

1,2,4-Trichlorobenzene

120-82-1

Hazard Summary

Occupational exposure to 1,2,4-trichlorobenzene may occur from inhalation during its manufacture and use. No information is available on the acute (short-term), chronic (long-term), reproductive, developmental, and carcinogenic effects of 1,2,4-trichlorobenzene in humans. Local irritation of the lungs and dyspnea have been reported in animals following acute inhalation exposure. Chronic oral exposure has been observed to result in increased adrenal weights and vacuolization of the zona fasciculata in the cortex in rats. Liver effects have also been reported following chronic oral exposure in rats. EPA has classified 1,2,4-trichlorobenzene as a Group D, not classifiable as to human carcinogenicity.

Please Note: The main source of information for this fact sheet is EPA's Integrated Risk Information System (IRIS) (2), which contains information on oral chronic toxicity and the Reference Dose (RfD). Another secondary source is the Hazardous Substances Data Bank (HSDB), a database of summaries of peer-reviewed literature. (1)

Uses

- 1,2,4-Trichlorobenzene is used as a dye carrier, a herbicide intermediate, a heat-transfer medium, a dielectric fluid in transformers, a degreaser, a lubricant, in synthetic transformer oils, and as a solvent in chemical manufacturing. (1,6)
- 1,2,4-Trichlorobenzene was formerly used as an insecticide against termites. (1,6)

Sources and Potential Exposure

- Occupational exposure to 1,2,4-trichlorobenzene will result mainly from inhalation during its manufacture and use. (1)
- The general population may be exposed by the consumption of contaminated drinking water and food, especially contaminated fish. (1)

Assessing Personal Exposure

- No information was located regarding the measurement of personal exposure to 1,2,4-trichlorobenzene.

Health Hazard Information

Acute Effects:

- No information is available on the acute health effects of 1,2,4-trichlorobenzene in humans.
- Adrenal enlargement was observed in rats following acute exposure by intraperitoneal (i.p.) injection. (1,2)
- Local irritation of the lungs and dyspnea have been reported in animals following acute inhalation exposure. (1)
- Acute animal tests in rats and mice have demonstrated 1,2,4-trichlorobenzene to have moderate to high acute toxicity from oral exposure. (3)

Chronic Effects (Noncancer):

- No information is available on the chronic health effects of 1,2,4-trichlorobenzene in humans.

- Chronic oral exposure has been observed to result in increased adrenal weights and vacuolization of the zona fasciculata in the cortex in rats. (1,2)
- Enzymatic changes in the liver have been reported following chronic oral exposure in rats. (2)
- 1,2,4-Trichlorobenzene is not very irritating to the skin, although fissuring typical of defatting action has been observed after prolonged contact in rabbits and guinea pigs. (1)
- The Reference Dose (RfD) for 1,2,4-trichlorobenzene is 0.01 milligrams per kilogram body weight per day (mg/kg/d) based on increased adrenal weights in rats. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer effects during a lifetime. It is not a direct estimator of risk but rather a reference point to gauge the potential effects. At exposures increasingly greater than the RfD, the potential for adverse health effects increases. Lifetime exposure above the RfD does not imply that an adverse health effect would necessarily occur. (2)
- EPA has medium confidence in the study used as the basis for the RfD because this study provides sufficient data with multiple endpoints and used appropriate group sizes; medium to low confidence in the database because no chronic exposure study is available; and, consequently, medium confidence in the RfD. (2)
- EPA has calculated a provisional Reference Concentration (RfC) of 0.2 milligrams per cubic meter (mg/m³) for 1,2,4-trichlorobenzene based on liver weight changes in rats, rabbits, dogs, and monkeys. The provisional RfC is a value that has had some form of Agency review, but it does not appear on IRIS. (4)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of 1,2,4-trichlorobenzene in humans.
- Several studies reported that 1,2,4-trichlorobenzene did not affect fertility or viability nor cause increased resorptions, embryoletality, or teratogenicity in orally exposed rats. One oral study in rats reported retarded growth in fetuses. (1,2)

Cancer Risk:

- No information is available on the carcinogenic effects of 1,2,4-trichlorobenzene in humans.
- When 1,2,4-trichlorobenzene was applied to the skin of mice, the incidence of any single tumor type was not increased significantly. (2)
- EPA has classified 1,2,4-trichlorobenzene as a Group D, not classifiable as to human carcinogenicity. (2)

