



Hazardous Substance Fact Sheet

Right to Know

Common Name: **NITROGEN MUSTARD**

Synonyms: Chloramine; HN-2; MBA; Mustine

Chemical Name: Ethanamine, 2-Chloro-N-(2-Chloroethyl)-N-Methyl-

Date: August 1998 Revision: August 2008

CAS Number: 51-75-2

RTK Substance Number: 1377

DOT Number: UN 2810

Description and Use

Nitrogen Mustard is a colorless to yellow, oily liquid with a soapy or fruity odor. It was developed by the military as a poison gas and has had minimal use in cancer treatment.

Reasons for Citation

- ▶ **Nitrogen Mustard** is on the Right to Know Hazardous Substance List because it is cited by DOT, DEP, IARC and EPA.
- ▶ This chemical is on the Special Health Hazard Substance List.

SEE GLOSSARY ON PAGE 5.

FIRST AID

Eye Contact

- ▶ Immediately flush with large amounts of cool water for at least 15 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. Seek medical attention immediately.

Skin Contact

- ▶ Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water. Seek medical attention.

Inhalation

- ▶ Remove the person from exposure.
- ▶ Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- ▶ Transfer promptly to a medical facility.

EMERGENCY NUMBERS

Poison Control: 1-800-222-1222

CHEMTREC: 1-800-424-9300

NJDEP Hotline: 1-877-927-6337

National Response Center: 1-800-424-8802

EMERGENCY RESPONDERS >>>> SEE BACK PAGE

Hazard Summary

Hazard Rating	NJDOH	NFPA
HEALTH	3	-
FLAMMABILITY	1	-
REACTIVITY	1	-
CARCINOGEN AND TERATOGEN POISON INHALATION HAZARD POISONOUS GASES ARE PRODUCED IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- ▶ **Nitrogen Mustard** can affect you when inhaled and may be absorbed through the skin.
- ▶ **Nitrogen Mustard** is a CARCINOGEN and MUTAGEN, and may be a TERATOGEN--HANDLE WITH EXTREME CAUTION.
- ▶ **Nitrogen Mustard** can irritate and burn the eyes with possible eye damage.
- ▶ Contact can irritate the skin and cause severe burns.
- ▶ Inhaling **Nitrogen Mustard** can irritate the nose and throat.
- ▶ Exposure to **Nitrogen Mustard** can cause headache, dizziness, nausea and vomiting.
- ▶ Repeated exposure to **Nitrogen Mustard** may affect the normal function of bone marrow. This can reduce blood cells (*anemia*).
- ▶ High exposure to **Nitrogen Mustard** can cause ringing in the ears (*tinnitus*), and may cause hearing loss.

Workplace Exposure Limits

No occupational exposure limits have been established for **Nitrogen Mustard**. However, the U.S. Military has established a TLV (threshold limit value) of **0.003 mg/m³**.

- ▶ **Nitrogen Mustard** is a PROBABLE CARCINOGEN and TERATOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
- ▶ It should be recognized that **Nitrogen Mustard** can be absorbed through your skin, thereby increasing your exposure.

Determining Your Exposure

- ▶ Read the product manufacturer’s Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- ▶ For each individual hazardous ingredient, read the New Jersey Department of Health Hazardous Substance Fact Sheet, available on the RTK website (www.nj.gov/health/eoh/rtkweb) or in your facility’s RTK Central File or Hazard Communication Standard file.
- ▶ You have a right to this information under the New Jersey Worker and Community Right to Know Act, the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- ▶ The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) require employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Health Hazard Information

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Nitrogen Mustard**:

- ▶ **Nitrogen Mustard** can irritate and burn the eyes with possible eye damage.
- ▶ Contact can irritate the skin and cause severe burns with itching and blisters.
- ▶ Inhaling **Nitrogen Mustard** can irritate the nose and throat causing coughing and wheezing.
- ▶ Exposure to **Nitrogen Mustard** can cause headache, dizziness, nausea and vomiting, lightheadedness and passing out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Nitrogen Mustard** and can last for months or years:

Cancer Hazard

- ▶ **Nitrogen Mustard** is a PROBABLE CARCINOGEN in humans. There is evidence that it causes leukemia and skin cancer in humans and it has been shown to cause cancer of the lung, liver, uterus, and other types of cancers in animals.
- ▶ Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

- ▶ **Nitrogen Mustard** may be a TERATOGEN in humans since it is a teratogen in animals.
- ▶ **Nitrogen Mustard** may decrease fertility in males and females.

