

DNOC

4,6-DINITRO-o-CRESOL (DNOC) (including salts)

534-52-1

Hazard Summary

4,6-Dinitro-o-cresol (DNOC) was used as a pesticide until 1991. It is extremely toxic to humans. Symptoms of acute (short-term) and chronic (long-term) toxicity include profuse sweating, increased pulse and respiratory rates, thirst, fatigue, headache, appetite loss, and greenish-yellow pigmentation of the conjunctivae in humans. Bilateral cataracts and blindness have been observed in individuals chronically exposed to DNOC by ingestion. Effects to the respiratory, cardiovascular, gastrointestinal, and central nervous system (CNS) of chronically exposed workers have been reported. No information is available on the reproductive, developmental, or carcinogenic effects of DNOC in humans. EPA has not classified DNOC for potential carcinogenicity.

Please Note: The main source of information for this fact sheet is EPA's Health and Environmental Effects Profile for Dinitrocresols (1) and the Agency for Toxic Substances and Disease Registry's (ATSDR's) Toxicological Profile for Dinitrocresols. (5)

Uses

- EPA cancelled DNOC's registration as a pesticide in 1991. (5)
- DNOC was used as a dormant spray insecticide, especially for thinning the blossoms of fruit trees or to kill locusts. (1,5,7)
- DNOC was also used as a contact herbicide for the control of broad-leaf weeds in cereals and for the pre-harvest desiccation of potatoes and leguminous seed crops. (1,5)

Sources and Potential Exposure

- Workers may have been formerly exposed by inhalation or dermal contact during the manufacture, formulation, or application of the pesticide. (1,5)
- DNOC may have been released to water in industrial effluents, by direct pesticidal applications, or by pesticide leaching or runoff. (1,5)

Assessing Personal Exposure

- DNOC can be measured in the blood, urine, and tissues of exposed persons. (5)

Health Hazard Information

Acute Effects:

- Increased basal metabolic rates have resulted in humans following acute and chronic exposures to DNOC. Symptoms of toxicity from acute exposure include profuse sweating, increased pulse rate, increased respiratory rate, thirst, fatigue, lethargy, headache, nausea, appetite loss, malaise, collapse, coma and greenish-yellow pigmentation of the conjunctivae in humans. Yellow coloring of the hands, nails, and hair may also result. (1,2,5)
- Damage to the liver, kidney, and nervous system have been reported in humans following acute exposure.

(2,5)

- DNOC is an uncoupler of oxidative phosphorylation, which accounts for its extreme acute toxicity. (1)
- Dermal contact may lead to local necrosis. (3,5)
- Acute animal tests in rats, mice, rabbits, and guinea pigs have demonstrated DNOC to have **extreme** acute toxicity from oral exposure and **high** acute toxicity from dermal exposure. (4)

Chronic Effects (Noncancer):

- Chronic exposure results in the same symptoms of toxicity in humans as acute exposure (see acute effects section). (1,2,5)
- Bilateral cataracts and blindness have been observed in individuals chronically exposed to DNOC by ingestion. (1,5)
- Respiratory, cardiovascular, gastrointestinal, and CNS effects in chronically exposed workers have been reported. (1,5)
- Decreased weight gain and food consumption have been observed in rats chronically exposed to DNOC by ingestion. Changes in the blood and urine, decreased liver enzyme activity, and changes in the absolute and relative organ weights (increased weights of the heart, brain, liver, kidney, spleen, adrenals, and thyroid and decreased weights of the thymus, uterus, ovaries, testes, and prostate gland) were also reported in rats; increased liver weight was described at all concentrations of exposure. (1,5)
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for DNOC. (6)
- ATSDR has established an intermediate oral minimal risk level (MRL) of 0.004 milligrams per kilogram body weight per day (mg/kg/d) based on neurological effects in humans. The MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse noncancer health effects over a specified duration of exposure. Exposure to a level above the MRL does not mean that adverse health effects will occur. The MRL is intended to serve as a screening tool. (5)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of DNOC in humans.
- DNOC had no teratogenic or embryotoxic effects in several animal studies, while chromosomal aberrations were reported in the fetuses of pregnant mice given DNOC by gavage. (1,5)
- One animal study reported that DNOC affected spermatogenesis, while another study did not find similar results. (5)

Cancer Risk:

- No information is available on the carcinogenic effects of DNOC in humans or animals. (1)
- EPA has not classified DNOC for potential carcinogenicity.

