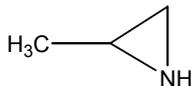


2-METHYLAZIRIDINE (PROPYLENIMINE)

CAS No. 75-55-8

First Listed in the *Fourth Annual Report on Carcinogens*



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 to light yellow, oily liquid, with an odor similar to that of aliphatic amines or similar to a strong ammonia-like odor. It fumes in air, is flammable, and is soluble in water, ethanol and most organic solvents. 2-Methylaziridine polymerizes easily and hydrolyzes in aqueous or hydrochloric acid solutions to give methylethanolamine. It is heat sensitive, reacts with strong oxidizers, carbonyl compounds, quinoines, and sulphonyl halides, and may attack some forms of plastics, coatings, or rubber (HSDB 2001, NTP 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

EPA regulates 2-methylaziridine under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and Superfund Amendments and Reauthorization Act (SARA). EPA established a reportable quantity (RQ) of 1 lb for 2-methylaziridine under CERCLA. 2-Methylaziridine is subject to reporting and record-keeping requirements under RCRA and SARA. Also under SARA, EPA requires that emergency response plans be prepared if the threshold planning quantity of 10,000 lb is reached.

ACGIH recommends a threshold limit value (TLV) of 2 ppm (4.7 mg/m³) for 2-methylaziridine. NIOSH has set a recommended exposure limit (REL) of 2 ppm (4.7 mg/m³). OSHA regulates 2-methylaziridine under the Occupational Safety and Health Act (OSH Act). OSHA has set a permissible exposure limit (PEL) of 2 ppm (5 mg/m³) as an 8-hr time-weighted average (TWA) in air. The potential for exposure through skin absorption was noted. OSHA also regulates 2-methylaziridine under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table 105.

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