BCEHS | BC Emergency Health Services

Paramedic Specialist

NH3 2018 1.0

Chemical Response Data Sheet

Chemical Name: Anhydrous Ammonia (NH3)

Identifying Data: UN # 1005 CAS # 7664-41-7
Classification: Class 2.3 Toxic Gas (Subsidiary Class 8)

Placard

NFPA Rating

WHMIS 2015 Symbols

Physical Properties:

Colour	Colorless	(*White fog when combines with moisture in air*)
Vapour Density	0.6	(*Heavier then air when combines with moisture in air*)
Solubility	High	(34%) (*Absorbs readily with water fog and body sweat, mucous membranes. Water can absorb 1300 times its volume of NH3 gas)*
Boiling Point	-35C	(*May cause thermal burns to exposed skin*)
Expansion Ratio	High	(*850 to 1) Liquid compressed gas.*
Vapour Pressure	High	(*125 psi / 8.5 atmospheres /6460 mmHg) >40 mmHg = Inhalation Risk*
PH (In water)	10.5 - 11.6	(*Strong base)*
Odor Threshold	17ppm	(varies with individual)
Ionization Potential	**10.7 eV**	

General Description:
Clear colourless gas, will produce white vapour cloud on release as it combines with water vapor in air. Lighter than air but hugs the ground initially upon release. Highly water soluble and will react with eyes, mucus membranes and moist skin and turn into strong base (Ammonium hydroxide). Not regulated as a flammable gas but will explode under right concentrations. Will produce both a chemical burn and a thermal burn if exposed at leak source. Those patients without tearing eyes, throat not likely to have been exposed to elevated concentrations.

Commonly Found Locations:

- In transport
- Ice Rinks
- Refrigeration Plants
- Water/waste water treatment
- Pharmaceutical Manufactures
- Drug Labs (Meth)
- Metal treating industry
- Food and Beverage Manufacturing
- Industrial Plants
- Farming (Fertilizer)
- Pulp Mills
- Textile and Plastics Manufacturing

Work Safe BC Permissible Limits

8 hr TWA 25ppm STEL/Ceiling 35ppm IDLH 300ppm (SCBA must be worn at or above this level)

BCEHS | BC Emergency Health Services

Paramedic Specialist

NH3 2018 1.0

Chemical Response Data Sheet

Emergency Procedures to Consider for Paramedic Specialist

- **Do initial Size-up of incident.**
- Evacuate immediate area and consider further evacuation as situation dictates. See ERG evacuation distance recommendations.
- Fire Departments may *consider Turnout gear or Coveralls with SCBA for immediate emergency rescue for viable patients. Decon patients and DO NOT remove SCBA until rescuer has been thru Decon in order to prevent inhalation injury. *** This level of skin protection with SCBA may result in skin burns to rescuer. Consider Risk vs Benefit.****
- Water fog to absorb vapour to protect responders and limit gas dispersion. Remember runoff water will be caustic and may pose environmental and safety hazard!
- LEL of NH3 is 15%, monitor and protect/withdraw responders as conditions change.
- Vapour suppression foam (Alcohol Resistant) may be utilized for leaks of aqueous solutions of Ammonia only.
- Provide Shelter in Place Instructions if requested:
  - * Stay indoors (unless evacuation has been called by local authorities)
  - * Close all windows and doors, seal with duct tape or wet towels
  - * Shut off furnace, exhaust fans, fireplaces, and air conditioners
  - * Wait for and follow advice from local police or authorities.
  - * If the smell is very strong, breathe through a wet cloth and turn on any nearby showers to absorb airborne vapors.

ERG 2016 Recommended Evacuation Distances

Small Spills < 200L

Isolate in all Directions	Protect Down wind	
	Day	Night
30M	0.1km	0.2km

Large Spills >200 L

		First Isolate	Then Protect Downwind (KM)					
			Day			Night		
Low wind	*<10kph*		Low	Mod.	High	Low	Mod.	High
Moderate wind	*10-20Kph*		wind	Wind	Wind	wind	Wind	Wind
High wind	*> 20Kph*							
Rail Tank car		300M	1.7	1.3	1.0	4.3	2.3	1.3
Hwy Tank truck or trailer		150M	0.9	0.5	0.4	2.0	0.8	0.6
Agriculture nurse tank		60M	0.5	0.3	0.3	1.3	0.3	0.3
Multiple small Containers		30M	0.3	0.2	0.1	0.7	0.3	0.2

See TDG Reference: TIH/Guide 125

BCEHS | BC Emergency Health Services

NH3 2018 1.0

Paramedic Specialist

Chemical Response Data Sheet

Emergency Decontamination:

- Have patient self-Decon with direction as need from safe distance. Assist removing clothing if needed with appropriate PPE to prevent secondary contamination and injury.
- Use water for decontamination. Large volume/low pressure. Tepid if immediately available.
- **Eyes take precedence.**
- Goal is to begin Decon within 1 minute of contact if possible (Time = Tissue)
- Ensure patient is fully decontaminated. Don not forget skinfolds, armpits, groin, buttocks and feet.
- Use PH paper to aid in determination of residual chemical on skin.
- Do not cause hypothermia. Focus on symptomatic areas (pain, visible burns)
- See Pre-Hospital Care below for further information.
- NO safety concerns of off gassing via Digestive tract or Respiratory system due to NH3 inhalation.

