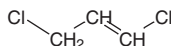


1,3-Dichloropropene (Technical Grade) CAS No. 542-75-6

Reasonably anticipated to be a human carcinogen
First Listed in the *Fifth Annual Report on Carcinogens* (1989)



Carcinogenicity

Technical-grade 1,3-dichloropropene, containing 1.0% epichlorohydrin as a stabilizer (trade name of the material purchased for testing was Telone II®), is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (NTP 1985, IARC 1986, 1987, 1999). When administered by gavage, Telone II® increased incidences of squamous cell papillomas and carcinomas of the forestomach and neoplastic nodules of the liver in male rats, and squamous cell papillomas of the forestomach in female rats. When administered by gavage, Telone II® increased the incidences of transitional cell carcinomas of the urinary bladder, alveolar/bronchiolar adenomas of the lung, and squamous cell papillomas or carcinomas of the forestomach in female mice. Evidence for carcinogenicity in male mice receiving Telone II® by gavage was considered to be inadequate because of reduced survival in the vehicle control group. However, there was some indication that Telone II® increased the incidences of transitional cell carcinomas of the urinary bladder, squamous cell papillomas of the forestomach, and alveolar/bronchiolar adenomas and carcinomas of the lung in male mice (NTP 1985). When administered by subcutaneous injection, the *cis* isomer of 1,3-dichloropropene induced injection-site fibrosarcomas in male mice (Van Duuren *et al.* 1979, IARC 1987).

No adequate data were available to evaluate the carcinogenicity of 1,3-dichloropropene in humans. Two cases of malignant histiocytic lymphoma were reported among nine firemen accidentally exposed to 1,3-dichloropropene six years before diagnosis. Because firemen are exposed to a large number of chemicals, the role of 1,3-dichloropropene could not be evaluated (IARC 1987).

Properties

1,3-Dichloropropene is a clear, white to lightly straw-colored liquid with a penetrating, irritating, chloroform-like odor. It is relatively insoluble in water and is soluble in ether, acetone, toluene, and benzene. 1,3-Dichloropropene is flammable, and when heated to decomposition it produces toxic fumes of hydrochloric acid and other chlorinated compounds as well as irritating gases. It reacts readily with aluminum, magnesium, and alloys of these metals (IARC 1987, 1999, HSDB 2000).

Telone II® was originally marketed as a mixture of technical-grade 1,3-dichloropropene isomers (89% to 92%) with small amounts of 1,2-dichloropropane, trichloropropane, and epichlorohydrin. As currently marketed, Telone II® is approximately 98% 1,3-dichloropropene with traces of 1,2-dichloropropane, and epoxidized soybean oil added as a stabilizer. Other trade names for technical-grade 1,3-dichloropropene products are D-D92, Doralone II, Nematox II, and Dedisol C.

Use

1,3-Dichloropropene (technical grade) is used as an intermediate in the manufacture of 3,3-dichloro-1-propene and other pesticides. Telone II® is a widely used agricultural soil fumigant for parasitic nematodes (NTP 1985, WHO 1993). Telone II® is used in Hawaii to control nematodes on pineapples (Albrecht 1987).

Production

Current production volumes for 1,3-dichloropropene were not found (WHO 1993). Chem Sources (2001) listed 12 U.S. suppliers of 1,3-dichloropropene. The USITC identified only one producer of the compound, with no stated production volume, from 1986 to 1994 (USITC 1987-1991, 1993-1995); the 1997 Directory of Chemical Producers also listed a single producer (SRI 1997). The EPA (OPPT) High Production Volume Chemicals list provided a production volume range of 3.0 to 5.0 million lb (EPA 1997). In 1985, the only domestic manufacturer of Telone II® produced an estimated 52 million lb (NTP 1985). U.S. imports constituted approximately 7% of production in 1985 and approximately 9% of production in 1984. In 1982, an estimated 25 million lb of Telone II® were produced in the United States (NTP 1985). The 1979 TSCA Inventory reported that eight manufacturers produced between 11 and 60 million lb of Telone II® in 1977 (TSCA 1979). No export data on Telone II® were available. Telone II® is the only technical-grade 1,3-dichloropropene product available in the United States.

Exposure

The primary routes of potential human exposure to 1,3-dichloropropene are inhalation of vapors, dermal contact, and ingestion of contaminated foods and drinking water (NTP 1985, ATSDR 1992, HSDB 2000). Although data pertaining to its occurrence in foods and water are limited, the presence of 1,3-dichloropropene in various water samples indicates its formation via chlorination of water (ATSDR 1992). Potential consumer exposure to 1,3-dichloropropene residues may occur through ingestion of pineapples fumigated with Telone II®. An estimate based on the usual application rate for Telone II® would indicate that nearly 2 million lb of the fumigant were used on pineapple fields in Hawaii in 1985 (Albrecht 1987). Workers may be exposed to 1,3-dichloropropene and its residues during the formulation and application of Telone II®. Additionally, workers in the pineapple production industry may be exposed during field preparation, planting, field maintenance, and crop harvesting (Albrecht 1987). The National Occupational Exposure Survey (1981-1983) indicated that 1,779 workers, including 33 women, were potentially exposed to 1,3-dichloropropene (NIOSH 1984). This estimate was based on observations of the actual use of the compound (89%) and the use of trade name products known to contain the compound (11%). EPA's Toxic Chemical Release Inventory (TRI) listed eight industrial facilities that produced, processed or otherwise used 1,3-dichloropropene in 1988 (TRI88 1990). The facilities reported releases of 1,3-dichloropropene to the environment, which were estimated to total 58,000 lb.

