



Right to Know Hazardous Substance Fact Sheet

Common Name: **AMMONIA**

Synonyms: Anhydrous Ammonia

Chemical Name: Ammonia

Date: September 2007

Revision: February 2016

CAS Number: 7664-41-7

RTK Substance Number: 0084

DOT Number: UN 1005

Description and Use

Ammonia is a colorless gas with a strong, sharp, irritating odor. It is often used in water solution. It is used in fertilizers, as a refrigerant, and in making plastics, dyes, textiles, detergents, and pesticides.

▶ ODOR THRESHOLD = 5 ppm

- ▶ Odor thresholds vary greatly. Do not rely on odor alone to determine potentially hazardous exposures.

Reasons for Citation

- ▶ **Ammonia** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, DEP, NFPA 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 water for at least 30 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. Seek medical attention immediately.

Skin Contact

- ▶ Immerse affected part in warm 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.
- ▶ Medical observation is recommended for 24 to 48 hours after overexposure, as pulmonary edema may be delayed.

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	NJDHSS	NFPA
HEALTH	-	3
FLAMMABILITY	-	1
REACTIVITY	-	0
CORROSIVE MAY IGNITE AND BURN WITH EXPLOSIVE FORCE POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

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

- ▶ **Ammonia** can affect you when inhaled.
- ▶ Contact can severely irritate and burn the skin and eyes with possible eye damage.
- ▶ Inhaling **Ammonia** can irritate the nose and throat.
- ▶ Inhaling **Ammonia** can irritate the lungs. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency.
- ▶ Repeated exposure may cause an asthma-like allergy and lead to lung damage.
- ▶ Contact with *liquid Ammonia* can cause frostbite.

Workplace Exposure Limits

OSHA: The legal airborne permissible exposure limit (PEL) is **50 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit (REL) is **25 ppm** averaged over a 10-hour workshift and **35 ppm**, not to be exceeded during any 15-minute work period.

ACGIH: The threshold limit value (TLV) is **25 ppm** averaged over an 8-hour workshift and **35 ppm** as a STEL (short-term exposure limit).

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 (<http://nj.gov/health/workplacehealthandsafety/right-to-know/>) 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) requires private 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 **Ammonia**:

- ▶ Contact can severely irritate and burn the skin and eyes with possible eye damage.
- ▶ Inhaling **Ammonia** can irritate the nose and throat causing coughing and wheezing.
- ▶ Inhaling **Ammonia** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
- ▶ Contact with *liquid Ammonia* can cause frostbite.

Chronic Health Effects

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

Cancer Hazard

- ▶ According to the information presently available to the New Jersey Department of Health, **Ammonia** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

- ▶ While **Ammonia** has been tested, it is not classifiable as to its potential to cause reproductive harm.

Other Effects

- ▶ **Ammonia** may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, coughing, and/or chest tightness.
- ▶ Repeated exposure may lead to permanent lung damage.

Medical

Medical Testing

For frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

- ▶ Lung function tests. The results may be normal if the person is not having an attack at the time of the test.

If symptoms develop or overexposure is suspected, the following is recommended:

- ▶ Consider chest x-ray after acute overexposure

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).

Mixed Exposures

- ▶ Because smoking can cause heart disease, lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

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:

- ▶ Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA *Compressed Gases Standard* (29 CFR 1910.101).

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 **Ammonia**. Wear personal protective equipment made from material which 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 *Nitrile*, *Neoprene*, *Butyl*, *Butyl/Neoprene* or *Viton/Neoprene* for gloves and Dupont *Tychem*® CPE and Kappler *Zytron*® 500 as protective materials for clothing.
- ▶ Where exposure to cold equipment, vapors, or liquid may occur, employees should be provided with special clothing designed to prevent the freezing of body tissues.
- ▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- ▶ Wear non-vented, impact resistant goggles when working with fumes, gases, or vapors.
- ▶ 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 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).

- ▶ Where the potential exists for exposure over **25 ppm**, use a NIOSH approved full facepiece respirator with a cartridge specifically approved for **Ammonia**. Increased protection is obtained from full facepiece powered-air purifying respirators.
- ▶ Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Ammonia**, (2) while wearing particulate filters abnormal resistance to breathing is experienced, or (3) eye irritation occurs while wearing a full facepiece respirator. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- ▶ Consider all potential sources of exposure in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- ▶ Where the potential exists for exposure over **250 ppm**, use a NIOSH approved supplied-air respirator with a full facepiece operated in a 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.
- ▶ Exposure to **300 ppm** is immediately dangerous to life and health. If the possibility of exposure above **300 ppm** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

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).

- ▶ Although **Ammonia** is not flammable, it MAY IGNITE AND BURN WITH EXPLOSIVE FORCE.
- ▶ Stop flow of gas or let burn.
- ▶ POISONOUS GASES ARE PRODUCED IN FIRE, including *Nitrogen Oxides*.
- ▶ CONTAINERS MAY EXPLODE IN FIRE.
- ▶ Use water spray to keep fire-exposed containers cool, and to absorb and disperse vapors.

