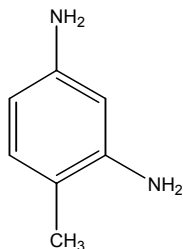


2,4-DIAMINOTOLUENE

CAS No. 95-80-7

First Listed in the *Second Annual Report on Carcinogens*



CARCINOGENICITY

2,4-Diaminotoluene is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (NCI 1979, IARC 1978, 1986). When administered in the diet, 2,4-diaminotoluene induced hepatocellular carcinomas or neoplastic nodules in rats of both sexes and fibromas of the subcutaneous tissue in male rats; it also increased the incidence of carcinomas or adenomas of the mammary gland in female rats. When administered in the diet, 2,4-diaminotoluene induced hepatocellular carcinomas and may have increased the incidence of lymphomas in female mice. No tumors occurred at significantly increased incidences in male mice. When injected subcutaneously, the compound induced local sarcomas in rats of both sexes (IARC 1978, 1986).

No adequate data were available to evaluate the carcinogenicity of 2,4-diaminotoluene in humans (IARC 1978).

PROPERTIES

2,4-Diaminotoluene is a colorless to brown, needle-shaped crystalline solid or powder that is soluble in water, ethanol, ether, and benzene. When heated to decomposition, it emits toxic fumes of nitrogen oxides. 2,4-Diaminotoluene is available in the U.S. as a commercial grade; however, the primary use of this chemical is as an intermediate without isolation, and it is typically produced as part of a mixture of approximately 80% 2,4- and 20% 2,6-diaminotoluene. It is also produced in smaller amounts as part of a mixture containing approximately 65% 2,4- and 35% 2,6-diaminotoluene (HSDB 2000).

USE

The primary use of 2,4-diaminotoluene is as an intermediate in the production of toluene diisocyanate, which is used to produce polyurethane. Small amounts of 2,4-diaminotoluene are used to produce dyes for textiles, leathers, furs, and wood and biological stains. 2,4-Diaminotoluene can be used in the production of approximately 60 dyes, 28 of which are believed to be produced in significant amounts worldwide. The following eight dyes, believed to be produced commercially from 2,4-diaminotoluene, were produced in the U.S. in 1975: C.I. Basic Brown 4, Basic Orange 1, Direct Brown 154, Direct Black 4, Direct Black 9, Leuco Sulfur Brown 10, Leuco Sulfur Brown 26, and Sulfur Black 2. These dyes are generally used to color silk, wool, paper, and leather. Some are also used to dye cotton fibers and cellulosic fibers, in

spirit varnishes and wood stains, as indicators in the manufacture of pigments, and as biological stains (IARC 1978).

2,4-Diaminotoluene is used as a developer for direct dyes, particularly to obtain black, dark-blue, and brown shades, and to obtain navy-blue and black colors on leather. It is also used in dyeing furs. In the U.S., 2,4-diaminotoluene was used in hair dye formulations until this use was banned in 1971 (IARC 1978). Other applications include its use for the preparation of impact resins, polyamides with superior wire coating properties, antioxidants, hydraulic fluids, polyurethane foams, fungicide stabilizers, and as a photographic developer (HSDB 2000).

PRODUCTION

In 1978, the IARC reported that 2,4-diaminotoluene had been produced commercially in the U.S. for over 50 years (IARC 1978); recent U.S. production data for only the 2,4-isomer could not be found in the published literature. Chem Sources (2001) identified seven U.S. suppliers of 2,4-diaminotoluene. In 1977, eight companies were reported to have produced more than 240 million lb and three companies imported 5,500 lb (TSCA 1979). No current data on imports or exports were available.

EXPOSURE

The primary routes of potential human exposure to 2,4-diaminotoluene are dermal contact and inhalation. The National Occupational Exposure Survey (1981-1983) indicated that 8,513 workers, including 395 women, were potentially exposed to 2,4-diaminotoluene (NIOSH 1990). EPA's Toxic Chemical Release Inventory (TRI) reported that a total of 664 lb of 2,4-diaminotoluene was released to the environment, only to the atmosphere, from five facilities (TRI99 2001).

Potential consumer exposure may occur as a result of the presence of trace contaminants in products that contain 2,4-diaminotoluene-based dyes (e.g., furs, leather, silk, textiles, and wool) (IARC 1978). Furthermore, the compound is a degradation product of the polyester urethane foam used in Meme silicone breast implants (Luu *et al.* 1998). Elevated levels were detected in the urine and plasma of patients up to two years post-operation; the levels ranged from 0.4 to 6 ng/mL (Sepai *et al.* 1995, Luu *et al.* 1998).

REGULATIONS

According to U.S. Consumer Product Safety Commission (CPSC), residual traces of 2,4-diaminotoluene may be present in some dyes based on the chemical and in the final consumer products. The presence of 2,4-diaminotoluene, even as a trace contaminant, may be a cause for concern; however, data describing the actual levels of impurities in the final product and the potential for consumer exposure are currently lacking.

EPA regulates 2,4-diaminotoluene under the Clean Air Act (CAA), 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). The National Emission Standards for Hazardous Air Pollutants (NESHAP) regulates 2,4-diaminotoluene emissions from processing facilities under CAA. Under CERCLA, EPA has established a reportable quantity (RQ) of 10 lb. RCRA

subjects wastes containing 2,4-diaminotoluene to handling and reporting and record-keeping requirements. EPA has included 2,4-diaminotoluene on a list of priority hazardous substances under SARA. Manufacturers, importers, and processors of 2,4-diaminotoluene are required to submit to EPA copies and lists of unpublished health and safety studies under TSCA.

FDA requires the use of warning labels on coal tar hair dyes containing 2,4-diaminotoluene under the Food, Drug, and Cosmetic Act (FD&CA). 2,4-Diaminotoluene is a hydrolysis product of polyurethane adhesives and of toluene diisocyanate, an adhesive component. The authorization for use of these urethane adhesives is being deferred pending evaluation of the potential for 2,4-diaminotoluene to migrate into food.

NIOSH has recommended that exposure to 2,4-diaminotoluene be reduced to the lowest feasible concentration. OSHA regulates 2,4-diaminotoluene under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table 57.

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