

Dangers of Anhydrous Ammonia (NH₃)

Potential Hazard

Pure ammonia or anhydrous ammonia (NH₃) is a toxic chemical most commonly found in:

- refrigerants
- cleaning products
- fertilizers.

NH₃ is hygroscopic, or water-seeking. When combined with moisture it forms a corrosive substance. Ammonia gas is very irritating to the eyes, nose and respiratory system, and in high concentrations is also corrosive to the skin and eyes. Breathing ammonia gas can be fatal. The level of danger depends on the concentration of ammonia and length of exposure.

- In **low concentrations**, inhaling ammonia gas causes irritation to eyes, and respiratory system; liquefied or pressurized ammonia can cause chemical and freezing burns to the skin and eyes.
- In **high concentrations**, ammonia gas can be fatal within a few breaths.

NH₃ has a distinct, pungent smell, which usually makes it easy to identify. But repeated exposure reduces your ability to smell the gas. This can occur even if levels of the gas are dangerously high.

Workplaces most commonly associated with potential ammonia exposures are those that use ammonia as a refrigerant, such as:

- food and beverage manufacturing
- processing facilities
- ice rinks
- cold storage plants
- ice manufacturing plants.

NH₃ exposure is also a risk during other workplace activities that use compressed ammonia gas, such as:

- blueprinting
- die hardening
- cleaning products manufacturing
- workers who repair or maintain ammonia systems.

Other workplaces subject to ammonia exposure are those that use liquid ammonia, which can include:

- microorganism growers
- wastewater treatment plants
- agricultural fertilizer manufacturers.

Liquid ammonia is also used directly in agricultural fields as a fertilizer.

(over)



How to Control the Hazard

To protect workers, employers should:

- change the material to eliminate or substitute NH₃ for a safer process or material, where possible
- implement engineering controls that generate less ammonia and improve ventilation systems to ensure current threshold limit values are followed*
- ensure Transport Canada regulations for NH₃ are followed when attempting to transport the chemical†
- consider installing barriers to help prevent gas from leaking into other areas of the workplace
- ensure all bystanders are prohibited from accessing areas where NH₃ is present
- ensure a large supply of water (4-5 gallons) is accessible for workers to flush eyes in case of emergency
- train workers on ammonia exposure dangers, warning signs, safe work procedures, manufacturer and input dealer's instructions
- train workers to use personal protective equipment (PPE) and ensure the correct equipment is supplied and available in good working order.
- develop and implement an exposure control plan; an effective plan must include purpose and responsibilities, risk assessment, controls, education, training, written safe work procedures, Material Safety Data Sheet (MSDS), washing or decontamination facilities, and documentation.

***NOTE:** In Manitoba, the Workplace Safety and Health Regulation adopts the current ACGIH® threshold limit values (TLV®) as the allowable occupational exposure limits. [As of 2018, ACGIH® set the TLV® for ammonia at 25 ppm for an average eight hour work week and short term exposure \(15 minutes or less\) at 35 ppm.](#) See SAFE Work Manitoba's Chemical and Biological Hazard Guidelines for full details.

Workers who work with or around ammonia should:

- learn about what control methods the company uses
- ask supervisors about how they will be protected when performing work with or near NH₃
- never wear contact lenses where NH₃ is being used (traps vapours against eyes)
- follow safe work procedures and use protective equipment (eyewear, respirators, and protective clothing).

FIRST AID for Anhydrous Ammonia exposure:

Take the following immediate steps when a workers has been exposed to any amount of NH₃:

- Seek medical attention.
- If the worker is not breathing, begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel.
- Flush exposed area with large quantities of clean water for a minimum of 15-30 minutes, or until medical aid is received, to minimize damage.
- Flood large amounts of water on contaminated clothing and remove using caution as clothing may freeze to skin.
- Keep burn area(s) moist.
- Where skin surface is damaged, apply a clean dressing. Where skin surface is not damaged, cleanse affected areas thoroughly by washing with mild soap and water.
- If NH₃ is ingested, drink large quantities of water (four to eight ounces). If the victim is unconscious, DO NOT give anything by mouth.
- DO NOT induce vomiting.

SAFE Work Manitoba contact information:

Winnipeg: 204-957-SAFE (7233)

Toll-Free: 1-855-957-SAFE (7233)

Publications and resources available at: safemanitoba.com



**NH₃-Approved PPE:**

- non-vented goggles and a full face shield
- appropriate respirator to NH₃ concentration*
- ammonia resistant gloves - gauntlet style, 35.5 cm (14")
- ammonia resistant protective suit
- protective boots

***NOTE:** Leave the area immediately if you can smell, taste or detect NH₃ while wearing a respirator

References to legal requirements under workplace safety and health legislation:

- Workplace Hazardous Materials Information Systems: Workplace Safety and Health Regulation, M.R. 217/2006, Part 35
- Chemical and Biological Substances: Workplace Safety and Health Regulation, M.R. 217/2006, Part 36

†Dangerous Goods Act and Regulations:

Anhydrous ammonia (NH₃) is a dangerous good and falls under the Transportation of Dangerous Goods Act and Regulations. For more information on Transport Canada regulations pertaining to anhydrous ammonia, contact:

Transport Canada | Transports Canada

Transport Dangerous Goods | Transport des marchandises dangereuses

Prairie & Northern Region | Région des Prairies et du Nord

Telephone | Téléphone: 1-888-463-0521

E-mail | Courriel: tdg-tmdpnr@tc.gc.ca

Internet: www.tc.gc.ca/tdg | www.tc.gc.ca/tmd

Additional workplace safety and health information available at safemanitoba.com

- [SAFE Work Manitoba – Occupational Disease and Illness Prevention Strategy](#)
- [SAFE Work Manitoba - Chemical and Biological Hazards Guideline](#)
- [SAFE Work Manitoba - WHMIS 2015 Information for Workers](#)
- [Canadian Centre of Occupational Health and Safety](#)
- [WorkSafeBC – Ammonia](#)



© WorkSafeBC (Workers' Compensation Board),
used with permission