

2,4,6-Trichlorophenol

88-06-2

Hazard Summary

2,4,6-Trichlorophenol is no longer used in the United States and only very low levels have been detected in ambient air. Limited information is available on the acute (short-term) and chronic (long-term) effects of 2,4,6-trichlorophenol in humans. The only available human study reported respiratory effects, such as cough, chronic bronchitis, chest wheezing, altered pulmonary function, and pulmonary lesions from chronic exposure to 2,4,6-trichlorophenol via inhalation. There are no studies available on the reproductive, developmental, or carcinogenic effects of 2,4,6-trichlorophenol in humans. 2,4,6-Trichlorophenol has been shown to be carcinogenic in animals, producing lymphomas, leukemia, and liver cancer via oral exposure. EPA has classified 2,4,6-trichlorophenol as a Group B2, probable human carcinogen.

Please Note: The main sources of information for this fact sheet are EPA's Integrated Risk Information System (IRIS) (3), which contains information on the carcinogenic effects of 2,4,6-trichlorophenol including the unit cancer risk for inhalation exposure, and the Agency for Toxic Substances and Disease Registry's (ATSDR's) Toxicological Profile for 2,4,6-Trichlorophenol. (1)

Uses

- 2,4,6-Trichlorophenol is no longer used in the United States. It was previously used as an antiseptic; a pesticide for wood, leather, and glue preservation; and as an anti-mildew treatment. It was also used in the manufacture of other chemicals. (1)
- Production of 2,4,6-trichlorophenol was discontinued in the United States in the 1980s. (1)

Sources and Potential Exposure

- Very low levels of 2,4,6-trichlorophenol have been detected in air, with levels generally less than 0.001 parts per billion (ppb). (1)
- 2,4,6-Trichlorophenol exposure may occur through drinking water or food. (1)
- Exposure to 2,4,6-trichlorophenol may occur through its use in pesticides, or wood, leather, or glue preservatives which were produced before 2,4,6-trichlorophenol production was discontinued in the 1980s. (1)

Assessing Personal Exposure

- A test is available that can measure the amount of 2,4,6-trichlorophenol in the blood. (1)

Health Hazard Information

Acute Effects:

- No studies are available on the acute effects of 2,4,6-trichlorophenol in humans via inhalation or oral exposure. (1)
- Tests involving acute exposure of rats have shown 2,4,6-trichlorophenol to have moderate acute toxicity.(2)

Chronic Effects (Noncancer):

- The only available chronic inhalation study in humans reported that occupational exposure to 2,4,6-trichlorophenol was associated with respiratory effects such as cough, chronic bronchitis, chest wheezing, altered pulmonary function, and pulmonary lesions. (1)
- Animal studies have reported effects on the blood (increased splenic hematopoiesis) and liver (midzonal vacuolization of hepatocytes and hepatic hyperplasia) from chronic oral exposure to 2,4,6-trichlorophenol, while no effects on the cardiovascular system, gastrointestinal system, kidneys, skin, immune system, or central nervous system were reported in these studies. (1)
- EPA has not established a Reference Concentration (RfC) or Reference Dose (RfD) for 2,4,6-trichlorophenol. (3)

Reproductive/Developmental Effects:

- No studies are available on the developmental or reproductive effects of 2,4,6-trichlorophenol in humans from inhalation or oral exposure. (1)
- Animal studies have reported a transient reduction in the body weight of the offspring of rats exposed to 2,4,6-trichlorophenol orally, while no other developmental effects have been noted in animal studies. (1)
- Reduced mean litter size was observed in rats following maternal exposure to 2,4,6-trichlorophenol in the drinking water, while no reproductive effects were observed in other animal studies via gavage (placing the chemical experimentally in the stomach). (1)

Cancer Risk:

- No studies are available on the carcinogenic effects of 2,4,6-trichlorophenol in humans from inhalation or oral exposure. (1,3)
- Oral exposure to 2,4,6-trichlorophenol in rats and mice resulted in an increased incidence of lymphomas or leukemias and hepatocellular adenomas or carcinomas. (1,3)
- EPA has classified 2,4,6-trichlorophenol as a Group B2, probable human carcinogen. (3)
- EPA uses mathematical models, based on animal studies, to estimate the probability of a person developing cancer from breathing air containing a specified concentration of a chemical. EPA calculated an inhalation unit risk estimate of $3.1 \times 10^{-6} (\mu\text{g}/\text{m}^3)^{-1}$. EPA estimates that, if an individual were to continuously breathe air containing 2,4,6-trichlorophenol at an average of $0.3 \mu\text{g}/\text{m}^3$ ($3 \times 10^{-4} \text{mg}/\text{m}^3$) over his or her entire lifetime, that person would theoretically have no more than a one-in-a-million increased chance of developing cancer as a direct result of breathing air containing this chemical. Similarly, EPA estimates that breathing air containing $3.0 \mu\text{g}/\text{m}^3$ ($3 \times 10^{-3} \text{mg}/\text{m}^3$) would result in not greater than a one-in-hundred thousand increased chance of developing cancer, and air containing $30.0 \mu\text{g}/\text{m}^3$ ($3 \times 10^{-2} \text{mg}/\text{m}^3$) would result in not greater than a one-in-ten-thousand increased chance of developing cancer. For a detailed discussion of confidence in the potency estimates, please see IRIS. (3)
- EPA has also calculated an oral unit risk factor of $3.1 \times 10^{-7} (\mu\text{g}/\text{L})^{-1}$ and an oral cancer slope factor of $0.011 (\text{mg}/\text{kg}/\text{day})^{-1}$. (3)

Physical Properties

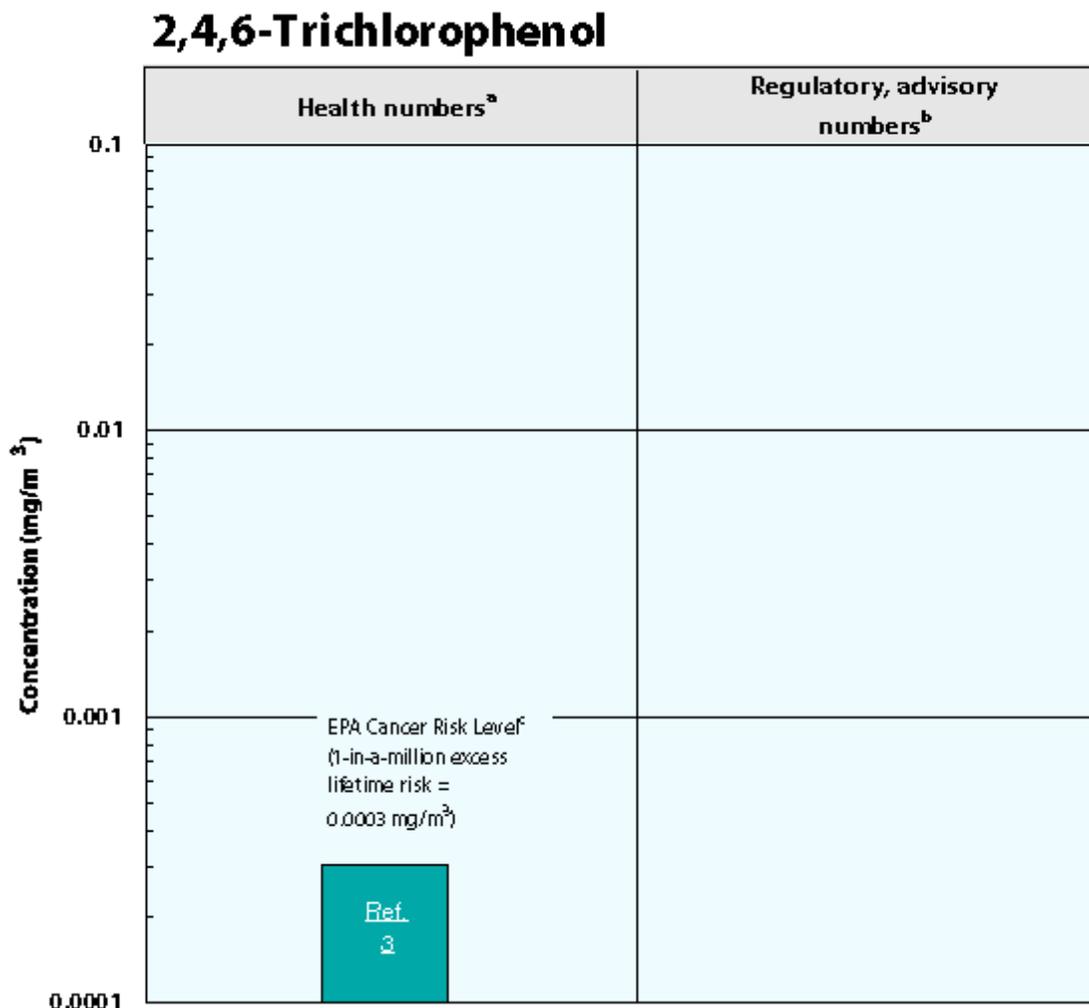
- 2,4,6-Trichlorophenol is a yellow solid or flakes with a strong, sweet smell. (1)
- The odor threshold for 2,4,6-trichlorophenol is 0.0026 parts per million (ppm). (1)
- The chemical formula for 2,4,6-trichlorophenol is $\text{C}_6\text{H}_3\text{Cl}_3\text{O}$, and its molecular weight is 197.46 g/mol. (1)
- The vapor pressure for 2,4,6-trichlorophenol is 0.012 mm Hg at 25 °C, and it has a log octanol/water partition coefficient ($\log K_{ow}$) of 3.38. (1)

Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m^3 : $\text{mg}/\text{m}^3 = (\text{ppm}) \times (\text{molecular weight of the})$

compound)/(24.45). For 2,4,6-trichlorophenol: $1 \text{ ppm} = 8.1 \text{ mg/m}^3$. To convert concentrations in air from $\mu\text{g/m}^3$ to mg/m^3 : $\text{mg/m}^3 = (\mu\text{g/m}^3) \times (1 \text{ mg}/1,000 \mu\text{g})$.

Health Data from Inhalation Exposure



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 These cancer risk estimates were derived from oral data and converted to provide the estimated inhalation risk.

Summary created in April 1992, updated January 2000

References

1. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological Profile for 2,4,6-Trichlorophenol. U.S. Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA. 1990.
2. 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.
3. U.S. Environmental Protection Agency. Integrated Risk Information System (IRIS) on 2,4,6-Trichlorophenol. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 1999.