Sources of Exposure

General Populations

- The most likely routes of exposure to 1,2-dibromoethane for the general population are from inhalation of air near processing facilities or ingestion of contaminated drinking water.

Occupational Populations

- Occupational exposure to 1,2-dibromoethane may occur through inhalation or dermal contact in facilities that produce or use this chemical.

Toxicokinetics and Biomonitoring

Toxicokinetics

- Ingested 1,2-dibromoethane is rapidly absorbed.
- Absorbed 1,2-dibromoethane and its metabolites are widely distributed. Based on studies with ^{14}C-labeled 1,2-dibromoethane, the highest concentrations of ^{14}C are found in kidneys, liver, spleen, and blood.
- Metabolism is the dominant mechanism of elimination of absorbed 1,2-dibromoethane. Major pathways of metabolism include oxidation mediated by cytochrome 450 and conjugation with glutathione mediated by glutathione S-transferase.
- Elimination from the body is rapid (<1 day).
- Metabolites of 1,2-dibromoethane (e.g., mercapturic acids) are excreted in urine.

NHANES Biomonitoring

- Blood 1,2-dibromoethane measurements were below of limit of detection of 0.015 ng/mL (NHANES 2007–2008).

Biomarkers/Environmental Levels

Biomarkers

- Precluding the detection of 1,2-dibromoethane in blood or urine, there are no specific exposure biomarkers.
- The metabolite 2-hydroxyethyl mercapturic acid can be detected in the urine; however, this metabolite is not specific for 1,2-dibromoethane.

Environmental Levels

Air

- There are no recent monitoring data for air levels of 1,2-dibromoethane in the United States. A study from 1983 showed ambient air levels below the level of detection in rural and remote areas and 2.6 ppm in urban and suburban areas.

Water

- There are no recent monitoring data for water levels of 1,2-dibromoethane in the United States.

Sediment and Soil

- There are no monitoring data for levels of 1,2-dibromoethane in the sediment or soil in the United States.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2018. Toxicological Profile for 1,2-Dibromoethane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for 1,2-Dibromoethane

$C_2H_4Br_2$

CAS # 106-93-4

September 2018

U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
www.atsdr.cdc.gov

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Chemical and Physical Information

1,2-Dibromoethane

- 1,2-Dibromoethane is a colorless liquid with a mild, sweet odor. It is volatile and soluble in water.
- 1,2-Dibromoethane is a halogenated aliphatic hydrocarbon produced when gaseous ethylene comes in contact with bromine.
- 1,2-Dibromoethane may be produced naturally in seawater by brown algae.
- Previously, 1,2-dibromoethane was used as an additive to leaded gasoline and as a fumigant; however, these uses are historical only.
- In 1984, EPA banned the use of 1,2-dibromoethane as a soil and grain fumigant.
- Currently, 1,2-dibromoethane is used as an intermediate in the production of dyes, resins, gums, and waxes, and as a pesticide treatment of felled logs.

Routes of Exposure

- Inhalation – Likely route of exposure for the general and occupational populations.
- Oral – Likely route of exposure for the general population through ingestion of contaminated food and water.
- Dermal – Possible route of exposure for occupational population or general population from showering with contaminated water.

1,2-Dibromoethane in the Environment

- The primary source of 1,2-dibromo-ethane in the environment is from industrial releases into air or effluent discharges into water.
- Volatilization is the most important removal process for 1,2-dibromoethane released to surface waters. Sorption to sediment or suspended particulate material is not expected to be an important process.
- In soils, 1,2-dibromoethane is rapidly lost by volatilization to the atmosphere or leaching to surface water and groundwater. It is highly mobile, but may persist in soil.
- 1,2 Dibromoethane is transformed in the atmosphere by reaction with hydroxyl radicals and in soils by biodegradation.
- Due to its high water solubility, 1,2-dibromoethane is not expected to bioconcentrate or biomagnify in terrestrial and aquatic food chains.

Relevance to Public Health (Health Effects)

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

Minimal Risk Levels (MRLs)

Inhalation

- No acute- (≤14 days), intermediate- (15–364 days), or chronic- (≥365 days) duration inhalation MRLs were derived for 1,2-dibromoethane.

Oral

- No acute- (≤14 days), intermediate- (15–364 days), or chronic- (≥365 days) duration oral MRLs were derived for 1,2-dibromoethane.

Health Effects

- Effects to the respiratory tract, gastrointestinal tract, liver, and kidney have been reported in individuals acutely exposed to lethal or near-lethal levels of 1,2-dibromethane by inhalation or ingestion.
- Cross-sectional studies of occupational cohorts showed serious effects to the male reproductive system (decreased sperm count and decreased percentage of viable and motile sperm).
- Inhalation of 1,2-dibromoethane resulted in histopathological changes to the liver, respiratory tract, thyroid, spleen, and kidneys, uterine atrophy, and reduced fertility in animals.
- Histopathological changes in liver, spleen and forestomach, decreased body weight and testicular atrophy were seen after oral exposure to 1,2-dibromoethane in animals.
- In animals, developmental effects (skeletal anomalies) were observed after acute inhalation exposure.
- In addition to cancers occurring in portal-of-entry tissues (e.g., respiratory and gastrointestinal), neoplasms have been observed in several tissue type in animals.
- 1,2-Dibromoethane has been classified by the U.S. Department of Health and Human Services as reasonably anticipated to be a human carcinogen, by the U.S. Environmental Protection Agency (EPA) as likely to be carcinogenic to humans, and by the International Agency for Research on Cancer (IARC) as probably carcinogenic to humans.

Children's Health

- It is not known if children are more sensitive to 1,2-dibromoethane exposure than adults.