Common Name: BIS(CHLOROMETHYL) ETHER

Synonyms: BCME; 1,1’-Dichlorodimethyl Ether
Chemical Name: Methane, Oxysbis[Chloro-

Date: December 2009       Revision: April 2011

CAS Number: 542-88-1
RTK Substance Number: 0234
DOT Number: UN 2249

Description and Use

Bis(Chloromethyl) Ether is a colorless liquid with an irritating odor. It is used as a chemical intermediate in the manufacturer of plastics, paints, varnishes, and ion-exchange resins.

Reasons for Citation

- Bis(Chloromethyl) Ether is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, DEP, IARC, IRIS, NFPA and EPA.
- This chemical is on the Special Health Hazard Substance List.

FIRST AID

Eye Contact

- Immediately flush with large amounts of water for at least 30 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. Seek medical attention immediately.

Skin Contact

- Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Inhalation

- Remove the person from exposure.
- Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- Transfer promptly to a medical facility.
- Medical observation is recommended for 24 to 48 hours after overexposure, as pulmonary edema may be delayed.

EMERGENCY NUMBERS

Poison Control: 1-800-222-1222
CHEMTREC: 1-800-424-9300
NJDEP Hotline: 1-877-927-6337
National Response Center: 1-800-424-8802

Workplace Exposure Limits

OSHA: No exposure limits have been established by OSHA for Bis(Chloromethyl) Ether. Refer to the OSHA 13 Carcinogens Standard (29 CFR 1910.1003).

NIOSH: Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.

ACGIH: The threshold limit value (TLV) is 0.001 ppm averaged over an 8-hour workshift.

- Bis(Chloromethyl) Ether is a CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
- The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.
Determining Your Exposure

- Read the product manufacturer’s Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- For each individual hazardous ingredient, read the New Jersey Department of Health Hazardous Substance Fact Sheet, available on the RTK website (www.nj.gov/health/eoh/rtkweb) or in your facility’s RTK Central File or Hazard Communication Standard file.
- You have a right to this information under the New Jersey Worker and Community Right to Know Act and the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) require employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Health Hazard Information

Acute Health Effects
The following acute (short-term) health effects may occur immediately or shortly after exposure to Bis(Chloromethyl) Ether:

- Contact can irritate and burn the skin and eyes.
- Bis(Chloromethyl) Ether can irritate the nose and throat.
- Inhaling Bis(Chloromethyl) Ether can irritate the lungs causing coughing and/or shortness of breath. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

Chronic Health Effects
The following chronic (long-term) health effects can occur at some time after exposure to Bis(Chloromethyl) Ether and can last for months or years:

Cancer Hazard
- Bis(Chloromethyl) Ether is a CARCINOGEN in humans. It has been shown to cause lung cancer in humans and in experimental animals.
- Many scientists believe there is no safe level of exposure to a carcinogen. Such substances may have the potential for causing reproductive damage in humans.

Reproductive Hazard
- According to the information presently available to the New Jersey Department of Health, Bis(Chloromethyl) Ether has not been tested for its ability to affect reproduction.

Other Effects
- Bis(Chloromethyl) Ether can cause chronic bronchitis, with cough, phlegm and shortness of breath.

Medical

Medical Testing
Before beginning employment and at regular times thereafter, (at least annually), the following are recommended:

- Lung function tests

If symptoms develop or overexposure is suspected, the following is recommended:

- Consider chest x-ray after acute overexposure

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

Mixed Exposures
- Because smoking can cause heart disease, lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

Workplace Controls and Practices

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at www.cdc.gov/niosh/topics/ctrlbanding/.

The following work practices are also recommended:

- Label process containers.
- Provide employees with hazard information and training.
- Monitor airborne chemical concentrations.
- Use engineering controls if concentrations exceed recommended exposure levels.
- Provide eye wash fountains and emergency showers.
- Wash or shower if skin comes in contact with a hazardous material.
- Always wash at the end of the workshift.
- Change into clean clothing if clothing becomes contaminated.
Do not take contaminated clothing home.
Get special training to wash contaminated clothing.
Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA 13 Carcinogens Standard (29 CFR 1910.1003).
Before entering a confined space where Bis(Chloromethyl) Ether may be present, check to make sure that an explosive concentration does not exist.
Where possible, transfer Bis(Chloromethyl) Ether from drums or other containers to process containers in an enclosed system.

Personal Protective Equipment

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Gloves and Clothing
Avoid skin contact with Bis(Chloromethyl) Ether. Wear personal protective equipment made from material which can not be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your operation.
Safety equipment manufacturers recommend Silver Shield®/4H® and Barrier® as glove materials for Ethers, aliphatic, and Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS, or the equivalent, as protective materials for Ethers, aliphatic.
All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection
Wear indirect-vent, impact and splash resistant goggles when working with liquids.
Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.
Do not wear contact lenses when working with this substance.

Respiratory Protection

Improper use of respirators is dangerous. Respirators should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

Where the potential exists for exposure over 0.001 ppm, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.

Fire Hazards

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

Bis(Chloromethyl) Ether is a FLAMMABLE LIQUID.
Use dry chemical, CO₂, water spray or foam as extinguishing agents.
Water spray may cause foam or frothing.
POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrochloric Acid.
CONTAINERS MAY EXPLODE IN FIRE.
Use water spray to keep fire-exposed containers cool.
Vapors may travel to a source of ignition and flash back.
Vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.
Bis(Chloromethyl) Ether may form an ignitable vapor/air mixture in closed tanks or containers.

Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If Bis(Chloromethyl) Ether is spilled or leaked, take the following steps:

Evacuate personnel and secure and control entrance to the area.
Eliminate all ignition sources.
Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
Ventilate and wash area after clean-up is complete.
Keep Bis(Chloromethyl) Ether out of confined spaces, such as sewers, because of the possibility of an explosion.
DO NOT wash into sewer.
It may be necessary to contain and dispose of Bis(Chloromethyl) Ether as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
Handling and Storage

Prior to working with Bis(Chloromethyl) Ether you should be trained on its proper handling and storage.

- A regulated, marked area should be established where Bis(Chloromethyl) Ether is handled, used or stored as required by the OSHA 13 Carcinogens Standard (29 CFR 1910.1003).
- Bis(Chloromethyl) Ether reacts with WATER or MOIST AIR to form Formaldehyde and Hydrogen Chloride gas.
- Bis(Chloromethyl) Ether is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
- Store in tightly closed containers in a cool, well-ventilated area away from SUNLIGHT, METALS, PLASTICS and RESINS.
- Sources of ignition, such as smoking and open flames, are prohibited where Bis(Chloromethyl) Ether is used, handled, or stored.
- Use only non-sparking tools and equipment, especially when opening and closing containers of Bis(Chloromethyl) Ether.
- Metal containers involving the transfer of Bis(Chloromethyl) Ether should be grounded and bonded.

Occupational Health Information Resources

The New Jersey Department of Health offers multiple services in occupational health. These services include providing informational resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations.

For more information, please contact:

New Jersey Department of Health
Right to Know
PO Box 368
Trenton, NJ 08625-0368
Phone: 609-984-2202
Fax: 609-984-7407
E-mail: rtk@doh.state.nj.us
Web address: http://www.nj.gov/health/eoh/rtkweb

The Right to Know Hazardous Substance Fact Sheets are not intended to be copied and sold for commercial purposes.
ACGIH is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

Acute Exposure Guideline Levels (AEGLs) are established by the EPA. They describe the risk to humans resulting from once-in-a lifetime, or rare, exposure to airborne chemicals.

Boiling point is the temperature at which a substance can change its physical state from a liquid to a gas.

A carcinogen is a substance that causes cancer.

The CAS number is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

CFR is the Code of Federal Regulations, which are the regulations of the United States government.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

ERG is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

Emergency Response Planning Guideline (ERPG) values are intended to provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group.

Ionization Potential is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

IRIS is the Integrated Risk Information System database maintained by federal EPA. The database contains information on human health effects that may result from exposure to various chemicals in the environment.

LEL or Lower Explosive Limit, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

Permeated is the movement of chemicals through protective materials.

PIH is a DOT designation for chemicals which are Poison Inhalation Hazards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that releases energy under certain conditions.

STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A teratogen is a substance that causes birth defects by damaging the fetus.

UEL or Upper Explosive Limit is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

Vapor Density is the ratio of the weight of a given volume of one gas to the weight of another (usually Hydrogen), at the same temperature and pressure.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.
Common Name: BIS(CHLOROMETHYL) ETHER

Synonyms: BCME; 1,1'-Dichlorodimethyl Ether
CAS No: 542-88-1
Molecular Formula: \((\text{CH}_2\text{Cl})_2\text{O}\)
RTK Substance No: 0234
Description: Colorless liquid with an irritating odor

### HAZARD DATA

<table>
<thead>
<tr>
<th>Hazard Rating</th>
<th>Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - Health</td>
<td>Bis(Chloromethyl) Ether reacts with WATER or MOIST AIR to form Formaldehyde and Hydrogen Chloride gas.</td>
</tr>
<tr>
<td>3 - Fire</td>
<td>Bis(Chloromethyl) Ether is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).</td>
</tr>
<tr>
<td>1 - Reactivity</td>
<td>Bis(Chloromethyl) Ether may form an ignitable vapor/air mixture in closed tanks or containers.</td>
</tr>
</tbody>
</table>

### REACTIVITY

- Bis(Chloromethyl) Ether reacts with WATER or MOIST AIR to form Formaldehyde and Hydrogen Chloride gas.
- Bis(Chloromethyl) Ether is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).

### SPILL/LEAKS

**Isolation Distance:**
- Spill: 50 meters (150 feet)
- Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand or earth. Keep Bis(Chloromethyl) Ether out of confined spaces, such as sewers, because of the possibility of an explosion. Use only non-sparking tools and equipment, especially when opening and closing containers of Bis(Chloromethyl) Ether. DO NOT wash into sewer. Bis(Chloromethyl) Ether is a marine pollutant.

### PHYSICAL PROPERTIES

- **Odor Threshold:** Irritating odor
- **Flash Point:** 66°F (19°C)
- **Vapor Density:** 4 (air = 1)
- **Vapor Pressure:** 30 mm Hg at 72°F (22°C)
- **Relative Density:** 1.3 (water = 1)
- **Water Solubility:** Decomposes
- **Boiling Point:** 219°F (104°C)
- **Freezing Point:** -43°F (-42°C)

### EXPOSURE LIMITS

- **OSHA:** Refer to 29 CFR 1910.1003
- **NIOSH:** Lowest feasible concentration
- **ACGIH:** 0.001 ppm (8-hr TWA)

The Protective Action Criteria values are:
- PAC-1 = 0.006 ppm
- PAC-2 = 0.044 ppm
- PAC-3 = 0.18 ppm

### PROTECTIVE EQUIPMENT

- **Gloves:** Silver Shield®/4H® and Barrier® (>8-hr breakthrough for Ethers, aliphatic)
- **Coveralls:** Tychem® BR, Responder® and TK; and Trellchem® HPS and VPS (>8-hr breakthrough for Ethers, aliphatic)
- **Respirator:** SCBA

### FIRST AID AND DECONTAMINATION

Remove the person from exposure. Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately. Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Begin artificial respiration if breathing has stopped and CPR if necessary. Transfer to a medical facility. Medical observation is recommended as symptoms may be delayed.