hydrolysis products, [claimed CBI] and aluminum oxides, may be very persistent in aerobic and anaerobic environments.

Bioaccumulation[4]: Bioaccumulation is relevant to whether a new chemical substance is likely to present an unreasonable risk because substances that bioaccumulate in aquatic and/or terrestrial species pose the potential for elevated exposures to humans and other organisms via food chains. EPA estimated the bioaccumulation potential for the anions and the cations using data for analogue(s) (highly reactive chemicals) and of the hydrolysis products, [claimed CBI] and aluminum oxides, using data for analogues (metal oxides). EPA estimated that the anions and the cations have low bioaccumulation potential based on rapid hydrolysis. Further, EPA estimated that the hydrolysis products, [claimed CBI] and aluminum oxides, do not bioaccumulate by lipophilic partitioning, and there is low concern they may accumulate in organisms by other mechanisms. EPA estimated that the anions and the cations could have limited persistence and low potential for bioaccumulation, such that repeated exposures are not expected to cause food-chain effects via accumulation in exposed organisms. Although EPA estimated that the hydrolysis products, [claimed CBI] and aluminum oxides, could be very persistent, the substances do not bioaccumulate by lipophilic partitioning, and there is low concern that they will accumulate in organisms by other mechanisms; thus, repeated exposures are not expected to cause food-chain effects via accumulation in exposed organisms.

Human Health Hazard[5]: Human health hazard is relevant to whether a new chemical substance

[4] Bioaccumulation: A chemical substance is considered to have a low potential for bioaccumulation if there are bioconcentration factors (BCF) or bioaccumulation factors (BAF) of less than 1,000 or if there are equivalent or analogous data. A chemical substance is considered to be bioaccumulative if there are BCFs or BAFs of 1,000 or greater and less than or equal to 5,000 or there are equivalent or analogous data. A chemical substance is considered to be very bioaccumulative if there are BCFs or BAFs of 5,000 or greater or if there are equivalent or analogous data. (64 FR 60194; November 4 1999)

[5] A chemical substance is considered to have low human health hazard if effects are observed in animal studies with a No Observed Adverse Effect Level (NOAEL) equal to or greater than 1,000 mg/kg/day or if there are equivalent data on analogous chemical substances; a chemical substance is considered to have moderate human health hazard if effects are observed in animal studies with a NOAEL less than 1,000 mg/kg/day or if there are equivalent data on analogous chemical substances; a chemical substance is considered to have high human health hazard if there is evidence of adverse effects in humans or conclusive evidence of severe effects in animal studies with a NOAEL of less than or equal to 10 mg/kg/day or if there are equivalent data on analogous chemical substances. EPA may also use Benchmark Dose Levels (BMDL) derived from benchmark dose (BMD) modeling as points of departure for toxic effects. See https://www.epa.gov/bmds/what-benchmark-dose-software-bmds. Using this approach, a BMDL is associated with a benchmark response, for example a 5 or 10 % incidence of effect. The aforementioned characterizations of hazard (low, medium, high) would also apply to BMDLs. In the absence of animal data on a chemical or analogous chemical substance, EPA may use other data or information such as from in vitro assays, chemical categories (e.g., Organization for Economic Co-operation and Development, 2014 Guidance on Grouping of Chemicals, Second Edition. ENV/JM/MONO(2014)4. Series on Testing & Assessment No. 194. Environment

is likely to present an unreasonable risk because the significance of the risk is dependent upon both the hazard (or toxicity) of the chemical substance and the extent of exposure to the substance. EPA estimated the human health hazard of these chemical substances based on their estimated physical/chemical properties, by comparing them to structurally analogous chemical substances for which there is information on human health hazard, and other structural information. Absorption of the new chemical substance polymer is expected to be nil all routes if unreacted. Absorption of the ligand complex is expected to be poor all routes. With reaction, absorption of the metal oxide products are expected to be nil to poor all routes. For the new chemical substance, EPA identified hazards for lung effects, if respirable, poorly soluble particulates are inhaled, based on insoluble metal oxides reaction products and skin sensitization, acute toxicity, developmental effects, systemic effects, neurotoxicity, and corrosion to skin, eyes, respiratory tract and lung toxicity, based on structural alerts, as hazards to the extent that the metal components are bioavailable. For the solvent present as a residual [claimed CBI], EPA identified neurotoxicity and kidney toxicity as hazards. EPA identified a Lowest Observed Adverse Effect Level (LOAEL) of 4 mg/kg-bw/day and a No Observed Adverse Effect Concentration (NOAEC) of 0.97 mg/m^3 based on systemic effects, which were protective for acute toxicity, neurotoxicity, kidney effects, developmental effects, and lung effects from the respirable, poorly soluble particulates of the metal oxides. The selected values were used to derive exposure route- and population-specific points of departure for quantitative risk assessment. EPA qualitatively evaluated irritation/corrosion and sensitization effects.

