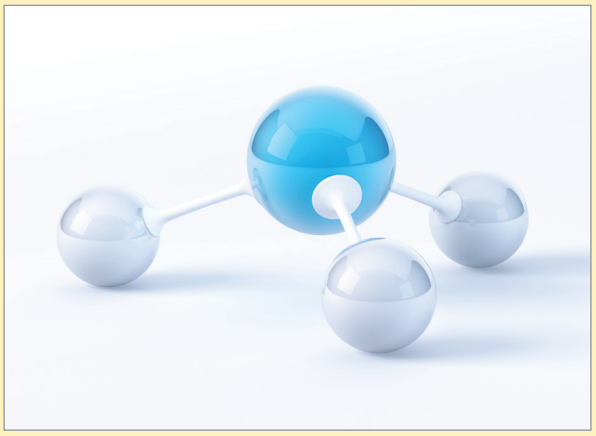
Ammonia

HEALTH AND SAFETY FACT SHEET

CUPE Canadian Union of Public Employees

Ammonia is severely toxic. It is a colourless gas with a distinct, pungent odour. It is widely used as a refrigerant in a wide variety of places, including recreation facilities such as arenas, skating and curling rinks; food processing facilities; and cold storage warehouses. It is also a common ingredient in many cleaners.

While most people can detect the smell of ammonia in the range of two to 55 parts per million (ppm), it has been recorded that workers who have been exposed repeatedly lose the ability to smell ammonia at low levels. Relying on the sense of smell is not an effective way to protect workers.



Ammonia is considered a severe health hazard due to its toxicity. Exposure to 300 ppm is immediately dangerous to life and health (IDLH) and can be fatal within a few breaths.

Ammonia is corrosive to the skin, eyes and lungs. While direct contact with concentrated amounts of the chemical can cause burns to the skin and eyes, the more common cause of serious risk for workers is the negative health effects of breathing in ammonia when it is released into the atmosphere.

While elevated levels can kill, lower levels of ammonia (levels from 70 to 300 ppm) can cause severe irritation of the nose, throat and airways. Damage from inhalation can cause life-threatening accumulation of fluid in the lungs (pulmonary edema). Symptoms of low and moderate levels of exposure include coughing, shortness of breath, difficult breathing and tightness in the chest. Symptoms may develop hours after exposure and can be made worse by physical effort. Long-term damage may result from a single severe short-term exposure. Additionally, low level long-term exposure can irritate and inflame the airways, which can lead to permanent damage.

Ammonia is flammable at concentrations of approximately 15 to 28 per cent by volume in air. It can explode if released in an enclosed space with a source of ignition present, or if a vessel containing ammonia is exposed to sufficient heat.

The only safe level of exposure to toxic chemicals is zero. However, the American Conference of Governmental Industrial Hygienists puts the threshold limit value for ammonia at 25 ppm for an eight-hour period. The threshold limit value is also known as the time-weighted average (the highest recommended amount of exposure to a chemical).

Ammonia in cleaners

Many cleaners sold as consumer products can contain between five to ten per cent of ammonia. Industrial strength cleaners can contain up to 35 per cent. Personal protective equipment, described by the products safety data sheet

(as part of a broader WHMIS program), should be worn to prevent exposure. This equipment includes rubber gloves and goggles. More stringent protections may be needed depending on the chemical and application.

Note: Cleaners that contain ammonia should not be mixed with cleaners that contain bleach, as it will produce a very toxic chlorine vapour that can quickly overwhelm, injure or even kill workers.

Ammonia in cooling systems

Ammonia cooling systems frequently make use of compressed ammonia gas to transform it into a clear liquid. When released, liquid ammonia evaporates quickly back to a gas. Ammonia gas is lighter than atmosphere and will collect towards the top of a room before filling it. However, due to the nature of liquid ammonia, a small leak can completely fill a room with enough ammonia gas to quickly overwhelm a worker.

When employers are running an ammonia-based cooling system, the following aspects should be included in their safe work program.

Key elements of a safe work program

- **Worker training**
  - Workers who have the responsibility of operating and maintaining cooling systems should be provided with documented training, direction, guidance and instructions on safe work procedures and other specifics related to the system they are responsible for.
- **Safe work procedures**
  - Running an ammonia-based cooling system can expose workers to extremely hazardous situations. The employer must have written safe work procedures. Workers must also be trained on safe work procedures for all processes including (but not limited to): leak detection and control, chiller maintenance process, disposal of related materials, connection and disconnection components, and start-up and shut-down processes. All procedures must be detailed, and all tasks and sub-tasks must be clearly listed.
- **Personal protective equipment (PPE)**
  - While working with systems that contain ammonia, workers should have goggles and a chemical cartridge respirator, appropriate gloves, aprons and boots. If the levels of ammonia are expected to be above 250 ppm, workers should use a fully encapsulated suit with self-contained breathing supply. The selection, procedures and training around PPE for ammonia should be developed in consultation with the health and safety committee and, when required, the assistance of a qualified ammonia system expert.
- **Maintenance of system**
  - Employers must regularly inspect the entire system to ensure it is properly functioning to prevent leaks.
- **Emergency control plan**
  - Employers running an ammonia-based cooling system should have emergency procedures and plans to keep people safe and reduce the amount of ammonia that could be released into the environment. They must ensure that proper emergency equipment is on-site so workers can deal with a leak, and they must ensure that other workers know when and how to properly evacuate the area. It is the employer's responsibility to run emergency drills to practice these procedures.
- **Alarm System**
  - It is too dangerous for workers to do inspections with detection equipment of rooms to determine if there has been a leak. As such, it is critical that any ammonia-based cooling system includes an alarm system that detects the smallest of leaks. These systems must be tested monthly to ensure that they are functional. Any problem must be fixed immediately.

First aid

Workers who work around ammonia-based cooling systems should have first aid training to help workers who have been exposed to ammonia gas or liquid. First aid rescue workers must be trained to use the proper PPE (such as an air supplied respirator) so they are not incapacitated or injured by a release of ammonia as well. While there is no "antidote" for ammonia poisoning, effects of smaller exposure can be treated, and most people are able to recover. Immediate decontamination of skin and eyes with copious amounts of water is very important. When inhaled, treatment may also consist of the administration of humidified oxygen, bronchodilators and airway management.

Working alone

Employers should set up a proper program for working alone to ensure that no worker enters areas that could potentially contain ammonia gas without a proper notification system. In short, the best practice is that no one should be entering an area that could be filled with ammonia gas without someone else there to act as a rescue worker. Additionally, proper lock-out or tag-out procedures should be in place to eliminate any accidental exposure during work.

Storage

If the employer stores ammonia on site (full or empty containers), it should be stored in an appropriate designated area that prevents incidental exposure. The storage area must be connected to the ammonia alarm system described previously. The storage room should be cool, dry, and out of direct sunlight. There should be no heat, ignition sources or chemicals that would react with ammonia in the storage area.

CUPE members who work in buildings should ensure that all safeguards mentioned are in place and functioning.

If there are any additional questions about ammonia-based cleaning supplies or cooling systems, ask your CUPE National Staff Representative or regional health and safety specialist.

FOR MORE INFORMATION CONTACT:
CUPE National Health and Safety Branch, 1375 St. Laurent Blvd.,
Ottawa, ON K1G 0Z7 tel (613) 237-1590 fax (613) 237-5508 health_safety@cupe.ca