

3,3-Dimethoxybenzidine

119-90-4

Hazard Summary

3,3'-Dimethoxybenzidine is used as an intermediate in the production of dyes and pigments. No information is available on the acute (short-term), chronic (long-term), reproductive, developmental, or carcinogenic effects of 3,3'-dimethoxybenzidine in humans. Animal studies have reported effects on the liver, kidneys, spleen, and bladder, and endocrine effects, gastritis, intestinal hemorrhage, and weight loss from chronic oral exposure. Increased incidences of tumors in several organs have been reported in rats orally exposed to 3,3'-dimethoxybenzidine or its salt. EPA has classified 3,3'-dimethoxybenzidine 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literature, and the Registry of Toxic Effects of Chemical Substances (RTECS) (3), a database of toxic effects that are not peer reviewed.

Uses

- 3,3'-Dimethoxybenzidine is used as an intermediate for the production of dyes and pigments. (2)

Sources and Potential Exposure

- Occupational exposure to 3,3'-dimethoxybenzidine may occur for those workers in dye manufacturing and processing plants. (1,2)
- Dermal exposure to the general population may occur from the use of packaged dyes and pigments for home use derived from 3,3'-dimethoxybenzidine. (2)

Assessing Personal Exposure

- Tests are available that measure 3,3'-dimethoxybenzidine in the urine of exposed individuals. (2)

Health Hazard Information

Acute Effects:

- No information is available on the acute effects of 3,3'-dimethoxybenzidine in humans.
- Acute animal tests in rats have shown 3,3'-dimethoxybenzidine to have moderate acute toxicity from oral exposure. (3)

Chronic Effects (Noncancer):

- No information is available on the chronic effects of 3,3'-dimethoxybenzidine in humans.
- Animal studies have reported effects on the liver, kidneys, spleen, and bladder, and endocrine effects, gastritis, intestinal hemorrhage, and weight loss from oral exposure. (2)
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for 3,3'-dimethoxybenzidine.

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of 3,3'-dimethoxybenzidine in humans or animals.

Cancer Risk:

- No information is available on the carcinogenic effects of 3,3'-dimethoxybenzidine in humans.
- A study by the National Toxicology Program reported an increased incidence of tumors of the mammary glands, intestine, skin, Zymbal gland, preputial and clitoral glands, oral cavity, liver, brain, mesothelium, and uterus/cervix from exposure to 3,3'-dimethoxybenzidine dihydrochloride in drinking water in rats. (5)
- EPA has classified 3,3'-dimethoxybenzidine as a Group B2, probable human carcinogen. (4)
- EPA has calculated an oral cancer slope factor of $0.014 \text{ (mg/kg/d)}^{-1}$ and an oral unit risk estimate of $4.0 \times 10^{-7} \text{ (}\mu\text{g/L)}^{-1}$. (4)

Physical Properties

- 3,3'-Dimethoxybenzidine is a colorless crystalline compound that turns violet upon exposure to air. (2)
- The chemical formula for 3,3'-dimethoxybenzidine is $\text{C}_{14}\text{H}_{16}\text{N}_2\text{O}_2$, and the molecular weight is 244.30 g/mol. (2)
- The vapor pressure for 3,3'-dimethoxybenzidine is 8.8×10^{-9} mm Hg at 25 °C, and it has a log octanol/water partition coefficient ($\log K_{ow}$) of 1.81. (1,2)
- It is almost insoluble in water. (6)

Note: There are very few health numbers or regulatory/advisory numbers for 3,3'-dimethoxybenzidine; thus, a graph has not been prepared for this compound. The health information cited in this factsheet was obtained in December 1999.

Conversion Factors:

To convert concentrations in air (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'-dimethoxybenzidine: $1 \text{ ppm} = 9.99 \text{ mg/m}^3$.

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. U.S. Environmental Protection Agency. Health and Environmental Effects Profile on 3,3'-Dimethoxybenzidine. Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH. 1987.
3. 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.
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. National Toxicology Program. Toxicology and Carcinogenesis Studies of 3,3'-Dimethoxybenzidine Dihydrochloride (CAS No. 20325-40-0) in F344/N Rats (Drinking Water Studies). TR No. 372. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, Bethesda, MD. 1990.