

Dinitrotoluenes - ToxFAQs™

CAS # 25321-14-6

This fact sheet answers the most frequently asked health questions (FAQs) about dinitrotoluenes. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because these substances may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Most people will not be exposed to significant levels of DNTs. People living near munitions facilities may be exposed via ingestion of contaminated water or from skin contact with contaminated soil. Exposure to high levels may affect the nervous system and the blood. DNTs have been found in at least 98 of the 1,699 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are dinitrotoluenes?

There are six forms of dinitrotoluenes (DNTs) which are called isomers. The names of the six isomers are 2,3-DNT, 2,4-DNT, 2,5-DNT, 2,6-DNT, 3,4-DNT, and 3,5-DNT.

DNTs are not found naturally in the environment, they are manufactured. DNTs are typically found as a mixture of two isomers: 2,4-DNT and 2,6-DNT. The other isomers (2,3-, 2,5-, 3,4-, and 3,5-DNT) are found in small amounts in this mixture.

DNTs are primarily used as a chemical intermediate for the production of toluene diisocyanate. They are also used in the production of trinitrotoluene (TNT), dyes, and polyurethane foams.

What happens to DNTs when they enter the environment?

- DNTs have been found in the soil, surface and ground water, but rarely in air. They are most commonly found, around manufacturing facilities or contaminated waste sites.
- DNTs are slowly broken down in water by microbial organisms and they can be broken down by sunlight in surface water.
- DNTs do not strongly bind to soil. They can move from soil into groundwater, where they can contaminate drinking water.

How might I be exposed to DNTs?

- Most people are not likely to be exposed to DNTs unless you live near facilities involved in the production, use, storage and/or disposal of DNTs.
- Breathing contaminated air or touching contaminated soil near manufacturing plants.
- Drinking water contaminated with DNTs.
- Breathing air or touching soil near a hazardous waste site that contains buried ammunition wastes.

How can DNTs affect my health?

A study of workers reported a relationship between heart disease and long-term exposure to DNTs.

Animal studies have shown that breathing DNTs can damage the lungs. Animal studies have also shown that ingesting DNTs during brief or long periods can cause anemia and damage to the nervous system, male reproductive system, and liver.

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How likely are DNTs to cause cancer?

Studies of workers have not shown conclusively that DNTs cause cancer. However, some studies of workers have found increased risk of kidney and bladder cancer associated with exposure to DNTs. Laboratory animals ingesting DNTs during most of their lives developed cancer of the liver and tumors in the kidneys.

The EPA has classified the mixture of 2,4- and 2,6-DNT as a probable human carcinogen. The International Agency for Research on Cancer (IARC) has classified 2,4- and 2,6-DNT as possibly carcinogenic to humans. IARC determined that 3,5-DNT is not classifiable as to its carcinogenicity in humans.

How can DNTs affect children?

There is no information regarding health effects in children or young animals exposed to DNTs.

We do not know whether DNTs can harm the unborn child. Studies in animals show that babies of mothers exposed to DNTs during pregnancy can have anemia and nervous system damage at birth. These effects are similar to those seen in adult animals.

How can families reduce the risk of exposure to DNTs?

- Prevent children from playing in soil contaminated with DNTs that may occur near ammunition producing facilities.
- Prevent your children from eating dirt and discourage them from putting objects in the mouth.
- Make sure children wash their hands frequently and before eating.
- DNTs are not often detected in drinking water supplies.

- If you use well water and live near an ammunition producing facility it may be a good idea to have the water tested for DNTs and other contaminants.

Is there a medical test to determine whether I've been exposed to DNTs?

DNTs and their breakdown products can be measured in urine. However, the detection of DNTs or metabolites cannot predict the kind of health effects that might develop from that exposure.

Because DNTs and their breakdown products leave the body fairly rapidly, the tests need to be conducted within days after exposure. These tests are not usually available in a doctor's office, but they can be performed in special laboratories.

Has the federal government made recommendations to protect human health?

The EPA has determined that exposure to 2,4-DNT in drinking water at concentrations of 1 mg/L for 1 or 10 days is not expected to cause any adverse effects in a child.

The Occupational Safety and Health Administration (OSHA) set a legal limit of 1.5 mg/m³ DNT in workplace air averaged over an 8-hour work day.

The National Institute for Occupational Safety and Health (NIOSH) recommends a limit of 1.5 mg/m³ DNT in workplace air averaged over a 10 hour work day.

Reference

This ToxFAQs™ information is taken from the 2016 Toxicological Profile for Dinitrotoluenes produced by the Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services in Atlanta, GA.

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

Phone: 1-800-232-4636

ToxFAQs™ on the web: www.atsdr.cdc.gov/ToxFAQs

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.