

Bromoethyl methanesulfonate

Safety Data Sheet

Division of Occupational Health and Safety
National Institutes of Health



WARNING:

This compound is toxic and mutagenic. It is an irritant and is corrosive in the presence of moisture. 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, drink plenty of water or milk. 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. Use aqueous alkali to dissolve compound. Wash down area with dilute alkali followed by soap and water. Dispose of waste solutions and materials appropriately.

A. Background

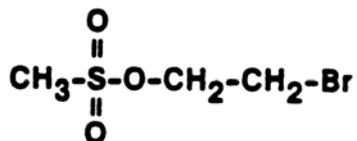
Bromethyl methanesulfonate (BEMS) is a light yellow oil that is stable in the absence of moisture but is slowly hydrolyzed to the corrosive methanesulfonic acid in the presence of water. It is toxic to bone marrow of experimental animals. Carcinogenicity has not been reported. It has limited commercial use as an antidote to injury of corn plants by some herbicides.

B. Chemical and Physical Data

1. Chemical Abstract No.: 4239-10-5; issued 10/82
2. Synonyms: BENS, 2-Bromoethyl methanesulfonate, ethanol, 2-bromo-, methanesulfonate (9CI)
3. Molecular formula, structure and weight:



202.0



4. Density: 1.703 g/cm³.

5. Absorption spectroscopy: No data.
6. Volatility: No data.
7. Solubility: Soluble in methanol and polyethylene glycols.
8. Description, appearance: Light yellow oil.
9. Boiling point: 140-142°C. Melting point: No data.
10. Stability: Stable in absence of moisture; hydrolyzed in water to the strongly corrosive methanesulfonic acid.
11. Chemical reactivity: BEMS alkylates nucleophiles such as hydroxyl, amino, and sulfhydryl groups. Hydrolyzed by excess aqueous alkali to noncorrosive and nontoxic compounds.
12. Flash point: No data.
13. Autoignition temperature: No data.
14. Explosive limits in air: No data.

C. Fire, Explosion, and Reactivity Hazard Data

1. BEMS does not require special fire-fighting procedures or equipment and does not present unusual fire and explosion hazards.
2. A condition contributing to instability is the presence of moisture, which results in hydrolysis to free acid, which is highly corrosive to metals unless neutralized with alkali.
3. No other incompatibilities are known to exist.
4. BEMS does not require nonspark equipment.

D. 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 BEMS.

1. Chemical inactivation: No validated method reported.
2. Decontamination: Turn off equipment that could be affected by BEMS 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 water. 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 BEMS shall be disposed of in sinks or general refuse. Surplus BEMS or chemical waste streams contaminated with BEMS 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 BEMS 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 BEMS shall be packaged for incineration, as above. Burnable waste (*e.g.*, absorbent bench top liners) minimally contaminated with BEMS 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 BEMS shall be handled in accordance with the NIH Radioactive waste disposal system.

4. Storage: Store in sealed glass ampoules or screw-capped bottles or vials with Teflon cap liners. Avoid exposure to moisture. Refrigeration is recommended.

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

1. Sampling: No data.
2. Separation and analysis: No specific methods have been reported. General methods for detection and estimation have been described, including colorimetric procedures using 4-picoline and o-dinitrobenzene as reagents (Sawicki and Sawicki, 1969) and the reaction with 4-(4-nitrobenzyl)pyridine (Preussmann, *et al.*, 1969).

F. Biological Effects (Animal and Human)

1. Absorption: No data are available; in analogy with chloroethyl methanesulfonate, it is probably readily absorbed after ingestion or injection.
2. Distribution: No data.
3. Metabolism and excretion: No data are available; in analogy with other alkyl methanesulfonates, it is likely that the bromo-ethanol portion reacts with thiol groups of cysteine or cysteine-containing compounds to form the corresponding S-(2-bromoethyl) derivatives.
4. Toxic effects: The intraperitoneal LD50 in the Holtzman rat has been reported as 31 mg/kg. The target organ is the bone marrow; administration of BEMS results in severe depression of erythroid and myeloid elements.
5. Carcinogenic effects: None reported; however, on the basis of alkylating properties of BEMS and its depressant action on mammalian bone marrow, one may suspect the possibility of carcinogenic effects at these sites.
6. Mutagenic and teratogenic effects: No specific information, but in analogy with the mutagenic methyl and ethyl methanesulfonates, it is likely that BEMS is also mutagenic. No information on teratogenicity.

G. Emergency Treatment

1. Skin and eye exposure: For skin exposure, remove contaminated clothing and wash skin with soap and water. For eye exposure, irrigate immediately with copious quantities of running water for at least 15 minutes.
2. Ingestion: Drink plenty of water or milk. Induce vomiting
3. Inhalation: Remove victim promptly to clean air. Administer rescue breathing if necessary.
4. Refer to physician. Observe for pulmonary irritation. Obtain ophthalmological consultation for eye exposure.

H. References.

- Pruessmann, R., H. Schneider, and F. Epple. 1969. Investigations for the determination of alkylating agents. II. The determination of different classes of alkylating agents with a modification of the color reaction with 4-(4-nitrobenzyl)pyridine (NBP). *Arzneim Forsch* 19: 1059-1073
- Sawicki, E., and C.R. Sawicki. 1969. Analysis of alkylating agents: Application to air pollution. *Ann NY Acad Sci* 163:895-920.