Physical Properties

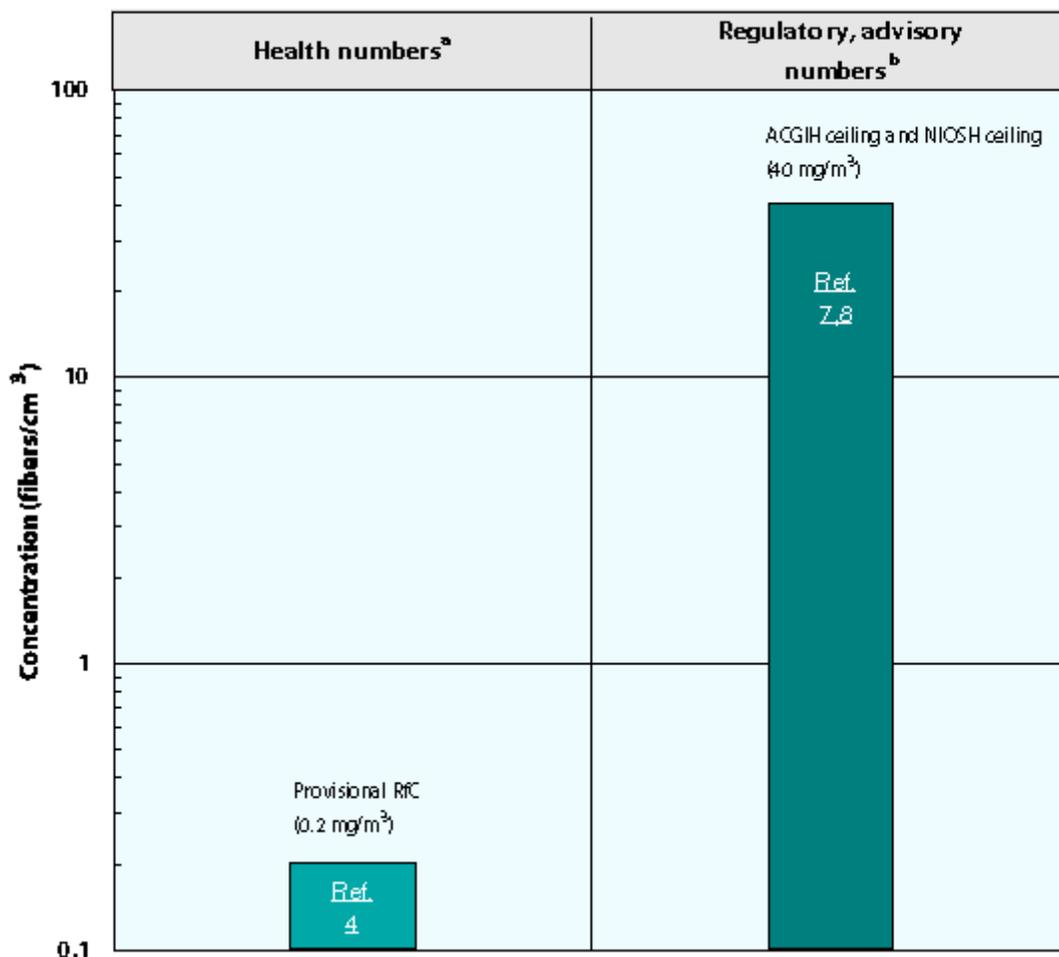
- The chemical formula for 1,2,4-trichlorobenzene is C₆H₃Cl₃, and its molecular weight is 181.46 g/mol. (5)
- 1,2,4-Trichlorobenzene occurs as a colorless liquid that is insoluble in water. (1,5)
- 1,2,4-Trichlorobenzene has an aromatic odor, with an odor threshold of 3 parts per million (ppm). (1)
- The vapor pressure for 1,2,4-trichlorobenzene is 0.29 mm Hg at 25 °C, and its log octanol/water partition coefficient (log K_{ow}) is 4.02. (1)

Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m³: $\text{mg/m}_3^3 = (\text{ppm}) \times (\text{molecular weight of the compound}) / (24.45)$. For 1,2,4-trichlorobenzene: 1 ppm = 7.42 mg/m³.

Health Data from Inhalation Exposure

1,2,4-Trichlorobenzene



ACGIH ceiling --American Conference of Governmental and Industrial Hygienists' threshold limit value ceiling; the concentration of a substance that should not be exceeded during any part of the working exposure.
 NIOSH ceiling --National Institute of Occupational Safety and Health's recommended exposure limit ceiling; the concentration 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 and ACGIH numbers are advisory.

Summary created in April 1992, updated January 2000

References

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4. U.S. Environmental Protection Agency. Health Effects Assessment Summary Tables. FY 1997 Update. Office of Research and Development, Office of Emergency and Remedial Response, Washington, DC. EPA/540/R-97-036. 1997.
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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.