



FACT SHEET

Facts About Nitrogen Mustards

What nitrogen mustards are

- Nitrogen mustards were produced in the 1920s and 1930s as potential chemical warfare weapons. They are vesicants (or blister agents) similar to the sulfur mustards.
- Nitrogen mustards come in different forms that can smell fishy, musty, soapy, or fruity. They can be in the form of an oily-textured liquid, a vapor (the gaseous form of a liquid), or a solid. Nitrogen mustards are liquids at normal room temperature (70°F).
- Nitrogen mustards can be clear, pale amber, or yellow colored when in liquid or solid form.
- The nitrogen mustards are also known by their military designations of HN-1, HN-2, and HN-3.

Where nitrogen mustards are found and how they are used

- The nitrogen mustards were never used in warfare.
- Nitrogen mustards are not found naturally in the environment.
- HN-1 was originally designed to remove warts but was later identified as a potential chemical warfare agent.
- HN-2 was designed as a military agent but was later used in cancer treatment. Other treatment agents have now replaced it.
- HN-3 was designed solely as a military agent.

How you could be exposed to nitrogen mustards

- If nitrogen mustards are released into the air as a vapor, you could be exposed through skin contact, eye contact, or breathing.
- If nitrogen mustards are released into water, you could be exposed by drinking the contaminated water or getting it on your skin.
- You could be exposed by coming in direct contact with liquid nitrogen mustards.
- Because it is heavier than air, nitrogen mustard vapor will settle in low-lying areas.

How nitrogen mustards work

- Adverse health effects caused by nitrogen mustards depend on the amount of nitrogen mustard to which people are exposed, the route of exposure, and the length of time that people are exposed.
- Nitrogen mustards are powerful irritants that damage the skin, eyes, and respiratory (breathing) tract.
- Nitrogen mustards can enter the cells of the body very quickly and cause damage to the immune system and bone marrow.

Immediate signs and symptoms of nitrogen mustard exposure

- Typically, signs and symptoms of nitrogen mustard exposure do not occur immediately. Depending on the severity of the exposure, symptoms may not occur for several hours.
- Nitrogen mustards can have the following effects on specific parts of the body:

Facts About Nitrogen Mustards

(continued from previous page)

- Skin: redness usually develops within several hours after exposure followed by blistering within 6 to 12 hours.
- Eyes: irritation, pain, swelling, and tearing may occur. High concentrations can cause burns and blindness.
- Respiratory tract: nose and sinus pain, cough, sore throat, and shortness of breath may occur within hours. Fluid in the lungs is uncommon.
- Digestive tract: abdominal pain, diarrhea, nausea, and vomiting.
- Brain: tremors, incoordination, and seizures are possible following a large exposure.
- Showing these signs or symptoms does not necessarily mean that a person has been exposed to a nitrogen mustard.

What the long-term health effects may be

- Exposure to nitrogen mustard liquid is more likely to produce second- and third- degree burns and later scarring than is exposure to nitrogen mustard vapor.
- Extensive breathing in of the vapors can cause chronic respiratory disease.
- Extensive eye exposure can cause long-lasting eye problems.
- Nitrogen mustards may cause bone marrow suppression beginning as early as 3 to 5 days after exposure. Bone marrow suppression can cause anemia, bleeding, and increased risk for infection. If severe, these effects could lead to death.
- Prolonged or repeated exposures to nitrogen mustards have caused cancer in animals. Some evidence exists that prolonged or repeated exposures to nitrogen mustards cause leukemia in humans.

