2,4,5-Trichlorophenol

95-95-4

Hazard Summary

Exposure to 2,4,5-trichlorophenol may occur during its production or use as a pesticide. Acute (short-term) dermal exposure to 2,4,5-trichlorophenol may burn skin in humans. It also irritates the eyes, nose, pharynx, and lungs in humans. No information is available on the chronic (long-term), reproductive, developmental, or carcinogenic effects of 2,4,5-trichlorophenol in humans. In one study, slight degenerative changes were observed in the liver and kidneys of rats chronically exposed to 2,4,5-trichlorophenol in their diet. EPA has classified 2,4,5-trichlorophenol as a Group D, not classifiable as to human carcinogenicity.

Please Note: The main sources of information for this fact sheet are EPA's Integrated Risk Information System (IRIS) (5), which contains information on oral chronic toxicity of 2,4,5-trichlorophenol and the RfD, and EPA's Health and Environmental Effects Document for Chlorinated Phenols. (4) Another secondary source is the Hazardous Substances Data Bank (HSDB), a database of summaries of peer-reviewed literature. (1)

Uses

- 2,4,5-Trichlorophenol is used as a fungicide in paper and pulp mills, as an herbicide, and as an intermediate in the manufacture of other pesticides (e.g., the herbicides 2,4,5-trichlorophenoxyacetic acid and Silvex and the insecticide Ronnel). (1,2,6)

Sources and Potential Exposure

- The most probable routes of human exposure to 2,4,5-trichlorophenol are inhalation and dermal contact of workers involved in the manufacture, formulation, or application of pesticides containing this compound. (1)
- 2,4,5-Trichlorophenol may be released through its production and use as a pesticide and pesticide intermediate. (2)
- 2,4,5-Trichlorophenol may also be released in emissions from incinerators to the ambient air. It has also been detected in drinking water. The general population may be exposed to low levels of 2,4,5-trichlorophenol through air, food, or drinking water. (1,2)

Assessing Personal Exposure

- No information was located regarding the measurement of personal exposure to 2,4,5-trichlorophenol.

Health Hazard Information

Acute Effects:

- Acute dermal exposure to 2,4,5-trichlorophenol may burn the skin and produce redness and edema in humans. It also irritates the eyes, nose, pharynx, and lungs in humans. (1)
- Tests involving acute exposure of rats, mice, and guinea pigs have demonstrated 2,4,5-trichlorophenol to have moderate acute toxicity by oral exposure. (3)

Chronic Effects (Noncancer):

- No information is available on the chronic effects of 2,4,5-trichlorophenol in humans.
- In one study, slight degenerative changes were observed in the liver and kidneys of rats chronically exposed to 2,4,5-trichlorophenol in their diet. (2,4,5)
- EPA has not established a Reference Concentration (RfC) for 2,4,5-trichlorophenol. (5)
- The Reference Dose (RfD) for 2,4,5-trichlorophenol is 0.1 milligram per kilogram body weight per day (mg/kg/d) based on liver and kidney pathology 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. (5)
- EPA has medium confidence in the study on which the RfD was based because, while five dose groups were tested and several parameters were monitored, only a few animals were tested per dose; low confidence in the database because little supporting data exist; and, consequently, low confidence in the RfD. (5)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of 2,4,5-trichlorophenol in humans.
- In several studies of mice exposed to 2,4,5-trichlorophenol via gavage (experimentally placing the chemical in the stomach), no birth defects were observed. In one study, a reduction in litter size was reported. (1,4)
- No changes in maternal or fetal parameters were noted in rats exposed to 2,4,5-trichlorophenol by injection. (4)

Cancer Risk:

- No information is available on the carcinogenic effects of 2,4,5-trichlorophenol in humans.
- EPA has classified 2,4,5-trichlorophenol as a Group D, not classifiable as to human carcinogenicity due to inadequate human and animal data. (4)

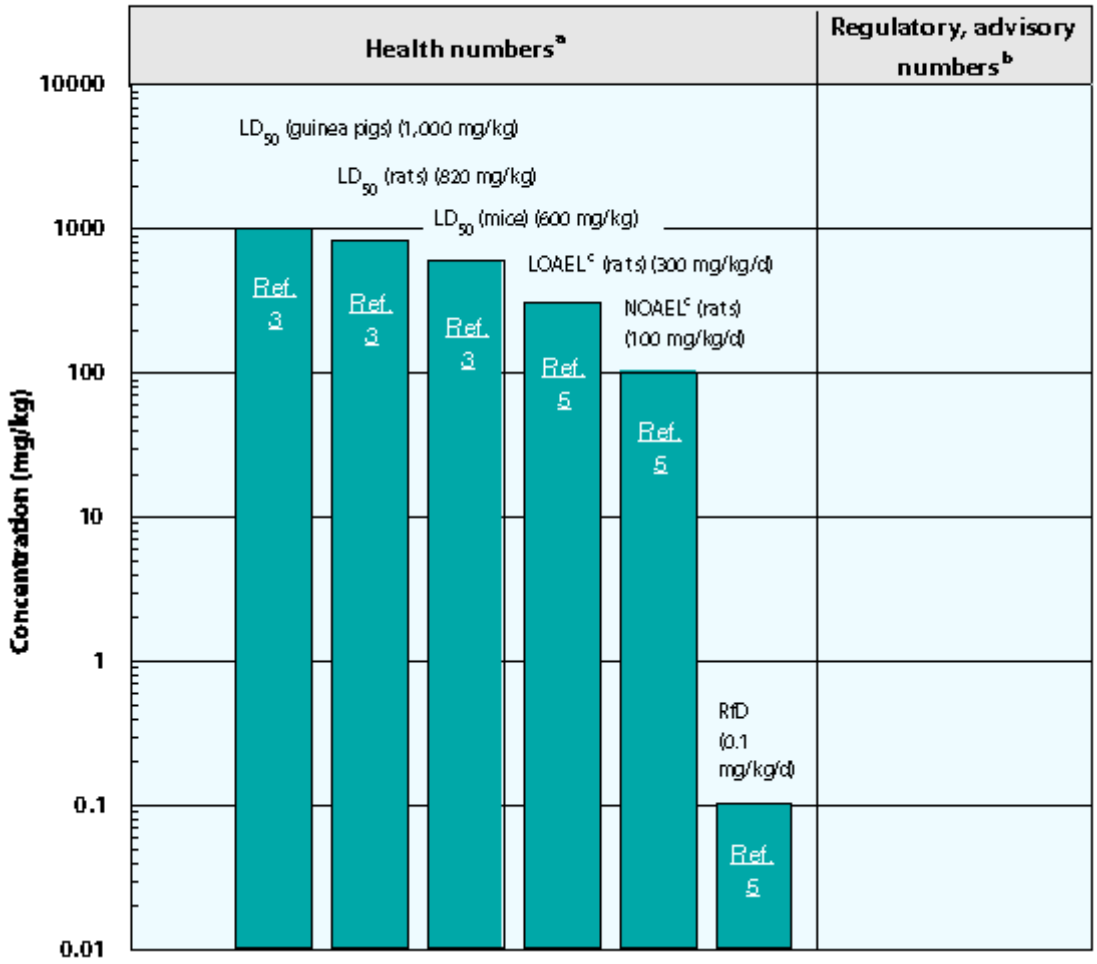
Physical Properties

- The chemical formula for 2,4,5-trichlorophenol is $C_6H_3Cl_3O$, and it has a molecular weight of 197.45 g/mol. (4)
- 2,4,5-Trichlorophenol occurs as gray flakes or needles that are sparingly soluble in water. (1,2,4)
- 2,4,5-Trichlorophenol has a strong unpleasant phenolic odor; the odor threshold has not been established. (4,6)
- The log octanol/water partition coefficient (log K_{ow}) of 2,4,5-trichlorophenol is 3.72. (4)
- The vapor pressure for 2,4,5-trichlorophenol is 1 mm at 72 °C. (2)

Conversion Factors:
To convert concentrations in air (at 25 °C) from ppm to mg/m^3: mg/m^3 = (ppm) × (molecular weight of the compound)/(24.45). For 2,4,5-trichlorophenol: 1 ppm = 8.1 mg/m^3.

Health Data from Oral Exposure

2,4,5-Trichlorophenol



LD_{50} (Lethal Dose $_{50}$)--A calculated dose of a chemical in water to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.
LOAEL--Lowest-observed-adverse-effect level.
NOAEL--No-observed-adverse-effect level.

The health 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.
[c] The LOAEL and NOAEL are from the critical study used as the basis for the EPA RfD.

Summary created in April 1992, updated January 2000

References

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2. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans: Some Halogenated Hydrocarbons. Volume 20. World Health Organization, Lyon. 1979.
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 and Environmental Effects Document for Chlorinated Phenols (Final Draft). ECAO-CIN-G013. Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH. 1987.
5. U.S. Environmental Protection Agency. Integrated Risk Information System (IRIS) on 2,4,5-Trichlorophenol. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 1999.
6. The Merck Index. An Encyclopedia of Chemicals, Drugs, and Biologicals. 11th ed. Ed. S. Budavari. Merck and Co. Inc., Rahway, NJ. 1989.