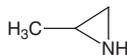


## 2-Methylaziridine (Propylenimine)

### CAS No. 75-55-8

Reasonably anticipated to be a human carcinogen  
First Listed in the *Fourth Annual Report on Carcinogens* (1985)



### Carcinogenicity

2-Methylaziridine (propylenimine) is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (IARC 1975, 1987, 1999, Weisburger *et al.* 1981). When administered by oral gavage or in the diet, 2-methylaziridine induced leukemia and intestinal adenocarcinomas in male rats, mammary adenocarcinomas in female rats, and gliomas and squamous cell carcinomas of the ear canal in rats of both sexes (IARC 1975, Weisburger *et al.* 1981).

No adequate data were available to evaluate the carcinogenicity of 2-methylaziridine in humans (IARC 1975, 1987).

### Properties

2-Methylaziridine is a colorless oily liquid with a molecular weight of 57.1, a melting point of -65°C, and a boiling point of 66°C to 67°C. It has an odor similar to that of aliphatic amines or ammonia. It fumes in air, is flammable, and is soluble in water, ethanol and most organic solvents. 2-Methylaziridine hydrolyzes in aqueous or hydrochloric acid solutions to give methylethanolamine. It reacts with carbonyl compounds, quinones, and sulphonyl halides (IARC 1975, HSDB 2001).

### Use

2-Methylaziridine is used in the United States exclusively as an intermediate, and its derivatives are used in the paper, textile, rubber, and pharmaceutical industries (Sax 1987). Its primary use is in the modification of latex surface-coating resins to improve adhesion. Because of the substantive bonding of imines to cellulose derivatives, polymers modified with 2-methylaziridine or its derivatives have been used in the adhesive, textile, and paper industries. 2-Methylaziridine has been used to modify dyes for specific adhesion to cellulose, and derivatives have been used in photography, gelatins, and synthetic resins. In the oil-additive industry, this chemical and its derivatives have been used as modifiers for viscosity control, high-pressure performance, and oxidation resistance. Other applications include use in flocculants in petroleum refining, as a modifier for rocket propellant fuels, in fiber modification, and in imine derivatives for use in medicinal and agricultural chemicals (IARC 1975).

### Production

Ten domestic suppliers of 2-methylaziridine were identified in 2001 (Chem Sources 2001). The 1979 TSCA Inventory identified one producer of 2-methylaziridine in 1977, with a reported production of 500,000 lb (TSCA 1979). No other production, import, or export data were available.

### Exposure

The primary routes of potential human exposure to 2-methylaziridine are inhalation, ingestion, and dermal contact. Due to its volatility, potential exposure could occur during production, packaging, or use of substances made with 2-methylaziridine. The National Occupational Hazard Survey, conducted by NIOSH from 1972 to 1974, estimated that 20 people were potentially exposed to 2-methylaziridine in the workplace in 1970 (NIOSH 1976). The American Conference of Governmental Industrial Hygienists (ACGIH) has noted the potential contribution to overall exposure by

the cutaneous route including mucous membranes and eyes, either by airborne, or more particularly, by direct contact with the substance. Potential consumer exposure could occur as a result of handling products coated with 2-methylaziridine or its derivatives. EPA's Toxic Chemical Release Inventory (TRI) listed six industrial facilities that produced, processed, or otherwise used 2-methylaziridine in 1999 (TRI99 1999). The facilities reported releases of 2-methylaziridine to the environment that were estimated to total 261 lb.

### Regulations

#### DOT

2-Methylaziridine is considered a hazardous material and special requirements have been set for marking, labeling, and transporting this material

#### EPA

##### Clean Air Act

NESHAP: Listed as a Hazardous Air Pollutant (HAP)

Prevention of Accidental Release: Threshold Quantity (TQ) = 10,000 lb

##### Comprehensive Environmental Response, Compensation, and Liability Act

Reportable Quantity (RQ) = 1 lb

##### Emergency Planning and Community Right-To-Know Act

Toxics Release Inventory: Listed substance subject to reporting requirements

Reportable Quantity (RQ) = 1 lb

Threshold Planning Quantity (TPQ) = 10,000 lb

##### Resource Conservation and Recovery Act

Listed Hazardous Waste: Waste codes in which listing is based wholly or partly on substance - P067

Listed as a Hazardous Constituent of Waste

#### OSHA

Permissible Exposure Limit (PEL) = 2 ppm (5 mg/m<sup>3</sup>)

### Guidelines

#### ACGIH

Threshold Limit Value - Time-Weighted Average Limit (TLV-TWA) = 2 ppm

#### NIOSH

Recommended Exposure Limit (REL) = 2 ppm (5 mg/m<sup>3</sup>)

Immediately Dangerous to Life and Health (IDLH) = 100 ppm

Listed as a potential occupational carcinogen

### REFERENCES

- ChemSources. 2001. Chemical Sources International, Inc. <http://www.chemsources.com>.
- HSDB. 2001. Hazardous Substances Data Base. National Library of Medicine. <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>.
- IARC. 1975. Some Arizidines, *N*-, *S*-, and *O*-Mustards and Selenium. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Humans, vol. 9. Lyon, France: International Agency for Research on Cancer. 286 pp.
- IARC. 1987. Overall Evaluations of Carcinogenicity. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Humans, Supplement 7. Lyon, France: International Agency for Research on Cancer. 440 pp.
- IARC. 1999. Re-evaluation of Some Organic Chemicals, Hydrazine, and Hydrogen Peroxide. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Humans, vol. 71. Lyon, France: International Agency for Research on Cancer. 1589 pp.
- NIOSH. 1976. National Occupational Hazard Survey (1972-74). Cincinnati, OH: Department of Health, Education and Welfare.
- Sax, N. I. and R. J. Lewis. 1987. Hawley's Condensed Chemical Dictionary, 11th ed. New York: Van Nostrand Reinhold Co. p. 276, 490, 633, 635 and 732.
- TRI99. 2001. Toxic Chemical Release Inventory 1999. Data contained in the Toxic Chemical Release Inventory (TRI). National Library of Medicine. <http://www.epa.gov/triexplorer/>.
- TSCA. 1979. Toxic Substances Control Act, Chemical Substances Inventory.
- Weisburger, E. K., B. M. Ulland, J. Nam, J. J. Gart and J. H. Weisburger. 1981. Carcinogenicity tests of certain environmental and industrial chemicals. *J Natl Cancer Inst* 67(1): 75-88.