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GUIDELINES FOR THE SAFE USE OF AMMONIA

Ammonia is a colorless, toxic gas consisting of one (1) nitrogen atom and three (3) hydrogen atoms (NH₃). Ammonia has a pungent odor; the odor can provide warning of exposure. Ammonia is highly reactive and is incompatible with strong oxidizers, acids, halogens, silver salts and oxides. Ammonia is used extensively in the agriculture industry as a nitrogen fertilizer source. Ammonia is soluble in water and forms aqueous ammonia or ammonium hydroxide.

1. Health Hazards

The health hazards of ammonia are dependent on the concentration and type of exposure.

- 1.1 Ammonia is irritating to the eyes, nose and respiratory tract; irritation of the eyes and nose is perceptible at ~ 200 ppm.
- 1.2 Inhalation of ammonia can lead to respiratory tract burns and cause allergy or asthma symptoms, breathing difficulties and lung damage.
- 1.3 Vapor contact may cause irritation and burns to eyes, skin and respiratory tract.

2. Safety Precaution

- 2.1 Individuals that work with ammonia at the University should receive training on the associated hazards and what to do in the event of an exposure or a release. A Safety Data Sheet (SDS) should be available in the immediate work area where ammonia is used. The SDS, along with this Guideline, can be used for training employees on the hazards of ammonia. Environmental Health and Safety (EH&S) is available to provide or assist in training (412-624-9505).
- 2.2 Principal Investigator / Laboratory Director is responsible for ensuring that the correct Personal Protective Equipment (PPE) is available in the laboratory and utilized by laboratory personnel. During handling of ammonia the following minimum PPE is required:
 - 2.2.1 Chemical goggles or safety glasses with side shields
 - 2.2.2 Fire Retardant [FR rated] laboratory coat
 - 2.2.3 Chemical resistant gloves - butyl, neoprene, or nitrile gloves
- 2.3 Compressed gas cylinders of ammonia must be stored in an upright position using an approved chain, strap, or floor device to prevent falling. Approved chains or straps should be secured around the top 1/3 of the cylinder and should never be located around the neck, regulator, or bottom 1/3 of the cylinder. Ammonia cylinders should be stored separately from other gas cylinders. No more than one (1) ammonia cylinder should be located within a single lab area. Ammonia cylinder must be transported (and stored) with the regulator removed, the cylinder cap secured in place, and transported only via the building freight elevator.

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- 2.4 Prior to work with ammonia, review University Guideline #04-021, Storage and Use of Health Hazard 3 and 4 Gas. Work with ammonia should always be conducted inside of a certified chemical fume hood (or exhausted gas cabinet). Only apparatus and chemicals essential for the specific procedure should be inside of the fume hood. The ammonia gas cylinder should be placed at least six (6) inches inside of the fume hood and the air baffles located in the back of the fume hood must remain clear of obstructions.
- 2.5 Do NOT store or use incompatible chemicals in the fume hood or gas cabinet with the ammonia.
- 2.5.1 Ammonia reacts violently with halogens (ex. methyl chloride, bromomethane, chloroform, carbon tetrachloride, dichloromethane) and acids.
- 2.5.2 Ammonia is incompatible with bromine, chlorine, fluorine, iodine, chloroformates, cyanides, oxidizing agents, various metals and their alloys.
- 2.5.3 Ammonia is also incompatible with inorganic chlorine compounds (ex. sodium chlorite, sodium hypochlorite, silver chloride and mercury chloride).
- 2.6 Only compatible and approved fittings, piping, regulators and valves must be used with the ammonia gas set-up.
- 2.6.1 Compatible materials
- Butyl rubber
 - Carbon steel
 - PVC (polyvinyl chloride)
 - Stainless steel
 - Teflon®
- 2.6.2 Incompatible materials
- Aluminum
 - Brass
 - Copper
 - Nylon®
 - Viton®
 - Zinc
- 2.6.3 The ammonia gas vendor should be contacted to provide recommendations for proper fittings, piping, regulators and valves.
- 2.7 If gaseous ammonia is required, the cylinder should be positioned vertically with the valve pointing down in order for the dip tube to be pointed upward into the gaseous layer.
- 2.8 If liquid ammonia is required, the cylinder should be positioned horizontally with the valve pointing up in order for the dip tube to be pointed down into the liquid layer. Ammonia cylinder must be secured in the horizontal position if liquid ammonia is being extracted.

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3. Waste Disposal

- 3.1 Ammonia cylinders should be obtained from vendors in a size that is returnable/refillable.
- 3.2 Liquid or solid wastes generated from work with ammonia should be collected in a chemically compatible container. A completed orange Waste Chemical label should be affixed to the container and the container should be properly disposed through the University's Chemical Waste Program.

4. Spill and Release Response

- 4.1 In the event of a gas leak or spill of liquid, immediately close the sash of the chemical fume hood and evacuate the laboratory.
- 4.2 Call the Pitt Police (412-624-2121) and report the emergency situation including the location of the release or spill.
- 4.3 Post signage (Do NOT Enter) on the laboratory door informing laboratory personnel of the situation; only emergency response personnel are permitted into the laboratory during clean-up procedures.

EMERGENCY PROCEDURES FOR AMMONIA EXPOSURES

Individuals exposed to ammonia should receive IMMEDIATE first aid and medical evaluation

Skin contact

1. Immediately proceed to the nearest eyewash/shower and wash affected area for a minimum of 15 minutes.
2. While washing the affected area, have someone call for emergency medical assistance – **412-624-2121**.
3. Remove all contaminated clothing.
4. After 15 minute rinse, immediately obtain emergency medical attention.

Eye contact

1. Immediately proceed to the nearest eyewash station.
2. Wash eyes with water for at least 15 minutes while holding eyelids open.
3. While washing eyes, have someone call for emergency medical assistance – **412-624-2121**.
4. After 15 minute rinse, immediately obtain emergency medical attention.