



1,3-DINITROBENZENE (1,3-DNB) AND 1,3,5-TRINITROBENZENE (1,3,5-TNB)

What are 1,3-DINITROBENZENE and 1,3,5-TRINITROBENZENE?

1,3-Dinitrobenzene (1,3-DNB) and 1,3,5-Trinitrobenzene (1,3,5-TNB) are man-made substances used in explosives. At room temperature, both substances are yellow, crystal-like solids. Under very high heat, both substances will explode. In air, DNB and TNB may exist in very small amounts as dust or vapor. They can dissolve in certain liquids. They have no odor or taste.

Where can 1,3-DNB and 1,3,5-TNB be found and how are they used?

Both 1,3-DNB and 1,3,5-TNB have been found in hazardous waste sites. 1,3-DNB and 1,3,5-TNB are used to make explosives. Both substances are formed when trinitro toluene (TNT) is made. TNT is another chemical used in making explosives. 1,3-DNB is also used to make solvents and dyes.

How can people be exposed to 1,3-DNB and 1,3,5-TNB?

Most people will not be exposed to 1,3-DNB or 1,3,5-TNB. If you live or work near a U.S. Army ammunition plant or other chemical factory, you may be exposed. This could happen through contact with polluted water, food, air or soil.

You could be exposed to 1,3-DNB or 1,3,5-TNB through:

Breathing air containing 1,3-DNB or 1,3,5-TNB.

Drinking water that contacted 1,3-DNB or 1,3,5-TNB.

Touching soil that contacted 1,3-DNB or 1,3,5-TNB.

Eye Contact by touching the eyes with hands that contacted 1,3-DNB or 1,3,5-TNB.

How do 1,3-DNB and 1,3,5-TNB work?

Studies in people and animals show that 1,3-DNB enters the body very quickly through the skin or lungs. Once 1,3-DNB is inside your body, it breaks down quickly. 1,3-DNB and its breakdown products also leave the body very quickly through the urine or waste matter. Most of the 1,3-DNB leaves the body two to three weeks after exposure.

How can 1,3-DNB and 1,3,5-TNB affect my health?

It is believed that 1,3-DNB and 1,3,5-TNB cause similar health effects. Exposure to high levels of 1,3-DNB can reduce the blood's ability to carry oxygen, causing the skin to turn bluish in color. If you are exposed to 1,3-DNB for a long time, you can lose red blood cells, which can cause a condition called anemia. Other symptoms of 1,3-DNB exposure are headache, nausea and dizziness. We do not know if 1,3-DNB or 1,3,5-TNB exposure causes long-term health effects in people. We also do not know if 1,3-DNB or 1,3,5-TNB cause birth defects or cancer in people.

Results from animal studies show some other effects of 1,3-DNB exposure. There were changes in behavior, damaged sperm production, and male reproductive damage. We do not know if these effects could occur in people. Animal studies also show that, in certain cases, a large single oral dose of 1,3-DNB can be fatal. These substances have not been tested to see if they would cause cancer in animals. They are not named as cancer-causing agents in humans.

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How is 1,3-DNB and 1,3,5-TNB poisoning treated?

There are antidotes for 1,3-DNB or 1,3,5-TNB poisoning. An antidote helps fight the effects of the poison. The treatment depends on the type of exposure.

What should I do if exposed to 1,3-DNB and 1,3,5-TNB?

If 1,3-DNB or 1,3,5-TNB gets on your skin, remove contaminated clothes quickly. Wash your skin right away with lots of soap and water.

If 1,3-DNB or 1,3,5-TNB gets in your eyes, wash them with water for at least 15 minutes.

If you drink or eat 1,3-DNB or 1,3,5-TNB, go to a doctor.

If you breathe 1,3-DNB or 1,3,5-TNB, move away from the area of exposure. Quickly go to a medical facility. If needed, someone should perform rescue breathing or cardio-pulmonary resuscitation (CPR).

What factors limit use or exposure to 1,3-DNB and 1,3,5-TNB?

Safe work methods can limit exposure. Have a source of fresh air and a ventilation system. Employers should provide breathing protection, protective clothing and safety glasses. If you live near a waste site that may contain 1,3-DNB or 1,3,5-TNB, avoid contact with soil and drink bottled water.

Is there a medical test to show whether I've been exposed to 1,3-DNB and 1,3,5-TNB?

There is no test to show if you have been exposed to 1,3-DNB or 1,3,5-TNB. Tests can show 1,3-DNB and its breakdown products in animals but these tests have not been used for people.

Technical information for 1,3-DNB and 1,3,5-TNB

CAS Number: 1,3-DNB – 99-65-0 1,3,5-TNB – 99-35-4

Chemical Formula: 1,3-DNB – $C_6H_4(NO_2)_2$ 1,3,5-TNB – $C_6H_3N_3O_6$

Carcinogenicity (EPA): 1,3-DNB D - not classifiable as to human carcinogenicity. 1,3,5-TNB – EPA has not classified this compound.

MCL (Drinking Water): There is no MCL for either of these two compounds.

OSHA Standards: Standard for an 8-hour day, 40-hour week for 1,3-DNB is 1 milligram per cubic meter of air.

NIOSH Standards: Recommended exposure limit for 10-hour time weighted average (TWA) is 1 milligram 1,3-DNB per cubic meter of air.

References and Sources

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. *Toxicological profile for 1,3-Dinitrobenzene and 1,3,5-Trinitrobenzene*. Atlanta, GA: U.S. Department of Health and Human Services.