The ToxGuide™ is developed to be used as a pocket guide. Tear off at perforation and fold along lines.

Sources of Exposure

General Populations

- Most people will not be exposed to dinitrotoluene (DNT).
- Populations residing near hazardous waste sites or munitions facilities may be exposed via ingestion of contaminated water or skin contact with contaminated soil.
- Dermal exposure to DNT could also occur when washing or bathing with contaminated water.
- Inhalation exposure of the general population is expected to be low.
- DNT is not used extensively in consumer products and is not often detected in food samples.

Occupational Populations

- Exposure to DNT may occur from its use in the manufacture of toluene diisocyanate, in the production of explosives, in the manufacture of azo dye intermediates, and in organic synthesis in the preparation of toluidines and dyes.
- Exposure may also occur at facilities that store or dispose the substance.

Toxicokinetics and Normal Human Levels

Toxicokinetics

- Absorption of DNT occurs following exposure via the inhalation, oral, and dermal routes of exposure.
- Studies of 2,4-DNT in rats showed that the parent compound and/or metabolites distribute preferentially to the liver and kidneys.
- Analysis of urine from workers exposed to DNT showed that the major metabolites are dinitrobenzoic acids and 2-amino-4-nitro nitrobenzoic acid.
- Metabolites of DNT are eliminated in the urine within 24 hours. Small amounts of DNTs may also be present in the feces.

Normal Human Levels

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

Biomarkers/Environmental Levels

Biomarkers

- Results of occupational studies support the use of 2,4-DNT, 2,6-DNT, and their metabolites in urine as biomarkers of exposure.

Environmental Levels

Air

- DNT is rarely detected in ambient air.

Sediment and Soil

- Concentrations of DNT of approximately 100 mg/kg have been reported at ammunition sites and military firing ranges.

Water

- DNT is rarely detected in public drinking water supplies.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2013. Toxicological Profile for Dinitrotoluenes (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

$C_7H_6N_2O_4$

ToxGuide™ for Dinitrotoluenes

$C_7H_6N_2O_4$

CAS# 25321-14-6

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U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
www.atsdr.cdc.gov

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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Chemical and Physical Information

DNTs are Solids

- DNT is a mixture of six chemicals (isomers) that have the same molecular weight and chemical structure, but differ in the position of the nitro groups on the benzene ring.
- The technical-grade mixture is composed mostly of 2,4-DNT (76%) and 2,6-DNT (19%). The remaining 5%, predominantly consists of . 2,3-, 2,5-, 3,4-, and 3,5-DNT
- DNT is a synthetic substance used primarily as chemical intermediate for the production of toluene diisocyanate. DNT is also used in the production of trinitrotoluene (TNT), dyes, and polyurethane foams. 2,4-DNT is used in the air bags of automobiles.

Routes of Exposure

- Inhalation – Predominant route of occupational exposure. Inhalation is not an important route for the general population.
- Oral – Incidental route of exposure for those living near ammunition or explosive manufacturing facilities.
- Dermal – Important route of occupational exposure. Incidental route of exposure for those living near ammunition or explosive manufacturing facilities.

DNT in the Environment

- DNT has been found in the soil, surface and ground water, and air; most commonly, around manufacturing facilities or contaminated waste sites.
- DNT is slowly broken down in water by microbial organisms and it can be broken down by sunlight in surface water.
- DNT does not adsorb strongly to soil. Therefore, it can move from soil into groundwater, where it can contaminate drinking water.

Relevance to Public Health (Health Effects)

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-, intermediate- or chronic duration inhalation MRLs were derived for dinitrotoluenes.

Oral

- An MRL of 0.05 mg/kg/day has been derived for acute-duration oral exposure (≤14 days) to 2,4-DNT.
- An MRL of 0.007 mg/kg/day has been derived for intermediate-duration oral exposure (15–364 days) to 2,4-DNT.
- An MRL of 0.001 mg/kg/day has been derived for chronic-duration oral exposure (≥365 days) to 2,4-DNT.
- An MRL of 0.09 mg/kg/day has been derived for acute-duration oral exposure (≤14 days) to 2,6-DNT.
- No intermediate-duration oral MRL was derived for 2,6-DNT.
- An MRL of 0.004 mg/kg/day has been derived for chronic-duration oral exposure (≥365 days) to 2,6-DNT.
- No acute-, intermediate-, or chronic-duration oral MRLs were derived for the other DNT isomers.

Health Effects

- Acute-duration animal studies show that ingestion of DNTs can cause anemia and damage to the nervous system, male reproductive system, and liver.
- Breathing or ingesting very high levels of DNTs may cause death.
- A study of workers reported a relationship between heart disease and long-term exposure to DNT.
- Animal studies have shown that ingesting DNT over long periods causes anemia and damage to the nervous system, male reproductive system, and liver.
- The EPA says a mixture of 2,4- and 2,6-DNT is probably carcinogenic to humans, based on findings of cancer in animal studies. The International Agency for Research on Cancer (IARC) says 2,4- and 2,6-DNT are possibly carcinogenic to humans, but it cannot be determined whether 3,5-DNT is carcinogenic to humans.

Children's Health

- It is not known whether children are more susceptible than adults to DNT effects.
- It is not known whether DNT can affect the fetus.
- Newborns of animals exposed to DNT during pregnancy can have anemia and nervous system damage at birth.