

# Safety Data Sheet

# Chloromethyl methyl ether

Division of Safety  
National Institutes  
of Health



## WARNING!

THIS COMPOUND IS ACUTELY TOXIC (CAUSING SEVERE IRRITATION TO SKIN, EYES, MUCOUS MEMBRANES, AND LUNGS), CARCINOGENIC, AND MUTAGENIC. AVOID FORMATION AND BREATHING OF AEROSOLS OR VAPORS.

LABORATORY OPERATIONS SHOULD BE CONDUCTED IN A FUME HOOD, GLOVE BOX, OR VENTILATED CABINET.

AVOID SKIN CONTACT: IF EXPOSED, WASH WITH SOAP AND WATER.

FOR EYE EXPOSURE, IRRIGATE IMMEDIATELY WITH LARGE AMOUNTS OF WATER. FOR INGESTION, ADMINISTER AN ANTACID PREPARATION AND INDUCE VOMITING. FOR INHALATION, REMOVE VICTIM PROMPTLY TO CLEAN AIR. ADMINISTER RESCUE BREATHING IF NECESSARY. REFER TO PHYSICIAN.

IN CASE OF LABORATORY SPILL, WEAR PROTECTIVE CLOTHING DURING CLEANUP. AVOID SKIN CONTACT OR BREATHING OF AEROSOLS OR VAPORS. COVER SPILL WITH 5% SODIUM CARBONATE SOLUTION. DISPOSE OF WASTE SOLUTIONS AND MATERIALS APPROPRIATELY.

### A. Background

Chloromethyl methyl ether (CMME) shows acute and chronic toxicity in experimental laboratory animals. Exposure has also confirmed toxicity in humans. CMME is a proven carcinogen in humans and in many species of laboratory animals. CMME is used commercially in the manufacture of ion exchange resins and in the laboratory as a research chemical and as an analytical standard.

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## Chemical and Physical Data

1. Chemical Abstract No.: 107-30-2

2. Synonyms:

CMME

Methylchloromethyl ether

Dimethylchloroether

Methoxychloromethane

Methane, chloromethoxy- (9CI)

3. Molecular

formula:  
 $C_2H_5ClO$

structure:

$Cl-CH_2-O-CH_3$

weight:  
80.52

4. Density: 1.0605 g/cm<sup>3</sup>.

5. Absorption spectroscopy: The IR and NMR (Van Duuren et al., 1968), Raman (Katayama and Morino, 1949), and MS (Shadoff et al 1973) spectra have been reported.

6. Volatility: About 200 mm Hg at 25°C (Rohm and Haas Co., 1981).

7. Solubility: Decomposes in water; soluble in polar and nonpolar organic solvents.

8. Description, appearance: Colorless, volatile liquid.

9. Boiling point: 59.2°C.

Melting point: -103.5°C.

10. Stability: Unstable in aqueous solution, but fairly stable in moist air (Tou and Kallos, 1974).

11. Chemical reactivity: Decomposed by water and by aqueous and alcoholic alkali. Reacts with nucleophilic groups such as -OH, -NH<sub>2</sub>, and -SH.

12. Flash point: -9°C.

13. Autoignition temperature: No data.

14. Flammable limits: No data.

## Fire, Explosion, and Reactivity Hazard Data

1. In case of fire, use extinguisher suited for the particular combustible material. Fire fighters should wear air-supplied respirators with full-face masks.

2. CMME is very volatile and it could cause a fire inside a glove box.
3. CMME decomposes in aqueous media.
4. Nucleophiles such as alcoholic hydroxyl, amino, and thiol compounds degrade CMME, but the reaction products would not be expected to cause any unusual hazards.
5. The hydrolysis products (hydrochloric acid, formaldehyde [known irritants], and methanol) do not present any unusual hazards.
6. To lessen the chance of accidental fire, any spark-producing equipment should be remote.

### Operational Procedures

The NIH Guidelines for the Laboratory Use of Chemical Carcinogens describe operational practices to be followed when potentially carcinogenic chemicals are used in NIH laboratories. The Guidelines should be consulted to identify the proper use conditions required and specific controls to be implemented during normal and complex operations or manipulations involving CMME.

