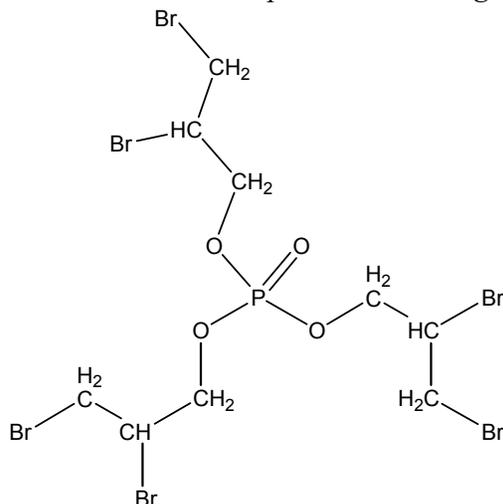


TRIS(2,3-DIBROMOPROPYL) PHOSPHATE

CAS No. 126-72-7

First Listed in the *Second Annual Report on Carcinogens*



CARCINOGENICITY

Tris(2,3-dibromopropyl) phosphate is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (NCI 1978, IARC 1979, 1987, 1999). When administered in the diet, tris(2,3-dibromopropyl) phosphate increased the incidences of kidney tubular cell adenomas or adenocarcinomas in rats of both sexes and male mice, hepatocellular carcinomas or adenomas in female mice, and forestomach squamous cell papillomas or carcinomas and bronchiolar/alveolar adenomas or carcinomas in mice of both sexes (NCI 1978). When administered topically, tris(2,3-dibromopropyl) phosphate increased the incidences of tumors of the skin, lung, forestomach, and oral cavity in female mice (IARC 1979, 1999).

No adequate human studies of the relationship between exposure to tris(2,3-dibromopropyl) phosphate and human cancer have been reported (IARC 1987, 1999).

PROPERTIES

Tris(2,3-dibromopropyl) phosphate is a viscous, pale yellow or a dense nearly colorless liquid. It is insoluble in water and miscible with carbon tetrachloride, chloroform, and methylene chloride. The compound is hydrolyzed by acids and bases. Tris(2,3-dibromopropyl) phosphate is available in the United States in at least two grades. Typical impurities include 2,3-dibromopropanol, 1,2,3-tribromopropane, and 1,2-dibromo-3-chloropropane (HSDB 2001).

USE

Tris(2,3-dibromopropyl) phosphate is no longer used in the United States. Previously, it was used primarily as a flame retardant additive for synthetic textiles and plastics. It was also recommended for use in phenolic resins, paints, paper coatings, and rubber. In 1977, the

Consumer Product Safety Commission (CPSC) banned the use of tris(2,3-dibromopropyl) phosphate in children's clothing and in fabric, yarn, and fiber when intended for use in such clothing. The ban, however, was not fully enforced. In 1978, the Commission identified 22 products containing the compound that were commercially available, including children's clothing, industrial uniforms, draperies, tent fabric, automobile headliners, epoxy resins for the electronics industry, Christmas decorations, and polyester thread (IARC 1979).

PRODUCTION

There were no reports that tris(2,3-dibromopropyl) phosphate is currently produced in the U.S. (WHO 1995). Chem Sources identified five U.S. distributors of the compound in 2001 (Chem Sources 2001). The 1979 TSCA Inventory reported that three manufacturers produced 605,000 lb in 1977 (TSCA 1979). In 1975, domestic production was estimated to be between 9 million and 12 million lb (IARC 1979, 1999). No data on imports or exports were available. Commercial production was first reported in the United States in 1959 (IARC 1979, 1999).

