

Technical Factsheet on: ETHYLENE DIBROMIDE (EDB)

[List of Contaminants](#)

As part of the Drinking Water and Health pages, this fact sheet is part of a larger publication:
National Primary Drinking Water Regulations

Drinking Water Standards

MCLG: zero mg/l

MCL: 0.00005 mg/l

HAL(child): 1 day: 0.008 mg/l; 10-day: 0.008 mg/l

Health Effects Summary

Acute: EPA has found ethylene dibromide (EDB) to potentially cause a variety of acute health effects, including damage to the liver, stomach, and adrenal cortex along with significant reproductive system toxicity, particularly the testes.

Drinking water levels which are considered "safe" for short-term exposures: For a 10-kg (22 lb.) child consuming 1 liter of water per day, a one-day exposure of 0.008 mg/L or a ten-day exposure to 0.008 mg/L.

Chronic: A lifetime exposure to EDB at levels above the MCL has the potential to damage the respiratory system, nervous system, liver, heart, and kidneys.

Cancer: There is some evidence that EDB may have the potential to cause cancer from a lifetime exposure at levels above the MCL.

Usage Patterns

Ethylene dibromide is mainly used (83% of all use) as a scavenger for lead in anti-knock gasoline mixtures, particularly in aviation fuel. Other uses (17%) include: solvent for resins, gums, and waxes; in waterproofing preparations; as a chemical intermediate in the synthesis of dyes and pharmaceuticals; and as a fumigant, insecticide, nematicide for grains and fruit.

Release Patterns

Monitoring of ethylene bromide in ocean water and ocean air suggests that ethylene bromide may be formed naturally in the ocean as a result of macro algae growth.

Artificial releases include: evaporative losses associated with the use, storage, and transport of leaded gasoline in which it is used as a lead scavenger; spills and leaking storage tanks for leaded gasoline; exhaust from vehicles using leaded gasoline; emissions from its former use as a fumigant for soil, grain, fruits, vegetables, tobacco, and seed uses which have recently been restricted or discontinued; wastewater and emissions from its use as a solvent for resins, gums, and waxes and; as a chemical intermediate in the synthesis of dyes and pharmaceuticals; residue in fumigated food.

From 1987 to 1993, according to the Toxics Release Inventory EDB releases to land totalled 2,670 lbs., and water releases totalled 2,554 lbs. These releases were primarily from facilities classified as petroleum refineries. The largest of these releases occurred in California and Missouri.

Environmental Fate

When spilled on land or applied to land during soil fumigation, ethylene dibromide will exhibit low to moderate adsorption and has been found in groundwater. Measured KOC values range from 14 to 160. However, in typical fields where gaseous ethylene dibromide has been used as a soil fumigant, 99% of the ethylene dibromide used in fumigation is in the sorbed state.

Persistence can vary greatly from soil to soil. In one laboratory screening study using 100 soils, half-lives ranging from 1.5 to 18 weeks were determined. In one field, ethylene bromide was detected in soil 19 years after its last known application; the long persistence was the result of entrapment in intraparticle micropores of the soil. Low Koc values and detection in various ground waters indicate that ethylene bromide will leach in soil. The relatively high vapor pressure (11.2 mm Hg) indicates evaporation will occur from soil surfaces.

In the atmosphere, ethylene dibromide will degrade by reaction with photochemically produced hydroxyl radicals (half life 32 days).

The primary removal process for ethylene bromide in surface water is volatilization. Under normal conditions, the volatilization half-life from a typical river and lake are about one day and 5 days, respectively.

In ground waters (such as aquifers) where volatilization does not occur, ethylene bromide can be degraded by biodegradation and hydrolysis. Uncatalyzed hydrolysis is slow, with half-lives reported of 6 yr at 25 deg C, to 13.2 yr at pH7 and 20 deg C. But hydrolysis catalyzed by the presence of various natural substances (such as HS ion) may be competitive with biodegradation (half-life of 1-2 months). It reacts with photochemically produced hydroxyl radicals with a half life of 32 days or a 2.2% loss per sunlit day. Ethylene bromide does not directly photolyze when exposed to uv light between 300 and 400 nm.

Biodegradation can be a primary degradation process in soil. A review of available biodegradation data pertaining to ethylene bromide concluded that ethylene bromide is biotransformed fairly readily in the environment; lifetimes can be as short as several days in surface soils and as long as many months in aquifer materials.

The measured log BCF in fish is < 1 indicating that ethylene dibromide does not bioconcentrate in fish.

Chemical/ Physical Properties

CAS Number: 106-93-4

Color/ Form/Odor: Colorless, heavy liquid; mildly sweet chloroform-like odor.

M.P.: 9.8 C B.P.: 131-132 C

Vapor Pressure: 11.2 mm Hg

Density/Spec. Grav.: 2.2 g/ml

Octanol/Water Partition (Kow): Log Kow = 135

Solubilities: 40 g/L of water at 25 C

Soil sorption coefficient (Koc): low to moderate; Koc = 14 to 160

Odor/Taste Thresholds: N/A

Bioconcentration Factor: <1 in fish

Henry's Law Coefficient: N/A

Trade Names/Synonyms: 1,2-Dibromoethane; EDB; Glycol dibromide; Bromofume; Dowfume W 85; Aadibroom; Iscobrome-D; Nefis; Pestmaster; EDB-85; Soilbrom; Soilfume; Kopfume

Other Regulatory Information

Monitoring For Ground/Surface Water Sources:

Initial Frequency- 4 quarterly samples every 3 years
Repeat Frequency- If no detections during initial round:
 2 quarterly per year if serving >3300 persons;
 1 sample per 3 years for smaller systems
Triggers - Return to Initial Freq. if detect at > 0.00001 mg/L
 Analysis:

Reference Source Method Numbers

EPA 600/4-88-039 504.1; 551

Treatment- Best Available Technologies:
Granular Activated Charcoal

Toxic Release Inventory - Releases to Water and Land, 1987 to 1993 (in pounds):

	Water		Land
TOTALS	2,554		2,670
Top Six States			
CA	344	500	
MS	342	500	
HI	750	0	
NJ	0	700	
TX	110	466	
PR	500	0	
Top Industrial Sources			
Petroleum refining			2,119
Industrial organic chemicals, fertilizers			355
			1,716
			700

For Additional Information:

EPA can provide further regulatory and other general information:
EPA Safe Drinking Water Hotline - 800/426-4791

Other sources of toxicological and environmental fate data include:
Toxic Substance Control Act Information Line - 202/554-1404
Toxics Release Inventory, National Library of Medicine - 301/496-6531
Agency for Toxic Substances and Disease Registry - 404/639-6000
National Pesticide Hotline - 800/858-7378