شرکت پتروشیمی رازی
Razi Petrochemical Co.

بسمه تعالی

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: AMMONIA

1. Chemical Product and Company Identification

PRODUCT NAME: AMMONIA

CHEMICAL NAME: Ammonia

COMMON NAMES/SYNONYMS: Ammonia Anhydrous; Anhydrous Ammonia

2. Composition, Information on Ingredients

LD_{50} or LC_{50} Route/Species	TLV-ACGIH[2]	PEL-OSHA[1]	% VOLUME	INGREDIENT
LC_{50} 2000 ppm/4H	25 ppm TWA 35 ppm STEL	50 ppm TWA	100.0	Ammonia FORMULA: NH_3 CAS: 7664-41-7 RTECS #: BO0875000

1 As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

2 As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

Irritating or corrosive to exposed tissues. Inhalation of vapors may result in pulmonary edema and chemical pneumonitis. Slightly flammable.

PRODUCT NAME: AMMONIA

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	No

HEALTH EFFECTS:

Sensitization No	Irritant Yes	Exposure Limits Yes
Mutagen Yes	Reproductive Hazard No	Teratogen No
		Synergistic Effects None Reported

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:
Mild concentrations of product will cause conjunctivitis. Contact with higher concentrations of product will cause swelling of the eyes and lesions with a possible loss of vision.

SKIN EFFECTS:
Mild concentrations of product will cause dermatitis or conjunctivitis. Contact with higher concentrations of product will cause caustic-like dermal burns and inflammation. Toxic level exposure may cause skin lesions resulting in early necrosis and scarring.

INGESTION EFFECTS:
Since product is a gas at room temperature, ingestion is unlikely.

INHALATION EFFECTS:
Corrosive and irritating to the upper respiratory system and all mucous type tissue. Depending on the concentration inhaled, it may cause burning sensations, coughing, wheezing, shortness of breath, headache, nausea, with eventual collapse.

Inhalation of excessive amounts affects the upper airway (larynx and bronchi) by causing caustic-like burning resulting in edema and chemical pneumonitis. If it enters the deep lung, pulmonary edema will result. Pulmonary edema and chemical pneumonitis are potentially fatal conditions.

NFPA HAZARD CODES HMIS HAZARD CODES RATINGS SYSTEM

Health: 3	Health: 3	0 = No Hazard
Flammability: 1	Flammability: 1	1 = Slight Hazard
Reactivity: 0	Reactivity: 0	2 = Moderate
Hazard		3 = Serious Hazard
		4 = Severe Hazard

4. First Aid Measures

EYES:
Flush contaminated eye(s) with copious quantities of water. Part eyelids to assure complete flushing. Continue for a minimum of 15 minutes. PERSONS WITH POTENTIAL EXPOSURE TO AMMONIA SHOULD NOT WEAR CONTACT LENSES.

SKIN:
Remove contaminated clothing as rapidly as possible. Flush affected area with copious quantities of water. In cases of frostbite or cryogenic "burns" flush area with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

INGESTION:
Not specified. Seek immediate medical attention.

INHALATION
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen. Keep victim warm and quiet. Assure that mucus or vomited material does not obstruct the airway by positional drainage.

5. Fire Fighting Measures

		Conditions of Flammability: Nonflammable	
Autoignition: Temperature: 1274 ^{o}F (690 ^{o}C)		Method: Not Applicable	Flash point: None
UEL(%): 25		LEL(%): 16	
Hazardous combustion products: None			
Sensitivity to mechanical shock: None			
Sensitivity to static discharge: None			

FIRE AND EXPLOSION HAZARDS:
The minimum ignition energy for ammonia is very high. It is approximately 500 times greater than the energy required for igniting hydrocarbons and 1000 to 10,000 times greater than that required for hydrogen.

EXTINGUISHING MEDIA:
Water fog. Use media suitable for surrounding fire.

FIRE FIGHTING INSTRUCTIONS:
If possible, stop the flow of gas. Since ammonia is soluble in water, it is the best extinguishing media--not only in extinguishing the fire, but also absorbing the escaped ammonia gas. Use water spray to cool surrounding containers.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Electrical Classification:
Class 1, Group D.

Earth-ground and bond all lines and equipment associated with the ammonia system. Electrical equipment should be non-sparking or explosion proof.

