

N-NITROSO COMPOUNDS

What are N-nitroso compounds?

N-nitroso compounds result from reactions involving other chemicals called alkylamines. At room temperature, N-nitroso compounds are yellow liquids. They do not have a distinct odor. Industry makes small amounts of N-nitroso compounds for research. They can also be formed as a side-reaction when other products are made.

Where can N-nitroso compounds be found and how are they used?

Nitroso-di-n-propylamine (NDPA) is used in some cosmetic and toiletry products and in cleansers. Some N-nitroso compounds were once used to make rocket fuel, but this manufacturing ended when high levels of the compound were found in air, water, and soil near a rocket fuel plant.

Low levels of N-nitroso compounds can be found in air, water, and food products treated with nitrite. Such food products include cheeses, fish, bacon and other cured meats, and beer. Some N-nitroso compounds form in the stomach after digesting foods treated with nitrite. N-nitroso compounds are also found in tobacco smoke, chewing tobacco, and toiletry and cosmetic products, including shampoos and cleansers. N-nitroso compounds can be found in the air inside cars and in household products, like detergents and pesticides.

N-nitroso compounds are found in tanneries and plants manufacturing pesticides, rubber products, and tires; and fish processing plants, foundries, dye-making plants, and research labs.

How can people be exposed to N-nitroso compounds?

You could be exposed to N-nitroso compounds through:

- **Eating** foods containing these compounds. These include fish, cheeses, bacon, and other cured meats.
- **Breathing** air containing these compounds near plants that use them, near a waste site containing N-nitroso compounds, or by breathing tobacco smoke or the air inside cars.
- **Drinking** some alcoholic beverages, including beer and other malt beverages. Infants drinking from a rubber bottle nipple could possibly be exposed to very small amounts.

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Frequently Asked Questions

- **Touching** these compounds if you work where they are used. You could also be exposed by handling rubber. Pacifiers may contain very small amounts of N-nitroso compounds. Some cosmetics and toiletries contain N-nitroso compounds, so you could be exposed when using them. Exposing the eyes to N-nitroso compounds is unlikely.

How do N-nitroso compounds work and how can they affect my health?

The most harmful form of exposure to N-nitroso compounds is through eating or drinking poisoned food or beverages. These compounds cause severe liver damage with internal bleeding leading to death. In animal studies, animals that ate food, drank water, or breathed air containing high levels of N-nitroso-dimethylamine (NDMA) over a period of days or several weeks developed serious, non-cancerous liver disease.

Animals with long-term exposure to NDPA in food or drinking water caused cancer of the liver, esophagus, and nasal cavities. Exposure to lower levels for more than several weeks caused lung cancer, liver cancer, and liver damage in rats, mice, hamsters, and other animals. However, all animals exposed to NDMA suffered internal bleeding, usually followed by death.

It is not known if these compounds will cause similar effects in humans. There is a high probability that breathing or touching N-nitroso compounds causes liver disease and cancer.

How is N-nitroso compounds poisoning treated?

There is no known treatment just for N-nitroso compounds. Doctors can treat the symptoms.

What should I do if exposed to N-nitroso compounds?

- **If you touch N-nitroso compounds**, clean the area right away with soap and water to remove as much of the compound as possible. Rinse affected area for 20 minutes.
- **If you get N-nitroso compounds in your eyes**, flush the eyes right away with large amounts of water for 20 minutes. Get medical attention.
- **If you breathe N-nitroso compounds**, get to an area of fresh air. Get medical help.

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What factors limit use or exposure to N-nitroso compounds?

Reduce exposure by limiting contact with tobacco smoke, by avoiding beer and other malt beverages, and by limiting intake of foods containing nitrite. At work, limit exposure by following health and safety rules.

Is there a medical test to show whether I've been exposed to N-nitroso compounds?

A chemical study can show N-nitroso compounds in blood and urine.

Technical Information for N-nitroso compounds

CAS Number: N-nitroso-diethylamine (NDEA): 55-18-5

Chemical Formula: NDEA – C₄H₁₀N₂O

N-nitroso-dimethylamine (NDMA): 39885-14-8, Chemical Formula: C₈H₁₀N₂O

N-nitroso-d-in-butylamine (NDBA): 924-16-3, Chemical Formula: C₈H₁₈N₂O

N-nitroso-di-n-propylanmine (NDPA): 621-64-7, Chemical Formula: C₆H₁₄N₂O

N-nitroso-methylethylamine (NMEA): 10595-95-66, Chemical Formula: C₂H₆N₂O

N-nitroso-pyrrolidine (NPYR): 930-55-2, Chemical Formula: C₄H₈N₂O

Carcinogenicity (EPA): The N-nitroso compounds studied by the EPA are classified as probable human carcinogens.

MCL (Drinking Water): There are no MCLs for any of the N-nitroso compounds.

OSHA Standards: There are no OSHA standards for these compounds.

NIOSH Standards: There are no NIOSH standards for these compounds.



Resources

Agency for Toxic Substances and Disease Registry (ATSDR). 1989. *Toxicological profile for N nitrosodimethylamine*. Atlanta, GA: U.S. Department of Health and Human Services.

Agency for Toxic Substances and Disease Registry (ATSDR). 1989. *Toxicological profile for N-nitrosodi-n propylamine*. Atlanta, GA: U.S. Department of Health and Human Services.

American Conference of Governmental Industrial Hygienists (ACGIH). 2003. *Guide to Occupational Exposure Values*. Cincinnati, OH.

NIOSH *Pocket Guide to Chemical Hazards*. 2003. Atlanta, GA: U.S. Department of Health and Human Services.