

Sources of Exposure

Toxicokinetics and Biomonitoring

Biomarkers/Environmental Levels

General Populations

- In the general population, possible sources of exposure to 1,2-dibromo-3-chloropropane are from food grown in soil that may still contain small amounts of the chemical or drinking water that may have been contaminated from 1,2-dibromo-3-chloropropane when it was used as a soil fumigant and nematocide prior to 1990.
- People who live near hazardous waste sites containing 1,2-dibromo-3-chloropropane may be exposed from contaminated air, surface water, groundwater, or soil.

Occupational Populations

- Occupational exposure to 1,2-dibromo-3-chloropropane may occur with workers who manufacture or use the compound or use it as a chemical intermediate in synthesis.
- Prior to its ban in 1985 for pesticide use, farmers and pesticide applicators may have been exposed to 1,2-dibromo-3-chloropropane.

Toxicokinetics

- 1,2-Dibromo-3-chloropropane is rapidly absorbed through the gastrointestinal tract and is presumed to be readily absorbed through the respiratory tract and skin (based on systemic toxicity in animals exposed by these routes).
- Absorbed 1,2-dibromo-3-chloropropane is widely distributed to tissues and remains longer in fat than other tissues.
- The predominant pathway for 1,2-dibromo-3-chloropropane metabolism is cytochrome P450 oxidation to form epoxide intermediates, which can be further hydrolyzed and debrominated or undergo glutathione conjugation catalyzed by glutathione transferase.
- Most absorbed 1,2-dibromopropane is excreted as metabolites in the urine; lesser amounts are excreted in feces or exhaled air as carbon dioxide.

NHANES Biomonitoring

- There are no data regarding levels of 1,2-dibromo-3-chloropropane in the general population.

Biomarkers

- There are no specific biomarkers for 1,2-dibromo-3-chloropropane.

Environmental Levels

Air

- There are no recent monitoring data for air levels of 1,2-dibromo-3-chloropropane in the United States.

Water

- National Priorities List (NPL) data of five hazardous waste sites indicate a median of 2.2 ppb for 1,2-dibromo-3-chloropropane in water. For general population exposures, there are no current data for 2-dibromo-3-chloropropane in water.

Sediment and Soil

- Three NPL sites reported a median of 61 ppm for 1,2-dibromo-3-chloropropane in soil. For general population exposures, there are no current data for 2-dibromo-3-chloropropane in soil.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2018. Toxicological Profile for 1,2-Dibromo-3-Chloropropane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™

for

1,2-Dibromo-3-Chloropropane

C₃H₅Br₂Cl

CAS # 96-12-8

April 2018

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



Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

1,2-Dibromo-3-chloropropane

- 1,2-Dibromo-3-chloropropane is a manufactured chemical. It is a colorless liquid with a pungent smell.
- Until 1977, 1,2-dibromo-3-chloropropane was extensively used as a soil fumigant and nematocide on over 40 different crops in the United States. Use became limited between 1977 and 1979, when 1,2-dibromo-3-chloropropane could only be used on pineapple crops in Hawaii.
- The U.S. Environmental Protection Agency (EPA) canceled the registration of 1,2-dibromo-3-chloropropane in 1985.
- 1,2-Dibromo-3-chloropropane may be used as an intermediate in the synthesis of organic chemicals, such as brominated flame retardants.

- Inhalation – Not a likely route of exposure for the general population, likely route for occupational populations.
- Oral – Most likely route of exposure for the general population through ingestion of contaminated food and water.
- Dermal – Likely route of exposure for occupational population.

1,2-Dibromo-3-chloropropane in the Environment

- In air, 1,2-dibromo-3-chloropropane is expected to degrade via a vapor-phase reaction with hydroxyl radicals.
- 1,2-Dibromo-3-chloropropane is expected to volatilize from surface water and soil.
- 1,2-Dibromo-3-chloropropane has a strong potential to leach through soil to groundwater.
- Residues in soil that do not leach or volatilize appear to be persistent.
- 1,2-Dibromo-3-chloropropane is not expected to adsorb significantly to sediment or suspended organic matter.
- Estimated half-lives for 1,2-dibromo-3-chloropropane are:
 - 36 days, hydroxyl radical degradation in air.
 - 13.5 hours to 8 days, volatilization from water (environmental conditions limited).
 - 140 days to 38 years, degradation (via hydrolysis) in water.
- 1,2-Dibromo-3-chloropropane is not expected to bioconcentrate in fish or other aquatic organisms.

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) or chronic- (≥ 365 days) duration inhalation MRLs were derived for 1,2-dibromo-3-chloropropane.
- An intermediate-duration (15–364 days) inhalation MRL of 0.0002 ppm was derived for 1,2-dibromo-3-chloropropane.

Oral

- No acute- (≤ 14 days) or chronic- (≥ 365 days) duration oral MRLs were derived for 1,2-dibromo-3-chloropropane.
- An intermediate-duration (15–364 days) oral MRL of 0.002 mg/kg/day was derived for 1,2-dibromo-3-chloropropane.

Health Effects

- Occupational exposure to 1,2-dibromo-3-chloropropane has been associated with male reproductive effects such as azoospermia (absence of sperm in the semen) or oligospermia (low sperm count). These sperm effects were often reversible many years after exposure.
- In animals, inhalation of 1,2-dibromo-3-chloropropane resulted in adverse effects in the nasal cavity, trachea, and bronchi.
- Oral exposure in animals resulted in inflammatory, proliferative, and degenerative effects in the gastrointestinal tract.
- Inhalation and oral exposure in animals resulted in testicular damage, decreased male fertility, and renal effects (nephritis, nephrosis, and necrosis).
- In animals, chronic inhalation or oral exposure has resulted in multiple-site tumors (e.g., nasal cavity, stomach, liver).
- 1,2-Dibromo-3-chloropropane has been classified by the U.S. Department of Health and Human Services as reasonably anticipated to be a human carcinogen and the International Agency for Research on Cancer as possibly carcinogenic to humans (Group 2B). The EPA has not evaluated this chemical as to its carcinogenicity.

Children's Health

- It is not known if children are more sensitive to 1,2-dibromo-3-chloropropane exposure than adults.