EXPOSURE

The primary routes of potential human exposure to tris(2,3-dibromopropyl) phosphate are inhalation, dermal contact, and ingestion. When released to soil, it leaches slowly to ground water, and under basic conditions it will hydrolyze. In water, it will rapidly hydrolyze. In the atmosphere, it will sorb to particulate matter and react with photochemically produced hydroxyl radicals (half-life = 3.74 days). Since the compound is no longer produced in the United States, the potential for exposure should be small; however, since CPSC has determined that it is present in some consumer products, the risk of exposure to tris(2,3-dibromopropyl) phosphate has not been eliminated. The compound persists in fabric and plastics, making occupational and consumer exposure possible. The chemical was widely used in children's sleepwear and mattresses, which presents a continuing risk if the items are "handed down" or reused (EPA 1983). CPSC estimated that over a 6-year period, a child wearing clothing treated with tris(2,3-dibromopropyl) phosphate could absorb from 2 to 77 mg of the compound/kg body weight. Approximately 180 µg/day is absorbed through the skin of children wearing treated polyester pajamas (IARC 1979); more recently, the Commission indicated that concentrations may be higher. Since the compound is still available in the United States, it is likely that workers involved in its use are potentially exposed to the compound. The National Occupational Hazard Survey, conducted by NIOSH from 1972 to 1974, estimated that 29,000 workers were potentially exposed to tris(2,3-dibromopropyl) phosphate by dermal contact in the workplace, primarily in the telephone communication industry (NIOSH 1976). This figure has probably decreased substantially since production was banned. Tris(2,3-dibromopropyl) phosphate does not occur naturally, but it has been detected in food and water. EPA estimated that as much as 10% of U.S. production entered the environment from textile finishing plants and laundries and that the remainder would have been disposed as solid waste (IARC 1979).

REGULATIONS

The U.S. Consumer Product Safety Commission (CPSC) acted under the Federal Hazardous Substances Act (FHSA) to remove all tris(2,3-dibromopropyl) phosphate-treated children's clothing from the market, as well as other consumer products containing tris(2,3-dibromopropyl) phosphate. The CPSC also prohibited the export of such products. Some

tris(2,3-dibromopropyl) phosphate-treated children's sleepwear, manufactured prior to the bans and stored in warehouses, may reappear illegally in the marketplace.

EPA regulates tris(2,3-dibromopropyl) phosphate under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Superfund Amendments and Reauthorization Act (SARA), and Toxic Substances Control Act (TSCA). Under CERCLA, EPA has established a reportable quantity (RQ) of 10 lb to control releases of tris(2,3-dibromopropyl) phosphate. Releases of the compound are also regulated under RCRA and SARA. Reporting requirements have been established under TSCA for any production, use, or import of the compound.

OSHA regulates tris(2,3-dibromopropyl) phosphate under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table 61.

REFERENCES

Chem Sources. Chemical Sources International, Inc. <http://www.chemsources.com>, 2001.

EPA. U.S. Environmental Protection Agency. An Overview of the Exposure Potential of Commercial Flame Retardants (Draft Report). EPA Contract No. 68-01-6239. U.S. EPA, Washington, DC, 1983.

HSDB. Hazardous Substances Data Bank. Online database produced by the National Library of Medicine. Tris(2,3-dibromo-1-propyl) phosphate. Profile last updated January 31, 2001. Last review date, March 17, 1989.

IARC. International Agency for Research on Cancer. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Some Halogenated Hydrocarbons. Vol. 20. 609 pp. Lyon, France: IARC, 1979.

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NCI. National Cancer Institute. Carcinogenesis, Technical Report Series No. 76. Bioassay of Tris(2,3-dibromopropyl) Phosphate for Possible Carcinogenicity (CAS No. 126-72-7). DHEW (NIH) Publication No. 78-1326. 62 pp. National Institutes of Health, Bethesda, MD, 1978.

NIOSH. National Institute for Occupational Safety and Health. National Occupational Hazard Survey (1972-74). Cincinnati, OH: Department of Health, Education, and Welfare, 1976.

tris(2,3-Dibromopropyl) phosphate (Continued)

TSCA. Toxic Substances Control Act, Chemical Substance Inventory, 1979: public record.

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