

Sources of Exposure

Toxicokinetics and Biomonitoring

Biomarkers/Environmental Levels

General Populations

- The most likely source of exposure for the general population to dinitrocresols (DNOC) is from ingesting contaminated drinking water or food.
- Populations living near sites that are burning DNOC, manufacturing or formulating dinitrocresols, or have DNOC containing wastes may also be exposed by breathing contaminated air or touching contaminated soil.

Occupational Populations

- Workers involved in manufacturing, formulating or incinerating, DNOC.
- It is possible that workers involved in remediating Superfund sites containing this pesticide could be exposed to DNOC.

Toxicokinetics

- DNOC is rapidly absorbed following inhalation, oral, or dermal exposure.
- Limited human and animal data indicate that absorbed DNOC is distributed to most tissues, but does not accumulate in any particular tissue.
- DNOC appears to be metabolized to less toxic metabolites which are readily eliminated in the urine.
- Although small quantities of DNOC may be conjugated, most of the dose appears to be reduced to mono amino derivatives and then subsequently conjugated prior to excretion. These metabolites have been found in the urine and kidney of humans and animals exposed to DNOC.

NHANES Biomonitoring

- There are no data regarding levels of DNOC in the general population.

Biomarkers

- DNOC and/or its metabolites can be detected in blood and urine and can serve as a biomarker of exposure.
- Yellow staining of skin, sclera, or conjunctiva may alert a physician to the possibility of DNOC exposure. This yellow staining is not jaundice, but is due to the yellow color of DNOC.

Environmental Levels

Air

- There are no recent monitoring data for air levels DNOC in the United States.

Water

- There are no recent monitoring data for water levels of DNOC in the United States. Median levels reported from some NPL sites is 10 parts per billion (ppb).

Sediment and Soil

- There are no monitoring data for levels of DNOC in the sediment or soil in the United States. Median soil levels of 270,000 ppb have been reported for some NPL sites.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2018. Toxicological Profile for Dinitrocresols. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for Dinitrocresols (4,6-Dinitro-*o*-cresol) $C_7H_6N_2O_5$

CAS # 534-52-1

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Human Services
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Agency for Toxic Substances
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www.atsdr.cdc.gov



Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

Dinitrocresols

- Dinitrocresols are a group of organic chemicals that can contain up to 18 individual compounds. 4,6 Dinitro-*o*-cresol (DNOC) is the most commercially important dinitrocresol.
- DNOC is a yellow solid with no smell. It dissolves slightly in water.
- DNOC is now primarily used as an intermediate in pesticide manufacturing.
- Historically, DNOC was used as a pesticide on fruit trees and other food crops. However, the U.S. Environmental Protection Agency (EPA) cancelled its registration as a pesticide in 1991.
- In the 1930s, DNOC was used in pills to induce weight loss. It is no longer used for this purpose because of severe adverse health effects.

- Inhalation – Likely route of exposure for the general and occupational populations.
- Oral – Likely route of exposure for the general population through ingestion of contaminated food and water.
- Dermal – Likely route of exposure for occupational population.

DNOC in the Environment

- In the air, DNOC exist predominantly as a particulate. It may be removed by rain and snow. It is unlikely to be transported long distances.
- DNOC is not likely to volatilize from water or soil.
- DNOC shows moderate adsorption to soil and does not leach far into the ground.
- Given its chemical properties, it is likely that DNOC will transfer to adjacent surface water or land via runoff water from treated fields or waste sites.
- Available data indicate that biodegradation of DNOC does not occur rapidly.
- Bioconcentration is not likely to occur.

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

Minimal Risk Levels (MRLs)

Inhalation

- No acute-(≤ 14 days), intermediate- (15–364 days), or chronic (≥ 365 days) duration inhalation MRLs were derived for dinitrocresols.

Oral

- An acute duration (≤ 14 days) oral MRL of 0.004 mg/kg/day was derived for 4,6-dinitro-*o*-cresol.
- An intermediate duration (15–364 days) oral MRL of 0.004 mg/kg/day was derived for 4,6-dinitro-*o*-cresol.
- No chronic duration (≥ 365 days) oral MRLs were derived for dinitrocresols.

Health Effects

- The most common and sensitive effects resulting from acute, intermediate, or chronic exposure are related to increased basal metabolic rates in humans (increased pulse rate, palpitations, and swelling of fingers and hands).
- Increased body temperature and blood sugar, and decreased activity of selected enzymes have been reported in humans and animals exposed to DNOC by inhalation or oral routes.
- Lethargy, dizziness, twitching, ataxia, salivation, and/or sluggishness have been seen in DNOC-exposed humans and animals.
- Urticarial eruptions on skin (an allergic response) were seen following oral exposure in humans.
- Atrophy or underdeveloped thymus, spleen and lymph nodes effects, and decreased circulating lymphocytes were seen in rats exposed orally to DNOC.
- No studies were found regarding cancer in humans or animals exposed to DNOC via inhalation, oral, or dermal routes.
- The Department of Health and Human Services, EPA and International Agency for Research on Cancer (IARC) have not classified dinitrocresols for carcinogenicity.

Children's Health

- It is not known if children are more sensitive to DNOC exposure than adults.