<table>
<thead>
<tr>
<th>Sources of Exposure</th>
<th>Toxicokinetics and Biomonitoring</th>
<th>Biomarkers/Environmental Levels</th>
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</thead>
<tbody>
<tr>
<td><strong>General Populations</strong></td>
<td><strong>Toxicokinetics</strong></td>
<td><strong>Biomarkers</strong></td>
</tr>
<tr>
<td>▪ It is unlikely that general population will be exposed to bis(chloromethyl)ether because it is only used in closed systems in the United States and it rapidly degrades in the environment.</td>
<td>▪ No information on the toxicokinetics of bis(chloromethyl)ether in humans or animals is reported.</td>
<td>▪ There are no specific exposure biomarkers for bis(chloromethyl)ether.</td>
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<td>▪ Exposure through water, food, or soil is unlikely to be significant.</td>
<td>▪ It is expected that bis(chloromethyl)ether is rapidly degraded in the aqueous environment of tissues, forming formaldehyde and HCl.</td>
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<tr>
<td><strong>Occupational Populations</strong></td>
<td><strong>NHANES Biomonitoring</strong></td>
<td><strong>Environmental Levels</strong></td>
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<td>▪ The most likely means of occupational exposure is inhalation of bis(chloromethyl)ether vapors during the production and use of chemicals such as chloromethyl methyl ether, in which bis(chloromethyl)ether may occur as a contaminant or be formed inadvertently.</td>
<td>▪ There are no data regarding levels of bis(chloromethyl)ether in the general population.</td>
<td><strong>Air</strong></td>
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<td></td>
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<td>▪ There are no recent monitoring data for air levels bis(chloromethyl)ether in the United States.</td>
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<td><strong>Water</strong></td>
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<td>▪ There are no recent monitoring data for water levels of bis(chloromethyl)ether in the United States.</td>
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<td><strong>Sediment and Soil</strong></td>
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<td>▪ There are no monitoring data for levels of bis(chloromethyl)ether in the sediment or soil in the United States.</td>
</tr>
</tbody>
</table>

**Reference**
### Chemical and Physical Information

**Bis(chloromethyl)ether**
- Bis(chloromethyl)ether is a colorless liquid with a strong, unpleasant odor. It dissolves easily in water and readily evaporates into air.
- Bis(chloromethyl)ether was used in the production of several types of polymers, resins, and textiles; however, most of these uses have stopped.
- Currently, bis(chloromethyl)ether is only used in small amounts in fully enclosed systems in manufacturing facilities.
- Small quantities may be formed as an impurity during the production of chloromethyl methyl ether.

### Routes of Exposure

- **Inhalation** – Most likely route of exposure for the general and occupational populations.
- **Oral** – Not a likely route of exposure for the general or occupational populations.
- **Dermal** – Not a likely route of exposure for the general or occupational populations.

### Bis(chloromethyl)ether in the Environment

- Due to the relatively short half-life of bis(chloromethyl)ether in both air and water, it is unlikely that significant transport or partitioning between media occurs.
- In the air, bis(chloromethyl)ether is primarily degraded by reacting with photochemically-generated free hydroxyl radicals or by hydrolysis.
- In water, bis(chloromethyl)ether is rapidly hydrolyzed, with a half-life of approximately 38 seconds.
- It is expected that bis(chloromethyl)ether would rapidly hydrolyze upon contact with moisture in soil or would react with soil constituents and therefore not persist for significant periods in the soil.
- Because bis(chloromethyl)ether is rapidly hydrolyzed, it will not bioaccumulate.

### 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) or chronic (≥365 days) duration inhalation MRLs were derived for bis(chloromethyl)ether.
- An intermediate duration (15–364 days) inhalation MRL of 0.0003 ppm was derived for bis(chloromethyl)ether.

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

### Health Effects

- In animals, inhalation of bis(chloromethyl)ether resulted in respiratory effects (distress, increased lung weight, pneumonitis, and tracheal and bronchial hyperplasia) after acute and intermediate duration.
- Neurological effects such as extreme irritability was seen in rats and hamsters after inhalation exposure.
- Lung cancer has been associated with occupational exposure to bis(chloromethyl)ether.
- Nasal and lung tumors have been seen after inhalation exposure, and skin cancer has developed after dermal exposure in animals.
- Bis(chloromethyl)ether has been classified by the U.S. Department of Health and Human Services, the U.S. Environmental Protection Agency, and by the International Agency for Research on Cancer as a human carcinogen.

### Children’s Health

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