How you can protect yourself, and what you should do if you are exposed to nitrogen mustards

- Because no antidote exists for nitrogen mustard exposure, the best thing to do is avoid it. If the nitrogen mustard release was indoors, get out of the building. If the release was outdoors, move away from the area of the release, stay upwind if possible, and seek higher ground. Quickly moving to an area where fresh air is available is highly effective in reducing the possibility of death from exposure to nitrogen mustard.
- If you are near a release of nitrogen mustard, emergency coordinators may tell you to either evacuate the area or “shelter in place” inside a building to avoid being exposed to the chemical. For more information about evacuation during a chemical emergency, see [“Facts About Evacuation”](#). For more information about sheltering in place during a chemical emergency, see [“Facts About Sheltering in Place”](#).
- If you think you may have been exposed, you should remove your clothing, rapidly wash your entire body with soap and water, and get medical care as quickly as possible.
- Removing your clothing:
 - Quickly take off clothing that has nitrogen mustard on it. Any clothing that has to be pulled over the head should be cut off the body instead of pulled over the head.
 - If you are helping other people remove their clothing, try to avoid touching any contaminated areas, and remove the clothing as quickly as possible.
- Washing yourself:
 - As quickly as possible, wash any nitrogen mustard from your skin with large amounts of soap and water. Washing with soap and water will help protect people from any chemicals on their bodies.
 - If your eyes are burning or your vision is blurred, rinse your eyes with plain water for 10 to 15 minutes. If you wear contacts, remove them and put them with the contaminated clothing. Do not put the contacts back in your eyes (even if they are not disposable

Facts About Nitrogen Mustards

(continued from previous page)

contacts). If you wear eyeglasses, wash them with soap and water. You can put your eyeglasses back on after you wash them.

- Disposing of your clothes:
 - After you have washed yourself, place your clothing inside a plastic bag. Avoid touching contaminated areas of the clothing. If you can't avoid touching contaminated areas, or you aren't sure where the contaminated areas are, wear rubber gloves or put the clothing in the bag using tongs, tool handles, sticks, or similar objects. Anything that touches the contaminated clothing should also be placed in the bag. If you wear contacts, put them in the plastic bag, too.
 - Seal the bag, and then seal that bag inside another plastic bag. Disposing of your clothing in this way will help protect you and other people from any chemicals that might be on your clothes.
 - When the local or state health department or emergency personnel arrive, tell them what you did with your clothes. The health department or emergency personnel will arrange for further disposal. Do not handle the plastic bags yourself.
- For more information about cleaning your body and disposing of your clothes after a chemical release, see "[Chemical Agents: Facts About Personal Cleaning and Disposal of Contaminated Clothing](http://www.bt.cdc.gov/planning/personalcleaningfacts.asp)" (<http://www.bt.cdc.gov/planning/personalcleaningfacts.asp>).
- If nitrogen mustard has been ingested (swallowed), do not induce vomiting or give fluids to drink.
- Seek medical attention right away. Dial 911 and explain what has happened.

How nitrogen mustard exposure is treated

No antidote exists for nitrogen mustard exposure. Treatment consists of removing the nitrogen mustard from the body as soon as possible and providing supportive medical care in a hospital setting.

Where you can get more information about nitrogen mustards

You can contact one of the following:

- Regional poison control center (1-800-222-1222)
- Centers for Disease Control and Prevention
 - Public Response Hotline (CDC)
 - 800-CDC-INFO (English and Spanish)
 - TTY (888) 232-6358
 - [Emergency Preparedness and Response Web site](http://www.bt.cdc.gov/) (<http://www.bt.cdc.gov/>)
 - E-mail inquiries: cdcinfo@cdc.gov
 - Mail inquiries:
Public Inquiry c/o BPRP
Bioterrorism Preparedness and Response Planning
Centers for Disease Control and Prevention
Mailstop C-18
1600 Clifton Road
Atlanta, GA 30333
- Agency for Toxic Substances and Disease Registry (ATSDR) (1-888-422-8737)
 - E-mail inquiries: atsdric@cdc.gov
 - Mail inquiries:
Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop E-29
Atlanta, GA 30333

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Page 3 of 4

Facts About Nitrogen Mustards

(continued from previous page)

This fact sheet is based on CDC's best current information. It may be updated as new information becomes available.

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The Centers for Disease Control and Prevention (CDC) protects people's health and safety by preventing and controlling diseases and injuries; enhances health decisions by providing credible information on critical health issues; and promotes healthy living through strong partnerships with local, national, and international organizations

For more information, visit www.bt.cdc.gov/chemical, or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

March 6, 2003

Page 4 of 4