Environmental Hazard[6]: Environmental hazard is relevant to whether a new chemical substance is likely to present unreasonable risk because the significance of the risk is dependent upon both the hazard (or toxicity) of the chemical substance and the extent of exposure to the substance. EPA estimated environmental hazard of these new chemical substances using hazard data for an analogous chemical (standard toxicity profile of aluminum compounds [claimed CBI]) and using the Ecological Structure Activity Relationships (ECOSAR) Predictive Model (https://www.epa.gov/tsca-screening-tools/ecological-structure-activity-relationships-ecosar-predictive-model); specifically the QSAR for [claimed CBI] compounds. These substances fall within the TSCA New Chemicals Categories of Aluminum Compounds and [claimed CBI] Compounds. For the P-20-0048 substance, acute toxicity values estimated for fish, aquatic invertebrates, and algae are 28.2 mg/L, 14.6 mg/L, and 0.24 mg/L, respectively. Chronic toxicity values estimated for fish, aquatic invertebrates, and algae are 0.061 mg/L, 0.061 mg/L, and 0.26 mg/L, respectively. For the P-20-0049 substance, acute toxicity values estimated for fish, aquatic

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Directorate, Organization for Economic Co-operation and Development, Paris, France. (http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2014)4&doclanguage=en)), structure-activity relationships, and/or structural alerts to support characterizing human health hazards.

[6] A chemical substance is considered to have low ecotoxicity hazard if the Fish, Daphnid and Algae LC50 values are greater than 100 mg/L, or if the Fish and Daphnid chronic values (ChVs) are greater than 10.0 mg/L, or there are not effects at saturation (occurs when water solubility of a chemical substance is lower than an effect concentration), or the log Kow value exceeds QSAR cut-offs. A chemical substance is considered to have moderate ecotoxicity hazard if the lowest of the Fish, Daphnid or Algae LC50s is greater than 1 mg/L and less than 100 mg/L, or where the Fish or Daphnid ChVs are greater than 0.1 mg/L and less than 10.0 mg/L. A chemical substance is considered to have high ecotoxicity hazard, or if either the Fish, Daphnid or Algae LC50s are less than 1 mg/L, or any Fish or Daphnid ChVs is less than 0.1 mg/L (Sustainable Futures https://www.epa.gov/sustainable-futures/sustainable-futures-p2-framework-manual).

invertebrates, and algae are 28.2 mg/L, 14.7 mg/L, and 1.3 mg/L, respectively. Chronic toxicity values estimated for fish, aquatic invertebrates, and algae are 0.027 mg/L, 0.040 mg/L, and 0.26 mg/L, respectively. These toxicity values indicate that the new chemical substances are expected to have high environmental hazard. For the P-20-0048 substance, application of assessment factors of 4 and 10 to acute and chronic toxicity values, respectively, results in acute and chronic concentrations of concern of 0.060 mg/L (60 ppb) and 0.006 mg/L (6 ppb), respectively. For the P-20-0049, application of assessment factors of 4 and 10 to acute and chronic toxicity values, respectively, results in acute and chronic concentrations of concern of 0.325 mg/L (325 ppb) and 0.003 mg/L (3 ppb), respectively.

Exposure: The exposure to a new chemical substance is potentially relevant to whether a new chemical substance is likely to present unreasonable risks because the significance of the risk is dependent upon both the hazard (or toxicity) of the chemical substance and the extent of exposure to the substance.

EPA estimates occupational exposure and environmental release of the new chemical substance under the intended conditions of use described in the PMN using ChemSTEER (Chemical Screening Tool for Exposures and Environmental Releases; https://www.epa.gov/tsca-screening-tools/chemsteer-chemical-screening-tool-exposures-and-environmental-releases). EPA uses EFAST (the Exposure and Fate Assessment Screening Tool; https://www.epa.gov/tsca-screening-tools/e-fast-exposure-and-fate-assessment-screening-tool-version-2014) to estimate general population, consumer, and environmental exposures.

