

3,3'-Dimethylbenzidine

119-93-7

Hazard Summary

3,3'-Dimethylbenzidine is used as an intermediate in the production of dyes and pigments. Acute (short-term) exposure to high levels of 3,3'-dimethylbenzidine in humans may irritate the nose and throat. No information is available on the chronic (long-term), reproductive, developmental, or carcinogenic effects of 3,3'-dimethylbenzidine in humans. A study by the National Toxicology Program (NTP) reported that oral exposure to 3,3'-dimethylbenzidine dihydrochloride resulted in an increased incidence of tumors of the skin, liver, intestine, lung, and other organs. EPA has classified 3,3'-dimethylbenzidine as a Group B2, probable human carcinogen.

Please Note: The main sources of information for this fact sheet are the Hazardous Substances Data Bank (HSDB) (1), a database of summaries of peer-reviewed literature, and the Registry of Toxic Effects of Chemical Substances (RTECS) (6), a database of toxic effects that are not peer reviewed.

Uses

- 3,3'-Dimethylbenzidine is used as an intermediate for the production of dyes and pigments. (6)

Sources and Potential Exposure

- Occupational exposure to 3,3'-dimethylbenzidine may occur for those workers in dye manufacturing and processing plants. (1)
- Dermal exposure to the general population may occur from the use of packaged dyes and pigments for home use derived from 3,3'-dimethylbenzidine. (1)

Assessing Personal Exposure

- No information is available on the measurement of personal exposure to 3,3'-dimethylbenzidine.

Health Hazard Information

Acute Effects:

- Acute exposure to high levels of 3,3'-dimethylbenzidine in humans may irritate the nose and throat. (2)
- No information is available on the acute effects of 3,3'-dimethylbenzidine in animals.

Chronic Effects (Noncancer):

- No information is available on the chronic effects of 3,3'-dimethylbenzidine in humans.
- Effects to the liver, kidney, spleen, bone marrow, thymus, lymph nodes, and body weight were observed in rats chronically exposed to 3,3'-dimethylbenzidine hydrochloride in drinking water. (7)
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for 3,3'-dimethylbenzidine. (3)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of 3,3'-dimethylbenzidine in

humans or animals.

- Immature sperm forms were observed in the testis and epididymus of male rats exposed to 3,3'-dimethylbenzidine dihydrochloride in drinking water. (7)

Cancer Risk:

- No information is available on the carcinogenic effects of 3,3'-dimethylbenzidine in humans.
- A study by the NTP reported an increased incidence of tumors of the intestine, skin, liver, lung, and other organs in rats from exposure to 3,3'-dimethylbenzidine dihydrochloride in drinking water. (7)
- EPA has classified 3,3'-dimethylbenzidine as a Group B2, probable human carcinogen. (4)
- EPA has calculated an oral cancer slope factor of $9.2 \text{ (mg/kg/d)}^{-1}$. (4)

