

4-Nitrophenol

100-02-7

Hazard Summary

4-Nitrophenol is used to manufacture drugs, fungicides, insecticides, and dyes and to darken leather. Acute (short-term) inhalation or ingestion of 4-nitrophenol in humans causes headaches, drowsiness, nausea, and cyanosis (blue color in lips, ears, and fingernails). Contact with eyes causes irritation in humans. No information is available on the chronic (long-term) effects of 4-nitrophenol in humans or animals from inhalation or oral exposure. No information is available on the reproductive, developmental, or carcinogenic effects of 4-nitrophenol in humans. EPA has not classified 4-nitrophenol for potential carcinogenicity.

Please Note: The main source of information for this fact sheet is the Agency for Toxic Substances and Disease Registry's (ATSDR's) Toxicological Profile for Nitrophenols. (1)

Uses

- 4-Nitrophenol is used to manufacture drugs (e.g., acetaminophen), fungicides, methyl and ethyl parathion insecticides, and dyes and to darken leather. (1)

Sources and Potential Exposure

- No information is available on the levels of 4-nitrophenol in ambient air or in food, and 4-nitrophenol has not been detected in drinking water. (1)
- Occupational exposure to 4-nitrophenol may occur for those workers involved in the manufacture or use of 4-nitrophenol. (1)

Assessing Personal Exposure

- Methods exist for measuring 4-nitrophenol in the urine. However, these methods are not very useful unless the exposure was very recent. (1)

Health Hazard Information

Acute Effects:

- Acute inhalation or ingestion of 4-nitrophenol in humans causes headaches, drowsiness, nausea, and cyanosis. Contact with the eyes causes irritation. (2)
- A study examining the acute effects of 4-nitrophenol from inhalation exposure in rats reported an increase in methemoglobin and corneal opacity. (1)
- Tests involving acute exposure of rats and mice have shown 4-nitrophenol to have [high](#) toxicity from oral and dermal exposure. (1,3)

Chronic Effects (Noncancer):

- No information is available on the chronic effects of 4-nitrophenol in humans or animals from inhalation or oral exposure. (1)
- An animal study examining the chronic effects of 4-nitrophenol from dermal exposure reported no effects on the respiratory, cardiovascular, gastrointestinal, muscular, immune, and central nervous systems, or the

liver and kidney. The only effects noted were dermal irritation consisting of erythema, scaling, scabbing, and cracking of the skin. (1)

- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for 4-nitrophenol. (4)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of 4-nitrophenol in humans.(1)
- One animal study reported no histological alterations in the testes and epididymides in mice exposed to 4-nitrophenol by inhalation, while in another study no changes were observed in the reproductive index of pregnant mice given 4-nitrophenol by gavage (placing the chemical experimentally in the stomach). (1)

Cancer Risk:

- No information is available on the carcinogenic effects of 4-nitrophenol in humans. (1)
- There was no evidence of carcinogenic activity in mice dermally exposed to 4-nitrophenol for 18 months in a National Toxicology Program (NTP) study. (5)
- EPA has not classified 4-nitrophenol for potential carcinogenicity. (4)

Physical Properties

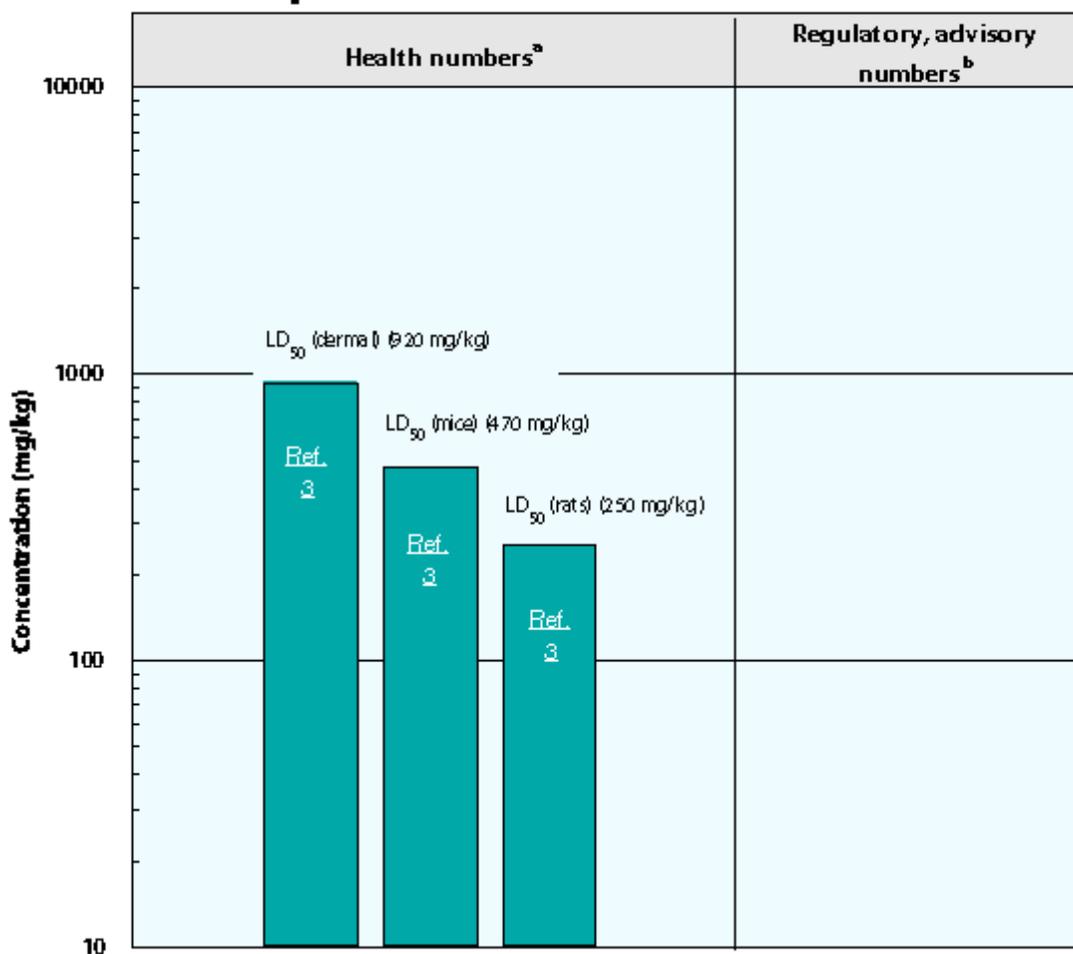
- 4-Nitrophenol is a colorless to light yellow solid with no odor. (1)
 - The chemical formula for 4-nitrophenol is $C_6H_5NO_3$, and the molecular weight is 139.11 g/mol. (1)
 - The vapor pressure for 4-nitrophenol is 0.0003 mm Hg at 30 °C, and it has a log octanol/water partition coefficient ($\log K_{ow}$) of 1.91. (1)
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Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m^3 : $mg/m^3 = (ppm) \times (\text{molecular weight of the compound}) / (24.45)$. For 4-nitrophenol: 1 ppm = 5.7 mg/m^3 .

Health Data from Oral Exposure

4-Nitrophenol



LD₅₀ (Lethal Dose₅₀)--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.

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.

Summary created in April 1992, updated January 2000

References

1. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological Profile for Nitrophenols (Draft). Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA. 1990.
2. 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.
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. Integrated Risk Information System (IRIS) on p-Nitrophenol. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 1999.
5. National Toxicology Program. Toxicology and Carcinogenesis Studies of p-Nitrophenol (CAS No. 100-02-7) in Swiss Webster Mice (Dermal Studies). TR-417. 1993.