

2-Nitropropane

79-46-9

Hazard Summary

2-Nitropropane is used primarily as a solvent. Severe liver damage, as well as some kidney damage, has been observed in workers poisoned from acute (short-term) inhalation exposure to 2-nitropropane. Chronic (long-term) inhalation exposure to 2-nitropropane has caused nausea, vomiting, diarrhea, severe headaches, and pulmonary irritation in workers. Liver effects have been observed in animals chronically exposed to 2-nitropropane by inhalation. No information is available on the reproductive, developmental, or carcinogenic effects of 2-nitropropane in humans. In one animal study, liver tumors were observed in rats. EPA has classified 2-nitropropane 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) (6), which contains information on inhalation chronic toxicity of 2-nitropropane and the [RfC](#), and EPA's Health and Environmental Effects Profile for 2-Nitropropane. (2)

Uses

- 2-Nitropropane is primarily used as a solvent for organic compounds, coatings, inks, dyes, adhesives, and vinyl resins. It improves drying time, insures more complete solvent release, provides better flow characteristics, and insures greater pigment dispersion. (1,2,3,5)
- 2-Nitropropane has a minor use as an additive in explosives, propellants, and fuels (in racing cars). It also has limited use as a paint and varnish remover. (5)
- 2-Nitropropane serves as an intermediate in the synthesis of some pharmaceuticals, dyes, insecticides, and textile chemicals. (5)

Sources and Potential Exposure

- Occupational exposure to 2-nitropropane may occur in many industries including industrial construction and maintenance, printing, highway maintenance (traffic markings), shipbuilding and maintenance (marine coatings), and furniture and plastic products. (1)
- 2-Nitropropane has been detected in tobacco smoke. (1)

Assessing Personal Exposure

- No information was located regarding the measurement of personal exposure to 2-nitropropane.

Health Hazard Information

Acute Effects:

- Severe liver damage, as well as some kidney damage, has been observed in workers fatally poisoned from acute inhalation exposure to high concentrations of 2-nitropropane. (2,3,6)
- Tests involving acute exposure of rats and mice have demonstrated 2-nitropropane to have [moderate](#) to [high](#) acute toxicity from inhalation and [moderate](#) acute toxicity from oral exposure. (4)

Chronic Effects (Noncancer):

- Chronic inhalation exposure to 2-nitropropane has caused nausea, vomiting, diarrhea, severe headaches, and pulmonary irritation in workers. (3,5)
- In rats and other animals chronically exposed to 2-nitropropane by inhalation, liver effects have been observed. Mild pulmonary effects have been observed in rats and rabbits. (2,6)
- The Reference Concentration (RfC) for 2-nitropropane is 0.02 milligrams per cubic meter (mg/m^3) based on liver focal vacuolization and nodules in rats. The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation 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 RfC, the potential for adverse health effects increases. Lifetime exposure above the RfC does not imply that an adverse health effect would necessarily occur. (6)
- EPA has low confidence in the critical studies on which the RfC is based because only a single exposure concentration was studied and it identified only a lowest-observed-adverse-effect level (LOAEL); low confidence in the database because of a lack of reproductive or developmental studies; and, consequently, low confidence in the RfC. (6)
- EPA has not established a Reference Dose (RfD) for 2-nitropropane. (6)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of 2-nitropropane in humans.
- One animal study has reported fetal toxicity (delayed fetal heart development) following injection of 2-nitropropane in rats. (2,6)

Cancer Risk:

- In one epidemiology study, there were no trends indicating increased carcinogenic risk from exposure to 2-nitropropane in humans. (2)
- In one animal study, multiple hepatocellular carcinomas were observed in rats. (2,3)
- EPA has classified 2-nitropropane as a Group B2, probable human carcinogen. (7)
- EPA has calculated a provisional inhalation unit risk factor of $0.0027 (\mu\text{g}/\text{m}^3)^{-1}$. (7)

