

## 1,3-Propane Sultone

### CAS No. 1120-71-4

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



### Carcinogenicity

1,3-Propane sultone is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (IARC 1974, 1999, Weisburger *et al.* 1981). When administered by gavage, 1,3-propane sultone induced significant increases of malignant gliomas (astrocytomas) of the cerebrum and cerebellum in rats of both sexes and mammary adenocarcinomas in female rats; the incidences of granulocytic leukemia, adenocarcinomas of the small intestine, and squamous cell carcinomas of the ear were somewhat increased in rats of both sexes. Single and repeated subcutaneous injections of 1,3-propane sultone induced myosarcomas, fibrosarcomas, and sarcomas at the injection site in rats. Subcutaneous injections also induced malignant neural tumors in the offspring of rats. When repeatedly injected subcutaneously, 1,3-propane sultone induced adenocanthomas and sarcomas at the injection site in female mice.

No data were available to evaluate the carcinogenicity of 1,3-propane sultone in humans (IARC 1974, 1999).

### Properties

1,3-Propane sultone occurs as a colorless liquid or as a white crystalline solid. It releases a foul odor as it melts. It is readily soluble in water and in many organic solvents such as ketones, esters, and aromatic hydrocarbons. It hydrolyzes to 3-hydroxy-1-propanesulfonic acid. When heated to decomposition, 1,3-propane sultone emits toxic fumes of sulfur oxides (HSDB 2001).

### Use

1,3-Propane sultone is used as a chemical intermediate to introduce the sulfopropyl group into molecules and to confer water solubility and an anionic character to the molecules (IARC 1974). It is also a chemical intermediate in the production of fungicides, insecticides, cation-exchange resins, dyes, vulcanization accelerators and variety of other chemicals (IARC 1999). The Consumer Product Safety Commission (CPSC) reported that it is also used as a chemical intermediate in detergents, lathering agents, and bacteriostats and as a corrosion inhibitor for mild (untempered) steel (Kirk-Othmer 1979).

### Production

No information on the global production of 1,3-propane sultone was available in 1999 (IARC 1999). Chem Sources identified 15 U.S. suppliers in 2001 (Chem Sources 2001). In 1974, the only U.S. producer of 1,3-propane sultone manufactured less than 500 lb of the chemical annually (IARC 1974). The 1979 TSCA Inventory identified three U.S. companies importing 1,3-propane sultone in 1977, but no data were available on the amount imported (TSCA 1979). 1,3-Propane sultone was first produced in the United States in 1963 (IARC 1974).

### Exposure

The primary routes of potential human exposure to 1,3-propane sultone are ingestion and inhalation. In water or moist soil, it will rapidly hydrolyze. In the atmosphere, it will react with photochemically produced hydroxyl radicals (half-life of 8 days). Workers involved in the formulation of compounds made from 1,3-propane sultone or the production of its end products are at the greatest risk of potential

exposure. 1,3-Propane sultone may occur in the waste streams of industrial facilities making or using it, but is not expected to remain for long periods of time because it is readily hydrolyzed (IARC 1974). Consumers are potentially exposed to its residues when using detergents, corrosion inhibitors, and other products manufactured from 1,3-propane sultone. 1,3-Propane sultone is not known to occur naturally (HSDB 2001). EPA's Toxic Chemical Release Inventory (TRI) listed two industrial facilities that produced, processed, or otherwise used 1,3-propane sultone in 1999 (TRI99 2001). Those facilities reported 167 lbs of propane sultone released to the environment.

### Regulations

#### EPA

##### Clean Air Act

NESHAP: Listed as a Hazardous Air Pollutant (HAP)

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

Reportable Quantity (RQ) = 10 lb

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

Toxics Release Inventory: Listed substance subject to reporting requirements

##### Resource Conservation and Recovery Act

Listed as a Hazardous Constituent of Waste

Listed Hazardous Waste: Waste codes in which listing is based wholly or partly on substance - U193

### Guidelines

#### ACGIH

Threshold Limit Value - Time-Weighted Average Limit (TLV-TWA) = as low as possible

#### NIOSH

Listed as a potential occupational carcinogen

### REFERENCES

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- 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.