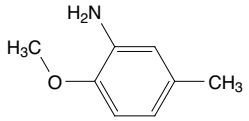
p-Cresidine

CAS No. 120-71-8

Reasonably anticipated to be a human carcinogen

First listed in the *Second Annual Report on Carcinogens* (1981)



Carcinogenicity

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

Cancer Studies in Experimental Animals

Oral exposure to *p*-cresidine caused tumors at several different tissue sites in mice and rats. Dietary administration of *p*-cresidine caused cancer of the urinary bladder (carcinoma, including squamous- and transitional-cell carcinoma) in mice and rats of both sexes, nasal cancer (olfactory neuroblastoma) in rats of both sexes, liver cancer (hepatocellular carcinoma) in female mice, and benign liver tumors (adenoma) in male rats (NCI 1979).

Cancer Studies in Humans

The data available from epidemiological studies are inadequate to evaluate the relationship between human cancer and exposure specifically to *p*-cresidine.

Properties

p-Cresidine is an aromatic amine that exists as white crystals at room temperature. It is slightly soluble in water and chloroform and soluble in ethanol, ether, benzene, and petroleum ether (HSDB 2009). Physical and chemical properties of *p*-cresidine are listed in the following table.

Property	Information
Molecular weight	137.2[a]
Density	1.0 g/cm^3 at 20°C[b]
Melting point	52°C[a]
Boiling point	235°C[a]
Log K_{ow}	1.74[a]
Water solubility	2.81 g/L at 25°C[c]
Vapor pressure	2.52×10^{-2} mm Hg at 25°C[c]

Sources: [a]HSDB 2009, [b]Akron 2009, [c]ChemIDplus 2009.

Use

p-Cresidine is used exclusively as a synthetic chemical intermediate to produce azo dyes and pigments, such as FD&C red no. 40 and C.I. direct black 17, direct blue 67, direct blue 126, direct green 26, direct orange 34, direct orange 83, direct red 79, direct violet 51, direct yellow 41, disperse black 2, direct orange 72, and direct violet 9. The dyes made with *p*-cresidine have been produced commercially in the United States and are used in the food and textile industries (NCI 1979, IARC 1982).

Production

p-Cresidine has been produced in the United States since 1926 (IARC 1982). In 2009, *p*-cresidine was produced by one manufacturer each in the United States and Europe and two manufacturers in India (SRI 2009) and was available from 26 suppliers, including 14 U.S. suppliers (ChemSources 2009). No data on U.S. imports or exports were found specifically for *p*-cresidine. Reports filed in 1986, 1990, and 1994 under the U.S. Environmental Protection Agency's Toxic Substances Control Act Inventory Update Rule indicated that U.S. production plus imports of *p*-cresidine totaled 1 million to 10 million pounds. The reported quantities were 500,000 lb to 1 million pounds in 1998 and 10,000 to 500,000 lb in 2002 (EPA 2004). In 2006, the quantity was less than 500,000 lb (EPA 2009).

Exposure

The routes of potential human exposure to *p*-cresidine are inhalation, ingestion, and dermal contact (HSDB 2009). *p*-Cresidine has been identified as a contaminant in FD&C red dye no. 40, which is used in gelatins, puddings, dairy products, confections, beverages, and condiments (FoodAdditives 2006, Richfield-Fratz *et al.* 1989). EPA's Toxics Release Inventory reported that in 1988, almost 13,000 lb of *p*-cresidine was released, mostly to air. From 1988 to 2002, environmental releases declined steadily except in 2000, when slightly over 12,000 lb was released to an off-site waste broker. No releases of *p*-cresidine were reported from 2002 to 2004. After 2004, releases of 260 lb (250 lb to surface water and 10 lb to air) were reported in 2005, 2006, and 2007 (TRI 2009). When released to air, *p*-cresidine is expected to exist solely as a vapor, with an estimated half-life of 2 hours. It is volatile in water, with an estimated half-life of 23 days in a river model and 169 days in a lake model. When released to soil or water, it is expected to bind to organic matter in soil, sediment, or suspended solids, because of the reactivity of the aromatic amine group. It is not expected to hydrolyze rapidly or to bioaccumulate in aquatic organisms (HSDB 2009).

Potential occupational exposure is believed to have been limited to workers in dye-production facilities in the past (NCI 1979). No estimates were found of the number of workers potentially exposed to *p*-cresidine.

Regulations

Environmental Protection Agency (EPA)

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.

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