

Sources of Exposure

Toxicokinetics and Biomonitoring

Biomarkers/Environmental Levels

General Populations

- The most likely route of exposure to bis(2-chloroethyl)ether (BCEE) for the general population is via ingestion of contaminated drinking water.
- Populations living near facilities manufacturing or using BCEE may also be exposed via contaminated air.

Occupational Populations

- Occupational exposure to bis(2-chloroethyl)ether may occur through inhalation or dermal contact in facilities that produce or use this chemical in the manufacturing of pesticides.

Toxicokinetics

- Greater than 95% of BCEE is absorbed following inhalation or oral exposure. BCEE appears to be absorbed through the skin, but there are no data on the rate or extent of absorption.
- BCEE appears to be widely distributed throughout the body, with the highest levels found in the liver, kidney, and small intestine following oral exposure.
- The predominant pathway for BCEE metabolism is hydroxylation to ultimately form thiodiglycolic acid. BCEE is also metabolized via direct substitution and oxidative dehalogenation.
- BCEE is primarily excreted in the urine as the metabolite thiodiglycolic acid. Within 48 hours of oral administration, 80% of the dose is excreted.

NHANES Biomonitoring

- There are no data regarding levels of bis(2-chloroethyl)ether in the general population.

Biomarkers

- There are no specific exposure biomarkers for bis(2-chloroethyl)ether.

Environmental Levels

Air

- There are no recent monitoring data for air levels bis(2-chloroethyl)ether in the United States.

Water

- There are no recent monitoring data for water levels of bis(2-chloroethyl)ether in the United States. Studies in 1985 and 1987 found trace quantities in the Mississippi, Delaware and Kanawha Rivers.

Sediment and Soil

- There are no monitoring data for levels of bis(2-chloroethyl)ether in the sediment or soil in the United States.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2017. Toxicological Profile for Bis(2-Chloroethyl) Ether. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for Bis(2-Chloroethyl)Ether



CAS # 111-44-4

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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)

Bis(2-chloroethyl) ether

- Bis(2-chloroethyl)ether (BCEE) is a colorless non-flammable liquid.
- In the past, BCEE has been used as a solvent for fats, waxes, greases, and esters.
- Currently, BCEE is primarily used as a chemical intermediate in pesticide manufacturing.

- Inhalation – Likely route of exposure for general and occupational populations.
- Oral – Likely route of exposure for the general population through ingestion of contaminated water.
- Dermal – Likely route of exposure for occupational population.

Bis(2-chloroethyl) ether in the Environment

- BCEE will slowly volatilize from water and soil.
- Because BCEE is quite soluble in water, it is expected that in air BCEE would tend to be removed by wet deposition, resulting in a cycle between water, soil, and air.
- BCEE is not expected to strongly adsorb to soil and is expected to migrate into groundwater.
- In aqueous media, BCEE is not expected to adsorb strongly to sediments, nor is it likely to be bioaccumulated by aquatic organisms.
- Biodegradation is likely an important fate process for BCEE in water.

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 bis(2-chloroethyl) ether.
- An intermediate duration (15–364 days) inhalation MRL of 0.02 ppm was derived for bis(2-chloroethyl)ether.

Oral

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

Health Effects

- In humans, exposure to airborne bis(2-chloroethyl) ether resulted in nasal and eye irritation.
- Nasal irritation, lung congestion, edema and hemorrhage were seen in guinea pigs after inhalation exposure.
- Airborne exposure to bis(2-chloroethyl) ether led to ocular irritation and at high doses, loss of consciousness in guinea pigs.
- Decreases in body weight gain have been observed following intermediate-duration inhalation exposure and chronic-duration oral exposure.
- In mice, chronic oral exposure to bis(2-chloroethyl)ether resulted in an increase in liver tumors.
- The U.S. Environmental Protection Agency (IRIS 2002) has classified BCEE as a probable human carcinogen (Group B2).

Children's Health

- It is not known if children are more sensitive to bis(2-chloroethyl)ether exposure than adults.