

AMMONIA (NH₃) GAS EXPOSURE IN THE WORKPLACE

The accidental release of ammonia caused the fatality of three workers in a rink in British Columbia in October 2017 and was also the source of an emergency evacuation in a rink in Prince Edward Island, where no injuries occurred. The presence of ammonia in a workplace is a serious health hazard to workers. To ensure protection against the exposure to ammonia, both workers and employers must be aware of its properties, how it affects the body and what to do in emergency situations.

Ammonia is used in mechanical refrigeration systems, including those found in ice rinks. Ammonia is used in a liquid form in these systems, but it becomes a gas once it is released into the air. A system failure or leak can cause ammonia gas to be released into the atmosphere. The results can be deadly if a worker is not properly protected. Consequently, ammonia mechanical systems are required to be installed, operated and maintained by licensed mechanical contractors or certified operators. The systems must be regularly inspected and the employer must have valid inspection certificates.

Effects of Ammonia Gas Exposure on the Human Body:

Exposure (ppm)	Effect on Human Body	Permissible Exposure
25 ppm	Odour detectable by most persons	Maximum 8 hrs
100 ppm	Eye Irritant Swelling of Eye Lids Dry Lips Burning throat	Eliminate deliberate exposure
400-700 ppm	Immediate eye and respiratory tract irritation	No serious effect if exposure is for less than 1 hour
1700 ppm	Coughing, difficulty breathing and severe eye laceration (crying)	Could be fatal after 0.5 hours
2000-3000 ppm	Skin blisters and burns within seconds	Could be fatal after 15 minutes
5000-10000 ppm	Suffocation within minutes	Fatal within minutes

Reduce Your Risk

The employer must ensure that procedures have been developed to instruct workers on how to work safely. Employers must ensure workers understand the procedures and are able to work competently. An emergency response plan must be in place and all workers must receive training on the plan. The plan should include provisions for emergency repairs, evacuation procedures, location of safety showers and eye wash stations and emergency phone numbers.

All facilities with an ammonia refrigeration system should have an ammonia detection system installed near the system that detects an ammonia leak and triggers the onset of an independent ventilation system, as well as an alarm. All workers should wear appropriate personal protective equipment when working with the system and should be trained in the proper selection, use and care of this equipment.

Checklist for Working Safely with Ammonia

- Do you have safe work procedures for the safe use and handling of ammonia? Have workers been trained in those safe work procedures?
- Have workers been educated and trained in WHMIS?
- Do workers have ready access to the Safety Data Sheet for ammonia?
- Do you have:
 - a respiratory protection program as outlined in the latest version of CSA Standard Z-94.4?
 - the appropriate respirator as required in the Safety Data Sheets?
 - training in the proper selection use and care of the respirators?
 - annual fit testing?
 - pulmonary function test and medical clearance?
- Do you have the proper gloves that are required in the Safety Data Sheet? Have workers been trained on the use and care of the gloves?
- Do you have the proper goggles for eye protection that are required in the Safety Data Sheet? Have workers been trained on the use and care of the eye protection?
- Do workers have up-to-date training in First Aid and CPR with valid certificates?
- Are your First Aid kits accessible? Are your First Aid kits maintained and stocked regularly?
- Do workers work alone? Do you have a Working Alone Policy?
- Do you keep records of:
 - training?
 - respirator fit testing?
 - inspections?
 - incidents or near misses?
 - health surveillance?
- Do you have written emergency / evacuation procedures in the event of an ammonia release? Have workers been trained in those emergency procedures?
- Do you have equipment in place to monitor ammonia levels? Is the equipment inspected and maintained according to the manufacturer's specifications?
- Is the warning alarm in place and properly functioning?
- Is there sufficient ventilation in the area of ammonia use to minimize exposure if released?
- Do you have a certified Boiler Inspector performing routine inspections on cooling equipment?

If you have questions on this or any workplace safety topic, contact WCB Occupational Health & Safety at 902-368-5697 or toll free 1-800-237-5049, or visit our website at wcb.pe.ca.