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MATERIAL
SAFETY
DATA SHEET

PRODUCT NAME Ammonia	**CAS #** 7664-41-7
TRADE NAME AND SYNONYMS Ammonia, Anhydrous (D.O.T.)	**DOT I.D. No.:** UN 1005 RQ 100 (45.5)
CHEMICAL NAME AND SYNONYMS Ammonia	**DOT Hazard Class:** Division 2.2
ISSUE DATES AND REVISIONS Revised: September 27, 2010	**Formula** NH_3
	Chemical Family: Nitrogen Hydride

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT

TWA = 25 Molar PPM; STEL = 35 Molar PPM (ACGIH 1997,). OSHA 1995 PEL (8 hr. TWA) 50 Molar PPM.

SYMPTOMS OF EXPOSURE

Corrosive and irritating to the skin, eyes, upper respiratory system and all mucosal tissue. Depending on the concentration inhaled, it may cause burning sensations, coughing, wheezing, shortness of breath, headache, nausea, with eventual collapse. Mild concentrations of vapor will cause dermatitis or conjunctivitis. Higher concentrations of vapor or liquid contact will cause caustic-like dermal burns and inflammation and swelling of the eyes with possible loss of vision. Rapidly evaporating liquid contacting dermal tissue or the eyes can cause cryoqenic “burns.”

TOXICOLOGICAL PROPERTIES

Inhalation: 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.

Toxic level exposure to dermal tissue causes caustic-like burns and skin lesions resulting in early necrosis and scarring. Burns to the eye result in lesions and possible loss of vision.

Cryogenic “burns” are like frostbite with a change in skin color to gray or white possibly followed by blistering. (Continued on Page 4)

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES IF OVEREXPOSURE TO AMMONIA. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF FIRE AND EXPLOSION HAZARD.

Inhalation: Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Unconscious persons should be moved to an uncontaminated area and given assisted respiration and supplemental oxygen. Keep the victim warm and quiet. Assure that mucus or vomited material does not obstruct the airway by positional drainage. Further treatment should be symptomatic and supportive. (Continued on Page 4)

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

Ammonia is flammable over a relatively narrow range in air. It reacts vigorously with fluorine, chlorine, hydrogen chloride, hydrogen bromide, nitrosyl chloride, chromyl chloride, trioxygen difluoride, nitrogen dioxide and nitrogen bichloride.

PHYSICAL DATA

BOILING POINT -28°F (-33.3°C)	**LIQUID DENSITY AT BOILING POINT** 42.6 lb/ft^3 (682 kg/m^3)
VAPOR PRESSURE @ 70°F (21.1°C):129 psia (889 kPa)	**GAS DENSITY AT 70°F. 1 atm** .0442 1b/ft^3 (0.708 kg/m^3)
SOLUBILITY IN WATER Very soluble liberating heat	**FREEZING POINT** -107.9°F (-77.7°C)
EVAPORATION RATE N/A (Gas)	**SPECIFIC GRAVITY (AIR=1)** @ 70°E (21.1°C) = 0.59

APPEARANCE AND ODOR Colorless gas with a pungent odor.

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	**AUTO IGNITION TEMPERATURE**	**FLAMMABLE LIMITS % BY VOLUME (See Page 4)**
Gas	1274°F(690 C)	LEL 15 UEL 27

EXTINGUISHING MEDIA	**ELECTRICAL CLASSIFICATION**
Water	Class 1, Group D

SPECIAL FIRE FIGHTING PROCEDURES

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

UNUSUAL 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.

REACTIVITY DATA

STABILITY		**CONDITIONS TO AVOID**
Unstable		None
Stable	X	

INCOMPATIBILITY (Materials to avoid) See Hazardous Mixtures of Other Liquids, Solids, or Gases

HAZARDOUS DECOMPOSITION PRODUCTS Hydrogen at very high temperatures (1544°F; 840°C)

HAZARDOUS POLYMERIZATION		**CONDITIONS TO AVOID**
May Occur		None
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

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

WASTE DISPOSAL METHOD

Do not attempt to dispose of waste or unused quantities. Return in the shipping container Properly labeled, with any valve outlet plugs or caps secured and protection cap in place to your supplier. For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed herein.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.		
VENTILATION Hood with forced ventilation	**LOCAL EXHAUST** To prevent accumulation above the TWA	**SPECIAL** N/A
	MECHANICAL (Gen.) In accordance with electrical codes	**OTHER** N/A
PROTECTIVE GLOVES Plastic or rubber		
EYE PROTECTION Safety goggles or glasses		
OTHER PROTECTIVE EQUIPMENT Safety shoes, safety shower		

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION

DOT Shipping Name: Ammonia, anhydrous (D.O.T.) DOT Hazard Class: Division 2.2
DOT Shipping Label: Nonflammable Gas I.D. No.: UN 1005 (RQ 100/45.5)

SPECIAL HANDLING RECOMMENDATIONS

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 reducing 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 or trap in the discharge line to prevent hazardous back flow into the cylinder.

For additional recommendations consult Compressed Gas Association's Pamphlets P- 1 and G-2

SPECIAL STORAGE RECOMMENDATIONS

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of noncombustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125F (52C). 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 being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage or use area. There should be no sources of ignition in the storage or use area.

For additional recommendations, consult Compressed Gas Association's Pamphlets P- 1 and G-2.

SPECIAL PACKAGING RECOMMENDATIONS

Gaseous or liquid andydrous ammonia corrodes certain metals at ambient temperatures. Oxygen presence enhances the corrosion of ordinary or semi-alloy steels. The addition of water inhibits this enhancement.

Keep anhydrous ammonia systems scrupulously dry.

OTHER RECOMMENDATIONS OR PRECAUTIONS

Earth-ground and bond all lines and equipment associated with the ammonia system. Electrical equipment should be non-sparking or explosion proof. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR). (Continued on Page 4)

*Various Government Agencies (i.e. Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.

HEALTH HAZARD DATA

TOXICOLOGICAL PROPERTIES: (Continued)

Ammonia is not listed in the IARC, NTP or by OSHA as a carcinogen or potential carcinogen.

Persons in ill health where such illness would be aggravated by exposure to ammonia should not be allowed to work with or handle this product.

RECOMMENDED FIRST AID TREATMENT: (Continued)

Eye Contact: PERSONS WITH POTENTIAL EXPOSURE TO AMMONIA SHOULD NOT WEAR CONTACT LENSES.

Flush contaminated eye(s) with copious quantities of water. Part eyelids to assure complete flushing. Continue for a minimum of 15 minutes.

Skin Contact: Flush affected area with copious quantities of water. Remove affected clothing as rapidly as possible.

Dermal Contact or Frostbite: Remove contaminated clothing and flush affected areas 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.

SPECIAL PRECAUTIONS

OTHER RECOMMENDATIONS OR PRECAUTIONS: (Continued)

Always secure cylinders in an upright position before transporting them. NEVER transport cylinders in trunks of vehicles, enclosed vans, truck cabs or in passenger compartments. Transport cylinders secured in open flatbed or in open pick-up type vehicles.

Ammonia is a toxic chemical subject to the reporting requirements of SARA, Title III, Section 313.

NFPA 704 No. for ammonia gas	=	2	1	0	None
NFPA 704 No. for ammonia liquid	=	3	1	0	None