Regulations

EPA

Clean Air Act

NESHAP: Listed as a Hazardous Air Pollutant (HAP)

Urban Air Toxics Strategy: Identified as one of 33 HAPs that present the greatest threat to public health in urban areas

Clean Water Act

Effluent Guidelines: Listed as a Toxic Pollutant

Water Quality Criteria: Based on fish/shellfish and water consumption = 10 µg/L; based on fish/shellfish consumption only = 1,700 µg/L

Comprehensive Environmental Response, Compensation, and Liability Act

Reportable Quantity (RQ) = 100 lb

Emergency Planning and Community Right-to-Know Act

Toxics Release Inventory: Listed substance subject to reporting requirements

Resource Conservation and Recovery Act

Listed Hazardous Waste: Waste codes in which listing is based wholly or partly on substance - U084

Listed as a Hazardous Constituent of Waste

Guidelines

ACGIH

Threshold Limit Value - Time-Weighted Average Limit (TLV-TWA) = 1 ppm

NIOSHRecommended Exposure Limit (time-weighted-average workday) = 1 ppm (5 mg/m³)

Listed as a potential occupational carcinogen

REFERENCES

- Albrecht, W. N. 1987. Occupational exposure to 1,3-dichloropropene (Telone II) in Hawaiian pineapple culture. *Arch Environ Health* 42(5): 286-91.
- ATSDR. 1992. Toxicological Profile for 1,3-Dichloropropene (Final Report). NTIS Accession No. PB93-110765. Atlanta, GA: Agency for Toxic Substances and Disease Registry. 146 pp.
- ChemSources. 2001. Chemical Sources International, Inc. <http://www.chemsources.com>.
- EPA. 1997. OPPT High Production Volume Chemicals. U.S. Environmental Protection Agency. <http://www.epa.gov/oppt/chemtest/cus/90b.pdf>.
- HSDB. 2000. Hazardous Substances Data Base. National Library of Medicine. <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>.
- IARC. 1986. Some Hydrocarbons and Pesticide Exposures. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Humans, vol. 41. Lyon, France: International Agency for Research on Cancer. 434 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. 1984. National Occupational Exposure Survey (1981-83). Cincinnati, OH: U. S. Department of Health and Human Services. <http://www.cdc.gov/noes/noes3/empl0003.html>.
- NTP. 1985. Toxicology and Carcinogenesis Studies of Telone II (Technical Grade 1,3-Dichloropropene (CAS No. 542-75-6) Containing 1.0% Epichlorohydrin as a Stabilizer) in F344/N Rats and B6C31F Mice (Gavage Studies). Technical Report Series No 269. NIH Publication No. 85-2525. Research Triangle Park, NC: National Toxicology Program. 159 pp.
- SRI. 1997. Directory of Chemical Producers, United States, 1997. Stanford Research Institute, Menlo Park, CA: SRI International.
- TRI88. 1990. Toxic Chemical Release Inventory 1988. 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.
- USITC. 1987. Synthetic Organic Chemicals, United States Production and Sales, 1986. USITC Publication No 2009. Washington, D.C.: U.S. Government Printing Office.
- USITC. 1988. Synthetic Organic Chemicals, United States Production and Sales, 1987. USITC Publication No 2118. Washington, D.C.: U.S. Government Printing Office.
- USITC. 1989. Synthetic Organic Chemicals, United States Production and Sales, 1988. USITC Publication No 2219. Washington, D.C.: U.S. Government Printing Office.
- USITC. 1990. Synthetic Organic Chemicals, United States Production and Sales, 1989. USITC Publication No 2338. Washington, D.C.: U.S. Government Printing Office.
- USITC. 1991. Synthetic Organic Chemicals, United States Production and Sales, 1990. USITC Publication No 2470. Washington, D.C.: U.S. Government Printing Office.
- USITC. 1993. Synthetic Organic Chemicals, United States Production and Sales, 1991. USITC Publication No 2607. Washington, D.C.: U.S. Government Printing Office.
- USITC. 1994. Synthetic Organic Chemicals, United States Production and Sales, 1992. USITC Publication No 2720. Washington, D.C.: U.S. Government Printing Office.
- USITC. 1995. Synthetic Organic Chemicals, United States Production and Sales, 1994. USITC Publication No 2933. Washington, D.C.: U.S. Government Printing Office.
- Van Duuren, B. L., B. M. Goldschmidt, G. Loewengart, A. C. Smith, S. Melchionne, I. Seldman and D. Roth. 1979. Carcinogenicity of halogenated olefinic and aliphatic hydrocarbons in mice. *J Natl Cancer Inst* 63(6): 1433-9.
- WHO. 1993. 1,3-Dichloropropene, 1,2-Dichloropropane and Mixtures. Environmental Health Criteria 146. Geneva: World Health Organization. 261 pp.
-