Gaseous or liquid anhydrous ammonia corrodes certain metals at ambient temperatures. The presence of oxygen enhances the corrosion of ordinary or semi-alloy steels. The addition of water inhibits this enhancement. Keep anhydrous ammonia systems scrupulously dry.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure regulator when connecting cylinder to lower pressure (<500 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve to trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

For additional handling recommendations, consult Compressed Gas Association Pamphlets P-1 and G2.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS[1]:

LD_{50} or LC_{50} Route/Species	TLV-ACGIH[3]	PEL-OSHA[2]	% VOLUME	INGREDIENT
LC_{50} 2000 ppm/4H	25 ppm TWA 35 ppm STEL	50 ppm TWA	100.0	Ammonia FORMULA: NH_3 CAS: 7664-41-7 RTECS #: BO0875000

[1] Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here. [2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993) [3] As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:
Use local exhaust ventilation to reduce concentrations to within current exposure limits. A laboratory type hood is suitable for handling small or limited quantities.

EYE/FACE PROTECTION:
Gas tight chemical goggles or full-face piece respirator.

SKIN PROTECTION:
Protective gloves made of any suitable material.

RESPIRATORY PROTECTION:
Level C respiratory protection with full face piece or self-contained breathing apparatus should be available for emergency use. Air purifying respirators must be equipped with suitable cartridges. Do not exceed maximum use concentrations. Do not use air purifying respirators in an oxygen deficient/immediately dangerous to life and health (IDLH) atmosphere. Consult manufacturers instructions before use.

OTHER/GENERAL PROTECTION:
Safety shoes, safety shower, eyewash "fountain".

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	Gas	psia
Vapor pressure at 70 °F	94	
Vapor density at 60₀F (Air = 1)	0.62	
Evaporation point	Not Available	°F
Boiling point	-28	°C
	-33.3	°F
Freezing point	107.9	°C
	-77.7	
pH	Not Available	
Specific gravity	Not Available	
Oil/water partition coefficient	Not Available	
Solubility (H20)	Very Soluble	
Odor threshold	Not Available	
Odor and appearance	Not Available : A colorless gas with	

10. Stability and Reactivity

STABILITY:

Unstable

CONDITIONS TO AVOID (STABILITY):

None

INCOMPATIBLE MATERIALS:

Reacts vigorously with fluorine, chlorine, HCl, HBr, nitrosyl chloride, chromyl chloride, nitrogen dioxide, trioxygen difluoride, and nitrogen trichloride.

HAZARDOUS DECOMPOSITION PRODUCTS:

Hydrogen at very high temperatures: 1544 °F (840 °C).

CONDITIONS TO AVOID (POLYMERIZATION):
None

HAZARDOUS POLYMERIZATION:
Will not occur.

11. Toxicological Information

MUTAGENIC:
Genetic mutations observed in bacterial and mammalian test systems.

OTHER:
Toxic effects to the respiratory system, senses, liver, kidneys and bladder observed in mammalian species from prolonged inhalation exposures at above 100 ppm.

12. Ecological Information

OTHER ENVIRONMENTAL INFORMATION:
The reportable quantity is the minimum quantity of a material that when released, requires reporting to the appropriate Federal, State and local officials. Notification requirements are found under CERCLA Section 103(a). Initial notification may be by telephone, radio, or in person. A written follow-up notice is also required.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

Canada TDG	United States DOT	PARAMETER
Ammonia, Anhydrous, liquefied	Ammonia, Anhydrous, liquefied	**PROPER SHIPPING NAME:**
2.4 (9.2)	2.2	**HAZARD CLASS:**
UN 1005	UN 1005	**IDENTIFICATION NUMBER:**
CORROSIVE GAS	NONFLAMMABLE GAS	**SHIPPING LABEL:**

Additional Marking Requirement:"Inhalation Hazard" If net weight of product $\geq$ 100 pounds, the container must be also marked with the letters "RQ".
Additional Shipping Paper Description Requirement: “Poison Inhalation Hazard, Zone A" If net weight of product $\geq$ 100 pounds, the shipping papers must be also marked with the letters "RQ"

15. Regulatory Information

Ammonia is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

SARA TITLE III NOTIFICATIONS AND INFORMATION
Ammonia is listed as an extremely hazardous substance (EHS) subject to state and local reporting under Section 304 of SARA Title III (EPCRA) with a reportable quantity (RQ) of 100 pounds.

The presence of Ammonia in quantities in excess of the threshold planning quantity (TPQ) of 500 pounds requires certain emergency planning activities to be conducted.

SARA TITLE III - HAZARD CLASSES:
Acute Health Hazard Sudden Release of Pressure Hazard Reactivity Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:
This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the

Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT BY VOLUME
7664-41-7	AMMONIA	100.0

This information must be included on all MSDS that are copied and distributed for this material.

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).