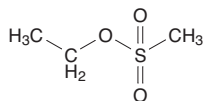


Ethyl Methanesulfonate

CAS No. 62-50-0

Reasonably anticipated to be a human carcinogen

First listed in the *Sixth Annual Report on Carcinogens* (1991)



Carcinogenicity

Ethyl methanesulfonate is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity from studies in experimental animals.

Cancer Studies in Experimental Animals

Ethyl methanesulfonate caused tumors in two rodent species, at several different tissue sites, and by several different routes of exposure. Ethyl methanesulfonate caused benign or malignant lung tumors (adenoma or carcinoma) when administered by subcutaneous injection to newborn mice and by intraperitoneal injection to adult mice and rats. When administered by intraperitoneal injection, it also caused benign or malignant kidney tumors in male mice and in rats (renal carcinoma in female rats and malignant epithelial and mesenchymal tumors in rats of both sexes). In these studies, a single injection was sufficient to cause lung tumors in newborn and adult mice and kidney tumors in rats (IARC 1974). Oral exposure to ethyl methanesulfonate caused kidney tumors in female rats and cancer of the mammary gland (adenocarcinoma) in rats of both sexes (Ueo *et al.* 1981). An additive effect on the incidence of kidney cancer was seen in rats receiving a single intraperitoneal injection of dimethylnitrosamine (*N*-nitrosodimethylamine) followed by a single intraperitoneal injection of ethyl methanesulfonate (IARC 1974).

Cancer Studies in Humans

No epidemiological studies were identified that evaluated the relationship between human cancer and exposure specifically to ethyl methanesulfonate.

Properties

Ethyl methanesulfonate is the ethyl ester of methanesulfonic acid and exists as a colorless liquid at room temperature (IARC 1974). It is soluble in water and stable under normal temperatures and pressures (Akron 2009). Physical and chemical properties of ethyl methanesulfonate are listed in the following table.

Property	Information
Molecular weight	124.2 ^a
Specific gravity	1.15 at 22°C/4°C ^a
Melting point	< -25°C ^b
Boiling point	213°C to 214°C at 761 mm Hg ^a
Log <i>K</i> _{ow}	0.09 ^a
Water solubility	135 g/L at 25°C ^b
Vapor pressure	0.328 mm Hg at 25°C ^a

Sources: ^aHSDB 2009, ^bChemIDplus 2009.

Use

Ethyl methanesulfonate is used experimentally as a mutagen and as a biochemical research reagent (Akron 2009, HSDB 2009).

Production

In 2009, no commercial manufacturers of ethyl methanesulfonate were identified worldwide (SRI 2009), but it was available from 24 suppliers, including 13 U.S. suppliers (ChemSources 2009). No data were found on U.S. imports or exports of ethyl methanesulfonate in 2009.

Exposure

Exposure to ethyl methanesulfonate is expected to be limited to laboratory researchers. It has been identified as a trace contaminant in pharmaceutical products (Li 2004). When released to air, ethyl methanesulfonate will exist almost entirely in the vapor phase and may react with photochemically produced hydroxyl radicals, with an estimated half-life of 30 days. It hydrolyzes relatively rapidly in water or moist soil, with an estimated half-life of 96 hours at 20°C, and is expected to volatilize from dry soil. It is not expected to bind to soil or sediment. It is therefore not expected to persist in the environment or to bioconcentrate in aquatic organisms. The National Occupational Exposure Survey (conducted from 1981 to 1983) estimated that 971 workers, including 448 women, potentially were exposed to ethyl methanesulfonate (NIOSH 1990).

Regulations

Environmental Protection Agency (EPA)

Comprehensive Environmental Response, Compensation, and Liability Act
Reportable quantity (RQ) = 1 lb.

Resource Conservation and Recovery Act

Listed Hazardous Waste: Waste code for which the listing is based wholly or partly on the presence of ethyl methanesulfonate = U119.
Listed as a hazardous constituent of waste.

References

- Akron. 2009. *The Chemical Database*. The Department of Chemistry at the University of Akron. <http://ull.chemistry.uakron.edu/erd> and search on CAS number. Last accessed: 5/09.
- ChemIDplus. 2009. *ChemIDplus Advanced*. National Library of Medicine. <http://chem.sis.nlm.nih.gov/chemidplus/chemidheavy.jsp> and select Registry Number and search on CAS number. Last accessed: 5/12/09.
- ChemSources. 2009. *Chem Sources - Chemical Search*. Chemical Sources International. <http://www.chemsources.com/chemonline.html> and search on ethyl methanesulfonate. Last accessed: 5/09.
- HSDB. 2009. *Hazardous Substances Data Bank*. National Library of Medicine. <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB> and search on CAS number. Last accessed: 3/22/09.
- IARC. 1974. Ethyl methanesulfonate. In *Some Anti-thyroid and Related Substances, Nitrofurans and Industrial Chemicals*. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Humans, vol. 7. Lyon, France: International Agency for Research on Cancer. pp. 245-251.
- Li W. 2004. Trace analysis of residual methyl methanesulfonate, ethyl methanesulfonate and isopropyl methanesulfonate in pharmaceuticals by capillary gas chromatography with flame ionization detection. *J Chromatogr A* 1046(1-2): 297-301.
- NIOSH. 1990. *National Occupational Exposure Survey (1981-83)*. National Institute for Occupational Safety and Health. Last updated: 7/1/90. <http://www.cdc.gov/noes/noes1/x6247sic.html>.
- SRI. 2009. *Directory of Chemical Producers*. Menlo Park, CA: SRI Consulting. Database edition. Last accessed: 5/09.
- Ueo H, Takaki R, Yamagami H, Sugimachi K. 1981. Mammary carcinoma induced by oral administration of ethyl methanesulfonate. Determination of some of the parameters affecting tumor induction. *Carcinogenesis* 2(12): 1223-1228.