EPA considers workers to be a potentially exposed or susceptible subpopulation (PESS) on the basis of greater exposure potential compared to the general population. EPA also considers PESS in conducting general population drinking water exposures by evaluating risks associated with water intake rates for multiple age groups, ranging from infants to adults. EPA considers consumers of specific products to be a potentially exposed or susceptible subpopulation on the basis of greater exposure potential compared to the general population who do not use specific products.

For this assessment, EPA assessed worker exposures via the dermal contact; inhalation exposure is not expected. Releases to water, air, and landfill were estimated. Exposure to the general population was assessed via drinking water. Exposure to the general population was not assessed via fish ingestion because bioaccumulation potential was evaluated to be low, via groundwater impacted by landfill leachate and stack air inhalation, because exposures were expected to be negligible (below modeling thresholds), or via fugitive air inhalation because no releases are expected. Consumer exposures were not assessed because consumer uses were not identified as conditions of use.

Risk Characterization: EPA applies a margin of exposure approach to calculate potential human health risks of new chemicals. A benchmark (acceptable) margin of exposure (MOE) is derived by applying uncertainty factors (UF) for the following types of extrapolations: intra-species extrapolation (UF_H = 10 to account for variation in sensitivity among the human population), inter-species extrapolation (UF_A = 10 to account for extrapolating from experimental animals to humans) and LOAEL-to-NOAEL extrapolation (UF_L = 10 to account

for using a LOAEL when a NOAEL is not available). Hence, in the New Chemicals Program, a benchmark MOE is typically 100 and 1,000 when NOAELs and LOAELs, respectively, are used to identify hazard. When allometric scaling or pharmacokinetic modeling is used to derive an effect level, the UF_H may be reduced to 3, for a benchmark MOE of 30. The benchmark MOE is used to compare to the MOE calculated by comparing the toxicity NOAEL or LOAEL to the estimated exposure concentrations. When the calculated MOE is equal to or exceeds the benchmark MOE, the new chemical substance is not likely to present an unreasonable risk. EPA assesses risks to workers considering engineering controls described in the PMN but in the absence of personal protective equipment (PPE) such as gloves and respirators. If risks are preliminarily identified, EPA then considers whether the risks would be mitigated by the use of PPE (e.g., impervious gloves, respirator).

Risks to human health for the new chemical substances were evaluated using the route-specific effect level (i.e., LOAEL) described above. Risks were identified for workers for systemic effects via dermal exposure based on quantitative hazard data for an analogue (MOE = 351; Benchmark MOE = 1,000). Risks were not evaluated for workers via inhalation exposure because exposures are expected to be negligible. Irritation/corrosion and sensitization hazards to workers via dermal contact were identified based on the presence of [claimed CBI], reactivity of the new chemical substances with water and air, and analogue data. Risks for these endpoints were not quantified due to a lack of dose-response for these hazards. However, exposures can be mitigated by the use of appropriate personal protective equipment (PPE), including impervious gloves, eye protection, and protective clothing. EPA expects that employers will require and that workers will use appropriate PPE consistent with the Safety Data Sheet (SDS) prepared by the submitter, in a manner adequate to protect them.

Risks were not identified for the general population for systemic effects via drinking water based on quantitative hazard data for an analogue ($MOE_{P\text{-}20\text{-}0048\ Adult\ Drinking\ Water\ (ADW)}$ = 612,557; $MOE_{P\text{-}20\text{-}0048\ Infant\ Drinking\ Water\ (IDW)}$ = 145,847; $MOE_{P\text{-}20\text{-}0049\ ADW}$ > 1 million; $MOE_{P\text{-}20\text{-}0049\ IDW}$ = 242,954; Benchmark MOE = 1,000). Risks were not evaluated for the general population via fish ingestion because bioaccumulation potential was evaluated to be low, via groundwater impacted by landfill leaching and stack air inhalation, because exposures were expected to be negligible (below modeling thresholds), or via fugitive air inhalation because release are not expected. Irritation/corrosion and sensitization hazards to the general population are not expected via drinking water due to dilution of the chemical substance in the media. Risks to consumers were not evaluated because consumer uses were not identified as conditions of use.

Risks to the environment were evaluated by comparing estimated surface water concentrations with the acute and chronic concentrations of concern. Risks to the environment were not identified due to releases to water that did not exceed the acute COC or the chronic COC.

Because worker exposures can be controlled by PPE, no unreasonable risks to the general population or environment were identified, and there are no expected consumer exposures, EPA has determined that the new chemical substances are not likely to present unreasonable risk to human health or the environment under the conditions of use.

10/27/2020
Date:

/s/
Madison H. Le, Director
New Chemicals Division
Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency