1,2-Diphenylhydrazine

122-66-7

Hazard Summary

1,2-Diphenylhydrazine was used in the past to produce benzidine-based dyes. Currently, the only use for it in the United States is in the production of anti-inflammatory drugs. Limited information is available on the health effects of 1,2-diphenylhydrazine. No information is available on the acute (short-term), chronic (long-term), reproductive, developmental, or carcinogenic effects of 1,2-diphenylhydrazine in humans. In a National Cancer Institute (NCI) study, liver tumors were observed in both sexes of rats and female mice exposed to 1,2-diphenylhydrazine in their diet. EPA has classified 1,2-diphenylhydrazine 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 1,2-diphenylhydrazine including the unit cancer risk for inhalation exposure, and the Agency for Toxic Substances and Disease Registry's (ATSDR's) Toxicological Profile for 1,2-Diphenylhydrazine. (1)

Uses

- 1,2-Diphenylhydrazine is no longer produced in the United States. (1)
- 1,2-Diphenylhydrazine is used as a starting material in the production of benzidine. Benzidine was used in the past to manufacture benzidine-based dyes which are no longer used in the United States, but may still be used in other countries. (1)
- 1,2-Diphenylhydrazine is used in the production of anti-inflammatory drugs. (1)

Sources and Potential Exposure

• Human exposure to 1,2-diphenylhydrazine appears to be primarily occupational; however, the number of workers potentially exposed has declined because dye manufacturers in the United States no longer produce benzidine-based dyes. (1)

Assessing Personal Exposure

• There is no test currently available to determine whether or not exposure to 1,2-diphenylhydrazine has occurred. (1)

Health Hazard Information

Acute Effects:

• No information is available on the acute effects of 1,2-diphenylhydrazine in humans or animals.

Chronic Effects (Noncancer):

- No information is available on the chronic effects of 1,2-diphenylhydrazine in humans. No inhalation data are available in animals.
- Degenerative alterations in the liver and depressed weight gain have been observed in rats and mice chronically exposed to 1,2-diphenylhydrazine in their diet. (1,2,4)

- Intestinal hemorrhage in mice and stomach hyperkeratosis and acanthosis in rats has been observed when the rodents were chronically exposed to 1,2-diphenylhydrazine in their diet. (1,2,4)
- Chronic oral administration of 1,2-diphenylhydrazine produced interstitial inflammation of the lungs in rats. (1)
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for 1,2diphenylhydrazine. (3)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of 1,2-diphenylhydrazine in humans.
- In one study, no effects on reproductive organs were found in rats and mice exposed via ingestion. (1)

Cancer Risk:

- No information is available on the carcinogenic effects of 1,2-diphenylhydrazine in humans.
- In an NCI study, hepatocellular carcinomas were observed in both sexes of rats and female mice exposed to 1,2-diphenylhydrazine in their diet; mammary adenocarcinomas were also observed in female rats. (3,4)
- EPA has classified 1,2-diphenylhydrazine as a Group B2, probable human carcinogen. (3)
- EPA uses mathematical models, based on human and 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 $2.2 \times 10^{-4} (\mu g/m^3)^{-1}$. EPA estimates that, if an individual were to continuously breathe air containing 1,2-diphenylhydrazine at an average of 0.005 $\mu g/m^3$ (0.000005 mg/m³) 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 0.05 $\mu g/m^3$ (0.00005 mg/m³) would result in not greater than a one-in-a-hundred thousand increased chance of developing cancer, and air containing 0.5 $\mu g/m^3$ (0.0005 mg/m³) would result in not greater than a one-in-a-million containing 0.5 $\mu g/m^3$ (0.0005 mg/m³) would result in not greater than a one-in-a-hundred thousand increased chance of developing cancer, and air containing 0.5 $\mu g/m^3$ (0.0005 mg/m³) 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 calculated an oral cancer slope factor of 0.8 (mg/kg/d) . (3)

Physical Properties

- The chemical formula for 1,2-diphenylhydrazine is $C \underset{12}{H} \underset{12}{N} \underset{2}{N}$, and its molecular weight is 184.24 g/mol. (1)
- 1,2-Diphenylhydrazine occurs as a white crystalline solid that dissolves only slightly in water. (1)
- The odor threshold for 1,2-diphenylhydrazine has not been established. (1)
- The vapor pressure for 1,2-diphenylhydrazine is 2.6×10^{-5} mm Hg at 25 °C, and its log octanol/water partition coefficient (log K) is 2.94. (1)

Note: There are very few health numbers or regulatory/advisory numbers for 1,2-diphenylhydrazine; thus, a graph has not been prepared for this compound. The health information cited in this fact sheet was obtained in December 1999.

Conversion Factors (only for the gaseous form):

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 1,2-diphenylhydrazine: 1 ppm = 7.54 mg/m 3 .

Summary created in April 1992, updated January 2000

References

1. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological Profile for 1,2-Diphenylhydrazine. Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA. 1990.

- U.S. Environmental Protection Agency. Health Effects Assessment for 1,2-Diphenylhydrazine. EPA/600/8-88/033. Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH. 1988.
- U.S. Environmental Protection Agency. Integrated Risk Information System (IRIS) on 1,2-Diphenylhydrazine. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 1999.
- National Cancer Institute. Bioassay of Hydrazobenzene for Possible Carcinogenicity (CAS No. 122-66-7). TR-92. U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health. 1978.