PPE

- SCBA *Turnout Gear/Coveralls for Emergency rescue and removal of viable victims or for quick isolation of valve.* Follow IAP and use wind, water fog etc. to protect responders.
- Level A Protection compatible with NH3 to be worn for all leaks that do not require immediate medical intervention.
- Respiratory protection. SCBA recommended at all times.
- NIOSH approved respirator and cartridges can be used for Ammonia vapour if within the allowable WorkSafe BC permissible concentrations. (Gas monitoring required)
- Gloves/Boots; Chemical resistant to Ammonia (Insulated Neoprene gloves recommended.) Utilize chemical compatibility charts for permeation and degradation times to determine optimum PPE protection to be worn.

Fire and Reactivity: Flammable (However does not meet DOT definition for flammable gas.)

- Flash point: N/A
- LEL 15% (150,000 ppm)
- UEL 28% (280,000 ppm)
- **Fire involved vessels may BLEVE.**
- NH3 leaks in buildings and confined spaces may reach flammable limits. PPM >150,000
- Ignition temperature 651 C (1204 F)
- Ammonia gas can decompose at high temperatures forming very flammable hydrogen and toxic Nitrogen dioxide.

BCEHS | BC Emergency Health Services

Paramedic Specialist

NH3 2018 1.0

Chemical Response Data Sheet

Toxidrome: Irritant Gas

Symptoms may include; Burning eyes, throat & skin. Cough, chest tightness, with increased heart rate and respiratory rate.

Primary route of exposure: Inhalation

Primary Targets of Toxicity: Respiratory/Skin

- Airway and Breathing; caused by corrosive local toxic effects on mucous membranes of upper and lower airways, NH3 + water = ammonia hydroxide. May cause irritation to death, depending on concentration and exposure.
- Any Cardiovascular (Tachycardia, Bradycardia, hypotension) and/or Neurologic symptoms (confusion/DLOC/seizures) may be secondary due to hypoxia.
- Odour detectable approx. 2-5 ppm.
- Eye irritation due to high solubility of ammonia vapor.
- Liquid contact will cause both thermal (frost bite) and chemical burns.
- Liquid contact to eyes can cause permanent damage.
- NH3 gas will cause burns to moist/wet (sweaty) areas of body.
- Liquid Ammonia (-33C) will freeze tissue on contact.
- NH3 seeks out water. Human body is composed of mostly water. Severe thermal (frost/chemical burns) may occur with contact to skin and mucus membranes (eyes, oropharynx) as NH3 combines with water to form Ammonium Hydroxide (strong Base) causing liquefactive necrosis.

Pre- Hospital Care:

- Remove victim from hazardous area utilizing appropriate PPE for hazard. Nitrile gloves (doubled) recommended for attendants. Latex not compatible with NH3.
- Remove all contaminated clothing from victim(s). Caution if clothing is frozen to skin, use water first to thaw clothing from skin
- NH3 with Eye contact can result in temporary or permanent corneal damage and/or blindness. Eye lids may be frozen to eyes, **flush before attempting to open eyelids** with fingers to prevent further damage. **Hold eyes open** while flushing and continue to flush beyond 20 minutes, ideally continue to flush during transport until handed over to medical staff at hospital.
- Decontamination of skin not usually required unless liquid involved or skin symptomatic. Flush with tepid water as per training for chemical burns.
- Use PH paper to aid in determination of residual product on skin.
- Apply High flow 02 with NRB as required. Assist ventilations with BVM if required. Treat patient following support of ABC's as per training.
- Exposed patients with underlying lung disease (Asthma. COPD) may become symptomatic at lower concentrations then healthy individuals. Utilize their prescribed inhalers as required or treat with Bronchodilators.
- Contact BC Poison Control at 1-800-567-8911 or 604-682-5050 for Physician advisement on patient care. Physician may recommend giving fully alert patient's water to wash out mouth or drink to help reduce corrosive effects in upper airway.
- **Patients to be transported to Hospital for further Physician assessment and monitoring for delayed effects.**

BCEHS | BC Emergency Health Services

Paramedic Specialist

Chemical Response Data Sheet

NH3 2018 1.0

References and Links:

WISER (Wireless Information System for Emergency Responders)

https://www.agrium.com/products/code/506-9201

AHLS Provider Manual/4th edition.

WorkSafe BC/Exposure Limits

Canutec ERG 2016

Cameo Chemicals