1. Chemical inactivation: No validated method reported.
2. Decontamination: Turn off equipment that could be affected by CMME or the materials used for cleanup. If more than 10 ml has been spilled or if there is any uncertainty regarding the procedures to be followed for decontamination, call the NIH Fire Department (dial 116) for assistance. Wash surfaces with copious quantities of 5% sodium carbonate solution (Rohm and Haas Co., 1981). Glassware should be rinsed (in a hood) with water, followed by soap and water. Animal cages should be washed with water.
3. Disposal: No waste streams containing CMME shall be disposed of in sinks or general refuse. Surplus CMME or chemical waste streams contaminated with CMME shall be handled as hazardous chemical waste and disposed of in accordance with the NIH chemical waste disposal system. Nonchemical waste (e.g., animal carcasses and bedding) containing CMME shall be handled and packaged for incineration in accordance with the NIH medical-pathological waste disposal system. Potentially infectious waste (e.g., tissue cultures) containing CMME shall be packaged for incineration, as above. Burnable waste (e.g., absorbent bench top liners) minimally contaminated with CMME shall be handled as potentially infectious waste and packaged for incineration, as above. Absorbent materials (e.g., associated with spill cleanup) grossly contaminated shall be handled in accordance with the chemical waste disposal system. Radioactive waste containing CMME shall be handled in accordance with the NIH radioactive waste disposal system.

4. Storage: Store in ampoules or screw-capped bottles with Teflon or conical polyethylene cap liners at 0-5°C in an explosion-safe refrigerator.

#### E. Monitoring and Measurement Procedures Including Direct Field Measurements and Sampling for Subsequent Laboratory Analysis

1. Sampling: From air, by derivatizing through impinger traps containing a derivatizing agent (Drew et al., 1975; Shadoff et al., 1973). From water, by use of a hollow filter probe placed into the media to be analyzed and connected to a mass spectrometer (Tou et al., 1974; Tou and Kallos, 1974; Westover et al., 1974).
2. Separation and analysis: Derivative GLC (Solomon and Kallos, 1975) or colorimetric (nonspecific) procedures (Drew et al., 1975) have been used for the determination of CMME in air. On-column reaction GC (Kallos et al., 1977) has been reported to be capable of selectively measuring one part per billion or better of CMME in air.

#### F. Biological Effects (Animal and Human)

1. Absorption: Because of the high reactivity of CMME in water and biological media, it is virtually impossible to obtain absorption data, and none have been reported. However, the acute toxic effects suggest that CMME and/or its hydrolysis products are rapidly absorbed by inhalation, ingestion, and parenteral injection and through the skin.
2. Distribution: No data (for reasons mentioned above).
3. Metabolism and excretion: No data.
4. Toxic effects: The acute LD50 in the rat on oral administration is 817 mg/kg; inhalation toxicity (LC50) is 55 and 65 ppm in the rat and hamster, respectively, for a 7-hour exposure (Drew et al., 1975). In humans, accidental exposure to low doses causes breathing difficulties lasting for several days, while high doses result in sore throat, fever, and chills. In animals, acute toxicity is probably due to the hydrolysis products of CMME (hydrochloric acid, formaldehyde, and methanol). Eye application causes severe irritation and necrosis; skin application produces hyperemia, edema, and necrosis; and inhalation in rats and hamsters causes mucous membrane irritation, lung congestion, edema, hemorrhage, and acute necrotizing bronchitis. Death in these species was due to pneumonia. The mouse appears to be far less sensitive to CMME inhalation than are other rodents.
5. Carcinogenic effects: CMME is a weak carcinogen in mice on skin application and subcutaneous injection. It has been noted that commercial CMME contains 1-7% bis(chloromethyl) ether and therefore any carcinogenicity ascribed to CMME may be due to this contaminant

(Laskin et al., 1975). Occupational exposure has resulted in significant incidences of lung cancer (Figuroa et al., 1973).

6. Mutagenic and teratogenic effects: CMME is mutagenic in the Ames test and in E. coli. There is no evidence for teratogenicity.

#### G. Emergency Treatment

1. Skin and eye exposure: For skin exposure, remove contaminated clothing and wash skin with a mild soap and water. Rinse with water for at least five minutes. For eye exposure, irrigate immediately with copious quantities of running water for at least 15 minutes.
2. Ingestion: Administer an antacid preparation. Induce vomiting.
3. Inhalation: Remove victim promptly to clean air. Administer rescue breathing if necessary.
4. Refer to physician at once. Consider treatment for pulmonary irritation.

#### H. References

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