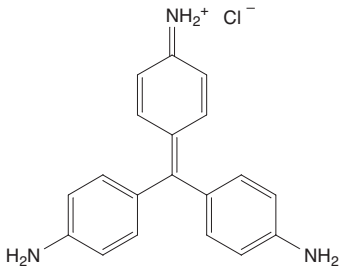
Basic Red 9 Monohydrochloride

CAS No. 569-61-9

Reasonably anticipated to be a human carcinogen

First listed in the *Fifth Annual Report on Carcinogens* (1989)

Also known as C.I. basic red monohydrochloride, C.I. 42500, or pararosaniline hydrochloride



Carcinogenicity

Basic red 9 monohydrochloride is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity from studies in experimental animals.

Cancer Studies in Experimental Animals

Exposure to basic red 9 monohydrochloride caused tumors in two rodent species, at several different tissue sites, and by two different routes of exposure. Oral administration of basic red 9 monohydrochloride caused liver cancer (hepatocellular carcinoma) in mice of both sexes and in male rats. In rats of both sexes, it caused cancer of the Zymbal gland (carcinoma), benign and malignant thyroid-gland tumors (follicular-cell adenoma and carcinoma), and benign skin tumors (fibroma). It also caused benign and malignant skin tumors (sebaceous adenoma, trichoepithelioma, and squamous-cell carcinoma) in male rats and benign adrenal-gland tumors (pheochromocytoma) in female mice. Other tumors possibly resulting from oral exposure were mammary-gland tumors in female rats and tumors of the hematopoietic system in female mice. Subcutaneous injection of basic red 9 monohydrochloride caused cancer at the injection site (sarcoma) in rats of unspecified sex (IARC 1974, 1987).

Cancer Studies in Humans

The data available from epidemiological studies are inadequate to evaluate the relationship between human cancer and exposure specifically to basic red 9 monohydrochloride. Evidence for the possible carcinogenicity of basic red 9 monohydrochloride in humans comes from an epidemiological study in which the incidence of urinary-bladder tumors was elevated among workers involved in the manufacture of magenta dye, of which basic red 9 monohydrochloride is a component (IARC 1974). However, it is not possible to determine whether the increased incidence of cancer in magenta workers was attributable to exposure to magenta or to one or more of its intermediates and impurities, such as *o*-toluidine or aniline.

Since basic red 9 monohydrochloride was listed in the *Fifth Annual Report on Carcinogens,* the International Agency for Research on Cancer has reaffirmed that the evidence for carcinogenicity in humans is inadequate for magenta and basic red 9 monohydrochloride and sufficient for the manufacture of magenta (Baan *et al.* 2008).

Properties

Basic red 9 monohydrochloride is a triphenylmethane dye that is a colorless to red or dark-green crystalline powder at room temperature. It is slightly soluble in water and ether and soluble in ethanol, methanol, and ethylene glycol methyl ether (HSDB 2009). It is stable under normal temperatures and pressures, but may decompose if heated (Akron 2009). Physical and chemical properties of basic red 9 monohydrochloride are listed in the following table.

Property	Information
Molecular weight	323.8[a]
Melting point	268°C to 270°C (decomposes)[a]
Log K_{ow}	0.21[a]
Water solubility	3 g/L at 25°C[b]
Vapor pressure	9.26×10^{-10} mm Hg[b]

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

Use

Basic red 9 monohydrochloride can be used to make C.I. solvent blue 23 and is a component of magenta dye (C.I. 42510). The Biological Stain Commission has determined that magenta must contain at least 50% C.I. basic red 9 in order to perform satisfactorily as a component of nutrient agar used in biological testing. Basic red 9 monohydrochloride is also used as a biological stain and as a dye for textiles (silks and acrylics), leather, fur, paper, carbon paper, plastics, glass, waxes, polishes, soaps, cosmetics, drugs, toilet sanitary preparations, automobile antifreeze solutions, anodized aluminum, high-speed photoduplicating inks, photo-imaging systems, and ink-jet computer printers (NTP 1986, IARC 1993, HSDB 2009).

Production

Two U.S. companies produced over 900 kg (2,000 lb) of C.I. basic red 9 in 1972, over 450 kg (1,000 lb) in 1975, and between 1 million and 10 million pounds in 1977 (NTP 1986, HSDB 2009). In 2009, no commercial producers of basic red 9 monohydrochloride were identified worldwide; however, 14 suppliers were identified, including 12 U.S. suppliers (ChemSources 2009). In 1974, the United States imported 2,000 kg (4,410 lb) of basic red 9 (HSDB 2009); no more recent data on U.S. exports or imports were found.

Exposure

The routes of potential human exposure to basic red 9 monohydrochloride are dermal contact, inhalation, and ingestion. Laboratory personnel who use and handle basic fuchsin dye might be exposed to basic red 9 monohydrochloride (HSDB 2009). Exposure might also occur through its use in magenta used in photoduplicating inks, photo-imaging systems, and ink-jet computer printers. The National Occupational Exposure Survey (conducted from 1981 to 1983) estimated that 907 workers (mostly from the Food and Kindred Products and Health Services industries), including 733 women, potentially were exposed to basic red 9 monohydrochloride (NIOSH 1990).

Regulations and Guidelines

Department of Transportation (DOT)

Toxic dyes and toxic dye intermediates are considered hazardous materials, and special requirements have been set for marking, labeling, and transporting these materials.

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