Other Effects

- ▶ Repeated exposure to **Nitrogen Mustard** may affect the normal function of bone marrow. This can reduce blood cells (*anemia*).
- ▶ High exposure to **Nitrogen Mustard** can cause ringing in the ears (*tinnitus*), and may cause hearing loss.

Medical

Medical Testing

Before beginning employment and at regular times after that, for frequent or potentially high exposures, the following are recommended:

- ▶ Complete blood count
- ▶ Hearing test (audiogram)

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

Workplace Controls and Practices

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at www.cdc.gov/niosh/topics/ctrlbanding/.

The following work practices are also recommended:

- ▶ Label process containers.
- ▶ Provide employees with hazard information and training.
- ▶ Monitor airborne chemical concentrations.
- ▶ Use engineering controls if concentrations exceed recommended exposure levels.
- ▶ Provide eye wash fountains and emergency showers.
- ▶ Wash or shower if skin comes in contact with a hazardous material.
- ▶ Always wash at the end of the workshift.
- ▶ Change into clean clothing if clothing becomes contaminated.
- ▶ Do not take contaminated clothing home.
- ▶ Get special training to wash contaminated clothing.
- ▶ Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- ▶ Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- ▶ Use a Class I, Type B, biological safety hood when mixing, handling, or preparing **Nitrogen Mustard**.

Personal Protective Equipment

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Gloves and Clothing

- ▶ Avoid skin contact with **Nitrogen Mustard**. Wear personal protective equipment made from material that can not be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your operation.
- ▶ Safety equipment manufacturers recommend Silver Shield®/4H® for gloves and DuPont Tychem® BR, LV, CSM, Responder®, and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC, or the equivalent, as protective materials for clothing.
- ▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- ▶ Wear indirect-vent, impact and splash resistant goggles when working with liquids.
- ▶ Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.
- ▶ Do not wear contact lenses when working with this substance.

Respiratory Protection

Improper use of respirators is dangerous. Respirators should only be used if the employer has implemented a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- ▶ At any exposure level, use a NIOSH approved supplied-air respirator with a full facepiece operated in pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.

Fire Hazards

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- ▶ **Nitrogen Mustard** may burn, but does not readily ignite.
- ▶ Use dry chemical, CO₂, water spray or foam as extinguishing agents.
- ▶ POISONOUS GASES ARE PRODUCED IN FIRE, including *Chlorine, Nitrogen Oxides* and *Hydrogen Chloride*.
- ▶ Use water spray to keep fire-exposed containers cool.

Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If **Nitrogen Mustard** is spilled or leaked, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate all ignition sources.
- ▶ Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit into sealed containers.
- ▶ Ventilate and wash area after clean-up is complete.
- ▶ DO NOT wash into sewer.
- ▶ It may be necessary to contain and dispose of **Nitrogen Mustard** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

Handling and Storage

Prior to working with **Nitrogen Mustard** you should be trained on its proper handling and storage.

- ▶ **Nitrogen Mustard** may react violently with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to form flammable and explosive *Hydrogen gas*.
- ▶ **Nitrogen Mustard** is not compatible with ISOCYANATES; HALOGENATED ORGANIC COMPOUNDS; PHENOLS; EPOXIDES; ANHYDRIDES; and ACID HALIDES.
- ▶ **Nitrogen Mustard** in contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) may result in a fire.
- ▶ Store in tightly closed containers in a cool, well-ventilated area away from LIGHT and HEAT, as **Nitrogen Mustard** becomes unstable.
- ▶ Sources of ignition, such as smoking and open flames, are prohibited where **Nitrogen Mustard** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
- ▶ **Nitrogen Mustard** is corrosive to IRON ALLOYS.