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 **Ammonia** is leaked, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Ventilate area of leak to disperse the gas.
- ▶ Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
- ▶ Neutralize small *liquid* spills with *Hydrochloric acid*. Wipe with a mop or use water aspirators.
- ▶ Use water spray to keep cylinders or tanks cool. Move cylinders away from the fire if there is no risk.
- ▶ It may be necessary to contain and dispose of **Ammonia** 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 **Ammonia** you should be trained on its proper handling and storage.

- ▶ **Ammonia** reacts violently with HALOGENS (such as FLUORINE, CHLORINE and BROMINE); ACIDS (such as HYDROGEN CHLORIDE, HYDROGEN FLUORIDE and HYDROGEN BROMIDE); NITROSYL CHLORIDE; CHROMYL CHLORIDE; TRIOXYGEN DICHLORIDE; NITROGEN DIOXIDE; NITROGEN TRICHLORIDE; BROMINE PENTAFLUORIDE; CHLORINE TRIFLUORIDE; and CALCIUM HYPOCHLORITE.
- ▶ Forms explosive compounds that are pressure and temperature sensitive with MERCURY; GOLD OXIDES; and SILVER SALTS and OXIDES.
- ▶ **Ammonia** is incompatible with CHLOROFORMATES; CYANIDES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES); DIMETHYL SULFATE; and MANY METALS and their ALLOYS (such as ZINC, COPPER and BRASS).
- ▶ **Ammonia** dissolves in WATER to release heat.
- ▶ Store in tightly closed containers in a cool, well-ventilated area away from HEAT, MOISTURE and DIRECT SUNLIGHT.

Occupational Health Information Resources

The New Jersey Department of Health and Occupational Health Service, 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.nj.gov
 Web address:
<http://nj.gov/health/workplacehealthandsafety/right-to-know/>

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.

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.

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: **AMMONIA**

Synonyms: Anhydrous Ammonia

CAS No: 7664-41-7

Molecular Formula: NH₃

RTK Substance No: 0084

Description: Colorless gas with a strong, sharp, irritating odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
<p>3 - Health</p> <p>1 - Fire</p> <p>0 - Reactivity</p> <p>DOT#: UN 1005</p> <p>ERG Guide #: 125</p> <p>Hazard Class: 2.3 (Toxic Gases)</p>	<p>Non-flammable gas which can ignite and burn with explosive force.</p> <p>Stop the flow of gas or let burn.</p> <p>POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Nitrogen Oxides</i>.</p> <p>CONTAINERS MAY EXPLODE IN FIRE.</p> <p>Use water spray to keep fire-exposed containers cool, and to absorb and disperse vapors.</p>	<p>Ammonia reacts violently with HALOGENS (such as FLUORINE, CHLORINE and BROMINE); ACIDS (such as HYDROGEN CHLORIDE, HYDROGEN FLUORIDE and HYDROGEN BROMIDE); NITROSYL CHLORIDE; CHROMYL CHLORIDE; TRIOXYGEN DICHLORIDE; NITROGEN DIOXIDE; NITROGEN TRICHLORIDE; BROMINE PENTAFLUORIDE; CHLORINE TRIFLUORIDE; CALCIUM HYPOCHLORITE; and forms explosive compounds that are pressure and temperature sensitive with MERCURY; GOLD OXIDES; and SILVER SALTS and OXIDES.</p> <p>Ammonia is incompatible with CHLOROFORMATES; CYANIDES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES); DIMETHYL SULFATE; and MANY METALS and their ALLOYS (such as ZINC, COPPER and BRASS).</p> <p>Ammonia dissolves in WATER to release heat.</p> <p>Keep away from HEAT, MOISTURE and DIRECT SUNLIGHT.</p>

SPILL/LEAKS

Isolation Distance:

Small spills – 30 meters (100 feet)

Large spills – 60 meters (200 feet)

Stop flow of gas.

Use water spray to absorb and disperse vapors.

Hazardous to the environment.

DO NOT wash into sewer.

PHYSICAL PROPERTIES

Odor Threshold:	Less than 5 ppm
Flash Point:	Non-flammable
LEL:	15%
UEL:	28%
Vapor Density:	0.6 (air = 1)
Vapor Pressure:	658 mm of Hg at 70°F (21°C)
Water Solubility:	Soluble
Boiling Point:	-28°F (-33.4°C)
Ionization Potential:	10.18 eV
Autoignition:	1,204°F (651°C)

EXPOSURE LIMITS

OSHA:	50 ppm (8-hr TWA)
NIOSH:	25 ppm (10-hr TWA), 35 ppm STEL
ACGIH:	25 ppm (8-hr TWA), 35 ppm STEL
IDLH LEVEL:	300 ppm
ERPG-1:	25 ppm
ERPG-2:	150 ppm
ERPG-3:	1,500 ppm

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Neoprene, Butyl, Butyl/Neoprene, Viton/Neoprene
Coveralls:	Dupont Tychem® CPE and Kappler Zytron® 500
Boots:	Butyl/Neoprene
Respirator:	> 25 ppm - APR with full-facepiece and cartridges for Ammonia >250 ppm - Supplied Air >300 ppm - SCBA

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns. Contact with liquid causes frostbite.
Acute:	Nose, throat and lung irritation with coughing and shortness of breath
Chronic:	An asthma-like allergy with shortness of breath, wheezing, coughing and/or chest tightness

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.

Immerse affected part in warm water if in contact with liquid.

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

Transfer to a medical facility.