Physical Properties

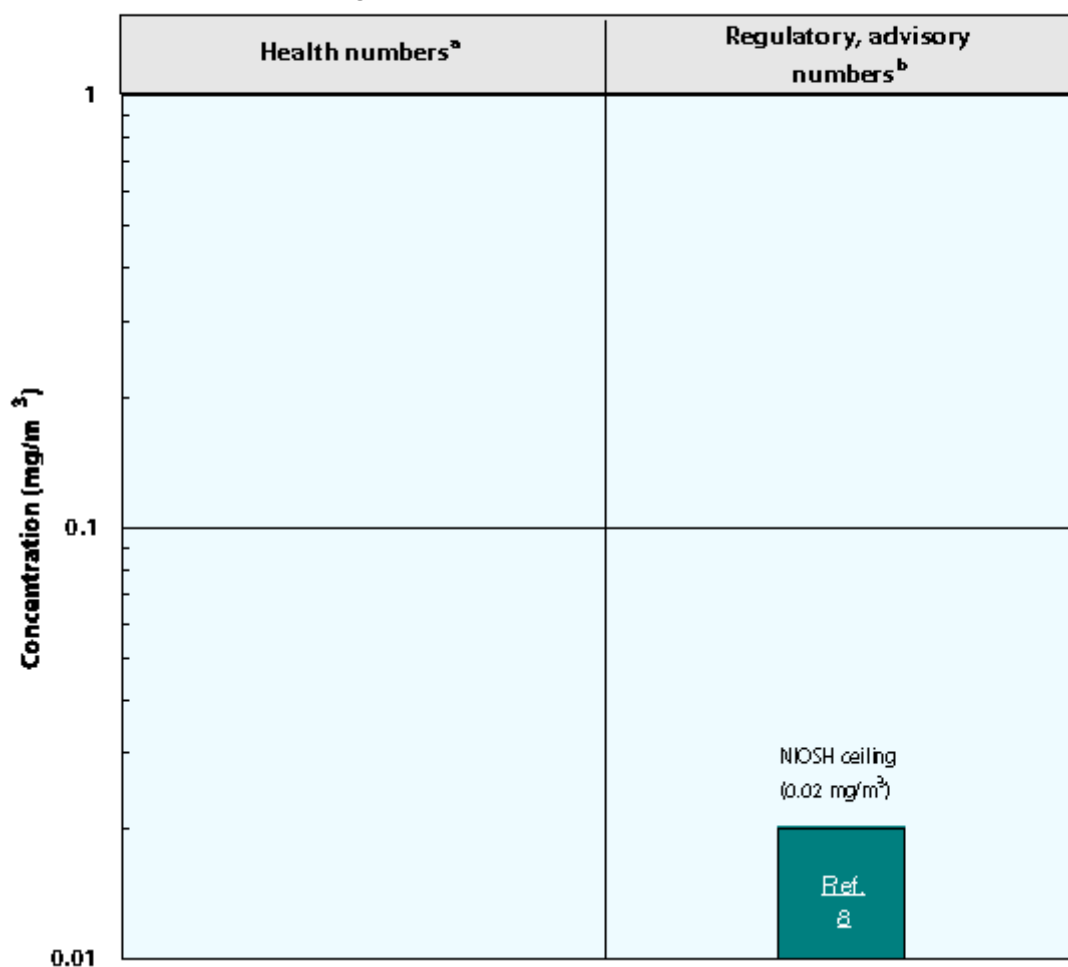
- 3,3'-Dimethylbenzidine is a white to red colored crystalline solid. (2)
 - The chemical formula for 3,3'-dimethylbenzidine is $\text{C}_{14}\text{H}_{16}\text{N}_2$, and the molecular weight is 212.3 g/mol. (5)
 - The vapor pressure for 3,3'-dimethylbenzidine is 1.7×10^{-4} mm Hg at 25 °C, and it has a log octanol/water partition coefficient ($\log K_{ow}$) of 4.59. (5)
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Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m^3 : $\text{mg/m}^3 = (\text{ppm}) \times (\text{molecular weight of the compound}) / (24.45)$. For 3,3'-dimethylbenzidine: $1 \text{ ppm} = 8.68 \text{ mg/m}^3$.

Health Data from Inhalation Exposure

3,3-Dimethylbenzidine



NIOSH REL ceiling --National Institute of Occupational Safety and Health recommended exposure limit ceiling; the concentration of a substance that should not be exceeded at any time.

The health and regulatory values cited in this factsheet were obtained in December 1999.

^a Health numbers are toxicological numbers from animal testing or risk assessment values developed by EPA.

^b Regulatory numbers are values that have been incorporated in Government regulations, while advisory numbers are nonregulatory values provided by the Government or other groups as advice. NIOSH numbers are advisory.

Summary created in April 1992, updated January 2000

References

1. U.S. Department of Health and Human Services. Hazardous Substances Data Bank (HSDB, online database). National Toxicology Information Program, National Library of Medicine, Bethesda, MD. 1993.
2. New Jersey Department of Health. Hazardous Substance Fact Sheet on 3,3'-Dimethylbenzidine. New Jersey Department of Health, Trenton, NJ. 1986.
3. U.S. Environmental Protection Agency. Integrated Risk Information System (IRIS) on 3,3'-Dimethylbenzidine. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 1999.
4. U.S. Environmental Protection Agency. Health Effects Assessment Summary Tables. FY 1997 Update. Solid Waste and Emergency Response, Office of Emergency and Remedial Response, Cincinnati, OH. EPA/540/R-97-036. 1997.
5. U.S. Environmental Protection Agency. Assessment Tools for the Evaluation of Risk (ASTER, online database). Environmental Research Laboratory, Duluth, MN. 1993.
6. U.S. Department of Health and Human Services. Registry of Toxic Effects of Chemical Substances (RTECS,

online database). National Toxicology Information Program, National Library of Medicine, Bethesda, MD. 1993.

7. National Toxicology Program. Toxicology and Carcinogenesis Studies of 3,3'-Dimethylbenzidine Dihydrochloride (CAS No. 612-82-8) in F344/N Rats (Drinking Water Studies). TR No. 390. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, Bethesda, MD. 1991.
8. National Institute for Occupational Safety and Health (NIOSH). *Pocket Guide to Chemical Hazards*. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention. Cincinnati, OH. 1997.