Occupational Health Information Resources

The New Jersey Department of Health offers multiple services in occupational health. These services include providing informational resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations.

For more information, please contact:

New Jersey Department of Health
Right to Know
PO Box 368
Trenton, NJ 08625-0368
Phone: 609-984-2202
Fax: 609-984-7407
E-mail: rtk@doh.state.nj.us
Web address: <http://www.nj.gov/health/eoh/rtkweb>

***The Right to Know Hazardous Substance Fact Sheets
are not intended to be copied and sold
for commercial purposes.***

GLOSSARY

ACGIH is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

Acute Exposure Guideline Levels (AEGs) are established by the EPA. They describe the risk to humans resulting from once-in-a-lifetime, or rare, exposure to airborne chemicals.

Boiling point is the temperature at which a substance can change its physical state from a liquid to a gas.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

CFR is the Code of Federal Regulations, which are the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

ERG is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

Emergency Response Planning Guideline (ERPG) values are intended to provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group.

Ionization Potential is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

IRIS is the Integrated Risk Information System database maintained by federal EPA. The database contains information on human health effects that may result from exposure to various chemicals in the environment.

LEL or Lower Explosive Limit, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

Permeated is the movement of chemicals through protective materials.

PIH is a DOT designation for chemicals which are Poison Inhalation Hazards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

UEL or Upper Explosive Limit is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

Vapor Density is the ratio of the weight of a given volume of one gas to the weight of another (usually *Hydrogen*), at the same temperature and pressure.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

Common Name: **NITROGEN MUSTARD**

Synonyms: Chloramine; HN-2; MBA; Mustine

CAS No: 51-75-2

 Molecular Formula: $C_5H_{11}Cl_2N$

RTK Substance No: 1377

Description: Colorless to yellow, oily liquid with a soapy or fruity odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 1 - Fire 1 - Reactivity DOT#: UN 2810 ERG Guide #: 153 Hazard Class: 6.1 (Poison)	Nitrogen Mustard may burn, but does not readily ignite. Use dry chemical, CO ₂ , water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Chlorine, Nitrogen Oxides</i> and <i>Hydrogen Chloride</i> . Use water spray to keep fire-exposed containers cool.	Nitrogen Mustard may react violently with REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES) to form flammable and explosive <i>Hydrogen gas</i> . Nitrogen Mustard is not compatible with ISOCYANATES; HALOGENATED ORGANIC COMPOUNDS; PHENOLS; EPOXIDES; ANHYDRIDES; and ACID HALIDES. Nitrogen Mustard in contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) may result in a fire. Nitrogen Mustard is unstable in LIGHT and HEAT.

SPILL/LEAKS
Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit into sealed containers.

Ventilate and wash area after clean-up is complete.

DO NOT wash into sewer.

Bioaccumulation is not expected.

PHYSICAL PROPERTIES

Odor Threshold:	Soapy (low concentration) Fruity (high concentration)
Flash Point:	May burn
Vapor Density:	5.9 (air = 1)
Vapor Pressure:	0.43 mm Hg at 77°F (25°C)
Specific Gravity:	1.2 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	167°F (75°C)
Melting Point:	-76°F (-60°C)
Freezing Point:	-76° to -85°F (-60° to -65°C)
Molecular Weight:	156.1

EXPOSURE LIMITS

 U.S. Military: **0.003 mg/m³**
PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H®
Coveralls:	DuPont Tychem® BR, LV, CSM, Responder®, and TK; Kappler® Zytron® 300; and Saint-Gobain ONESuit® TEC (>8-hr breakthrough)
Respirator:	<0.003 mg/m ³ - Full facepiece APR with CBRN cartridges >0.003 mg/m ³ - Supplied air

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation, severe burns with itching and blisters
Inhalation:	Nose and throat irritation with coughing and wheezing Headache, dizziness, nausea, vomiting and passing out
Chronic:	Cancer (leukemia and skin) in humans

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention .

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.