Physical Properties

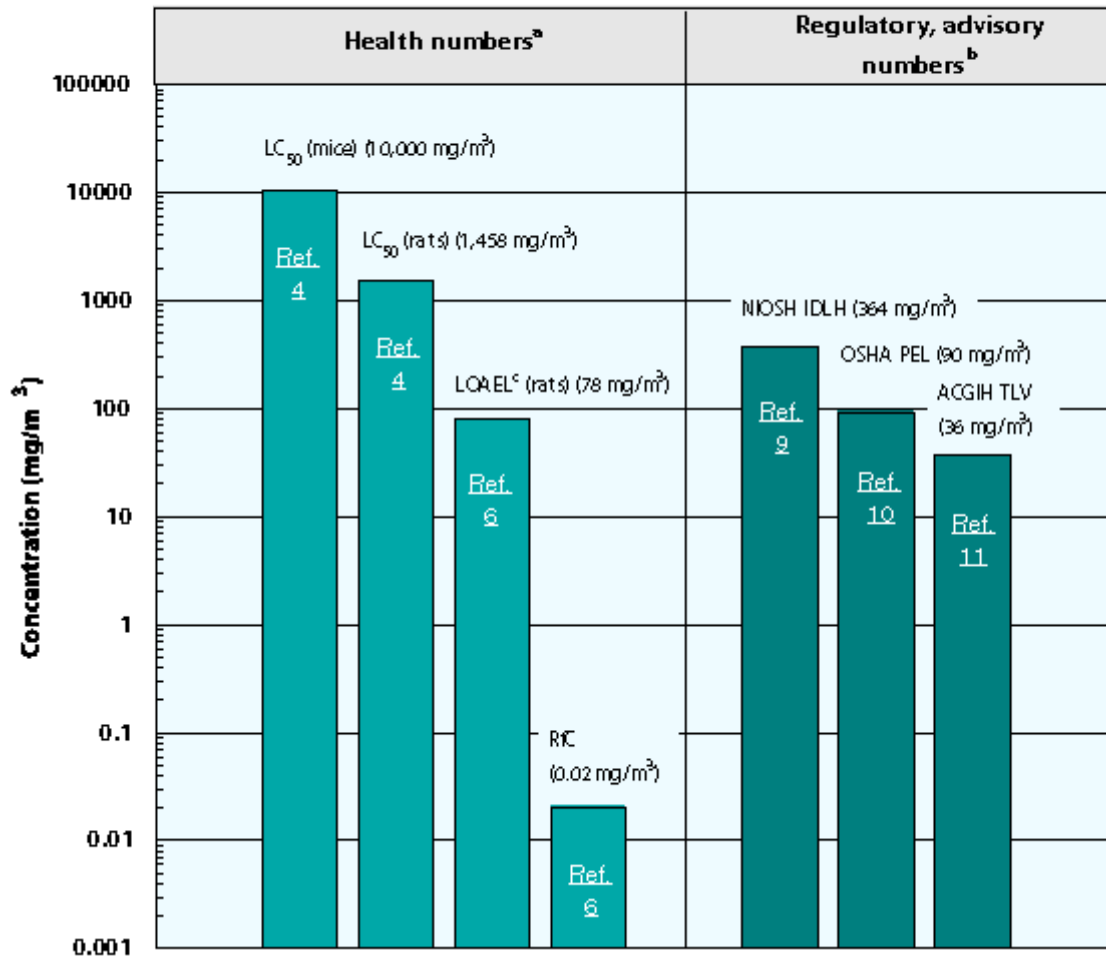
- The chemical formula for 2-nitropropane is $\text{C}_3\text{H}_7\text{NO}_2$, and it has a molecular weight of 89.095 g/mol. (2)
- 2-Nitropropane is a colorless liquid that is slightly soluble in water. (2)
- 2-Nitropropane has a mild odor with an odor threshold of 70 parts per million (ppm) ($255 \text{ mg}/\text{m}^3$). (2,8)
- The vapor pressure for 2-nitropropane is 18.0 mm Hg at 25 °C. (2)

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-nitropropane: $1 \text{ ppm} = 3.64 \text{ mg}/\text{m}^3$. To convert concentrations in air from $\mu\text{g}/\text{m}^3$ to mg/m^3 : $\text{mg}/\text{m}^3 = (\mu\text{g}/\text{m}^3) \times (1 \text{ mg}/1,000 \mu\text{g})$.

Health Data from Inhalation Exposure

2-Nitropropane



ACGIH TLV--American Conference of Governmental and Industrial Hygienists' threshold limit value expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effects.

LC₅₀ (Lethal Concentration₅₀)--A calculated concentration of a chemical in air to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.

NIOSH IDLH-- National Institute of Occupational Safety and Health's immediately dangerous to life or health concentration; NIOSH recommended exposure limit to ensure that a worker can escape from an exposure condition that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from the environment.

OSHA PEL--Occupational Safety and Health Administration's permissible exposure limit expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-h workday or a 40-h workweek.

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. OSHA numbers are regulatory, whereas NIOSH and ACGIH numbers are advisory.

^c The LOAEL is from the critical study used as the basis for the EPA RfC.

Summary created in April 1992, updated January 2000

References

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