Physical Properties

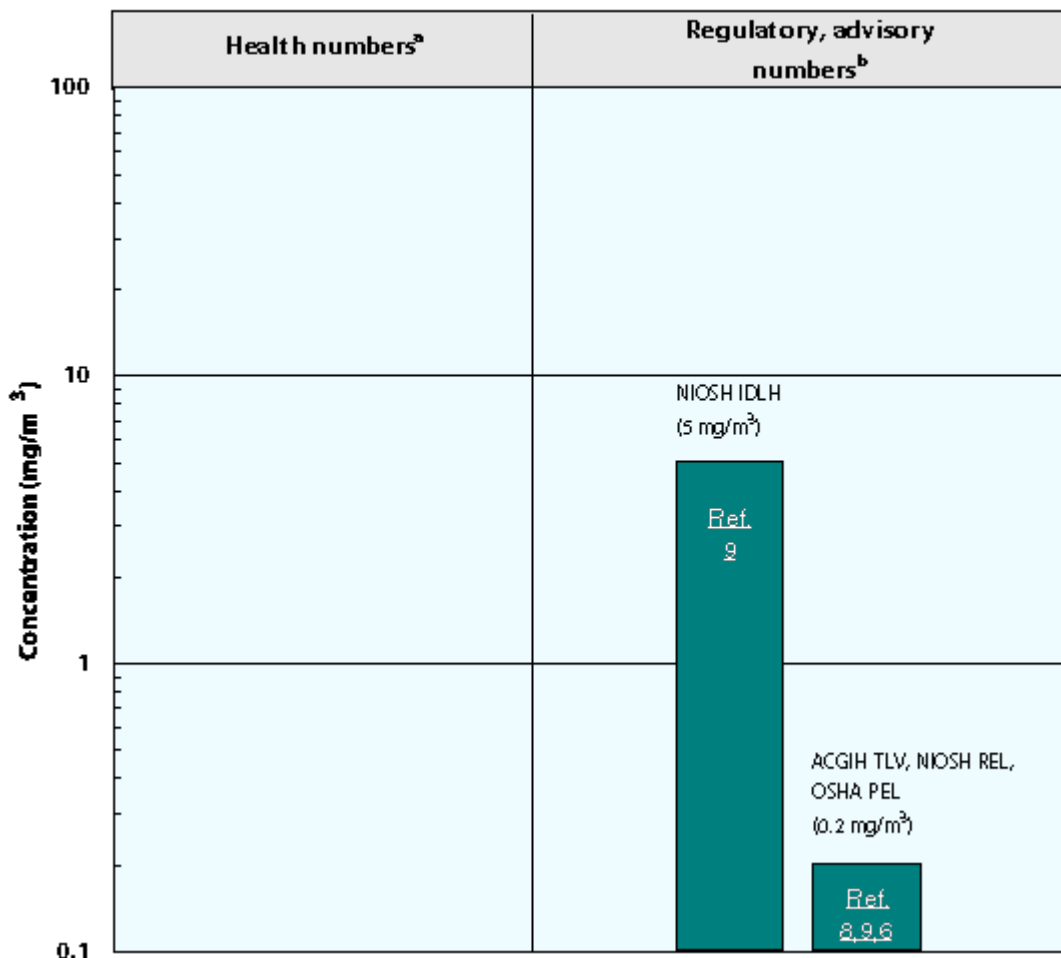
- The chemical formula for DNOC is $C_7H_6N_2O_5$, and its molecular weight is 198.15 g/mol. (1)
- DNOC occurs as a yellow prismatic solid that is sparingly soluble in water. (1,3)
- The odor threshold for DNOC has not been established.
- The vapor pressure for DNOC is 1.05×10^{-4} at 25 °C, and its log octanol/water partition coefficient ($\log K_{ow}$) is 2.564. (1)

Conversion Factors (only for the gaseous form):

To convert concentrations in air (at 25 °C) from ppm to mg/m^3 : $mg/m^3 = (ppm) \times (\text{molecular weight of the compound}) / (24.45)$. For 4,6-dinitro-o-cresol: 1 ppm = 8.1 mg/m^3 .

Health Data from Inhalation Exposure

4,6-Dinitro-o-cresol



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.

NIOSH IDLH--National Institute of Occupational Safety and Health's immediately dangerous to life or health limit; 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.
 NIOSH REL--NIOSH's recommended exposure limit; NIOSH-recommended exposure limit for an 8- or 10-h time-weighted-average exposure and/or ceiling.

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 fact sheet 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.

Summary created in April 1992, updated January 2000

References

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