



Material Safety Data Sheet

NFPA Classification	DOT/TDG Pictograms	WHMIS Classification	Protective Clothing
<p>Health: 3 Fire Hazard: 1 Reactivity: 0 Specific Hazard: ALK</p>			

Section I. Chemical Product and Company Identification

PRODUCT NAME/ TRADE NAME	Anhydrous Ammonia, Industrial Grade 82-0-0		
SYNONYM	Anhydrous ammonia		
CHEMICAL NAME	Ammonia	Revision Number:	
CHEMICAL FAMILY	Alkali	MSDS prepared by Technical Services on: June 27, 2005	
CHEMICAL FORMULA	NH ₃	24 Hour Emergency Telephone Number: (520) 720-2150 (Ask for the Shift Supervisor) CHEMTREC 1-800-424-9300	
MATERIAL USES	A high quality anhydrous ammonia containing 0.2-0.3 % moisture. Used in the manufacture of chemicals, synthetic fibers, cleaning solutions and other products.		
MANUFACTURER	SUPPLIER		
Apache Nitrogen Products, Inc. P. O. Box 700 Benson, AZ 85602 Fax (520) 720-4158 www.apachenitro.com	Apache Nitrogen Products, Inc. P. O. Box 700 Benson, AZ 85602 Fax (520) 720-4158 www.apachenitro.com		

Section II. Hazardous Ingredients

NAME	CAS #	Exposure Limits (ACGIH)						% by Weight
		TLV-TWA mg/m ³	TLV-TWA ppm	STEL mg/m ³	STEL ppm	CEIL mg/m ³	CEIL ppm	
Anhydrous Ammonia	7664-41-7	17	25	24	35			99.7%

Other Information on Ingredients:

Section III. Hazards Identification

POTENTIAL ACUTE HEALTH	<p>Anhydrous ammonia gas or liquid is very corrosive to body tissues, reacting with body with moisture on contact. The odor threshold for ammonia is on average 17 PPM although the range of sensitivity ranges from 0.7 PPM to 50 PPM for acclimatized individuals.</p> <p>Generally, concentrations of up to 25 PPM are tolerated although unpleasant and pungent. Above this concentration, irritation of the eyes, nose and throat may begin. The extent of irritation increases with increasing ammonia concentration. Eye and throat irritation is more pronounced between 100 and 400 PPM.</p> <p>Above 400 PPM, skin irritation is noticeable and immediate throat irritation and coughing will result. NIOSH has established 300 PPM as the concentration immediately dangerous to life and health (IDLH), which is defined as the concentration above which self-rescue may be difficult or impossible due to physiological effects. At concentrations between 1000 PPM and 2500 PPM increasing chest tightness, bronchospasm and severe eye and skin irritation will result.</p> <p>Delayed effects such as chemical pneumonitis and pulmonary edema may develop several hours after exposure. At concentrations above 2500 PPM, laryngeal spasm may occur resulting in rapid asphyxia. Effects may be more pronounced at lower concentrations in children, the elderly, and persons with impaired lung function.</p>
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Section III. Hazards Identification

Eyes:	Eye irritant. May cause severe eye irritation with corneal injury and permanent vision impairment.
Skin:	Skin irritant. Contact may cause severe skin irritation, chemical burns, and blistering. Contact with vaporizing liquid may cause frostbite due to rapid evaporative cooling. Cooling effect may mask the extent of corrosive injury received.
Inhalation:	Irritating to entire respiratory tract. Excessive overexposure may cause severe irritation to the upper respiratory tract and potential lung damage.
Ingestion:	Ingestion is not a likely route of exposure due to the physical state of the substance (a compressed, liquefied gas).
POTENTIAL CHRONIC HEALTH EFFECTS	CARCINOGENIC EFFECTS: NONE by ACGIH, EPA, IARC, NTP, OSHA. MUTAGENIC EFFECTS: NONE by ACGIH, EPA, IARC, NTP, OSHA. TERATOGENIC EFFECTS: NONE by ACGIH, EPA, IARC, NTP, OSHA.
ROUTE(S) of ENTRY	Inhalation – Yes Skin – Yes Ingestion – Yes

Section IV. First Aid Measures

EYE CONTACT	Immediately flush eyes with running water for at least 30 minutes, keeping eyelids open. SEND FOR MEDICAL ATTENTION IMMEDIATELY.
MINOR SKIN CONTACT	Dermal contact may freeze tissue and cause severe skin irritation. FLUSH IMMEDIATELY WITH RUNNING WATER FOR AT LEAST 30 MINUTES. SEEK MEDICAL ATTENTION.
EXTENSIVE SKIN CONTACT	No additional information.
MINOR INHALATION	Loosen tight clothing. Allow to rest in a well ventilated area. Give artificial respiration if breathing has stopped. Get immediate medical attention.
SEVERE INHALATION	Evacuate affected persons to a safe area as soon as possible. Loosen tight clothing around the neck and waist. If the person is not breathing, perform artificial respiration. If breathing is difficult, administer oxygen. Maintain an open airway. Obtain immediate medical attention. <u>Observation may be warranted. Pulmonary edema may occur several hours after exposure.</u> If gases or vapors are present, rescuers must wear self-contained breathing apparatus and an impervious (Level A) encapsulating suit if subject to US OSHA requirements. (29CFR 1910.120 has been deemed to overrule the lesser protection requirements given in 1910.111) In other jurisdictions or if responding under D.O.T. rules (49CFR) full bunker gear or Level B clothing may suffice.
SLIGHT INGESTION	If anhydrous ammonia has entered the mouth or throat, begin resuscitation or artificial respiration and continue until victim is breathing. Administer oxygen if available. Obtain immediate medical attention. Do not induce vomiting. Careful removal of the substance from the stomach by medical personnel is required. Call a physician or poison control center immediately. Get immediate medical attention. If tolerated, give no more than 1 cup of milk or water to rinse the mouth and throat and dilute the stomach contents. No more than 8 ounces (1 cup) in adults and 4 ounces (1/2 cup) in children is recommended to minimize the risk of vomiting.
EXTENSIVE INGESTION	No additional information.

Section V. Fire and Explosion Data

THE PRODUCT IS	Combustible. Product will burn with difficulty if kept between the LEL of 16% and UEL of 25%.
AUTO-IGNITION TEMPERATURE	651.1°C (1204°F)
FLASH POINT	Not applicable. Material exists as a gas unless confined under pressure.
FLAMMABILITY LIMITS	LOWER: 16% Upper: 25%
PRODUCTS OF COMBUSTION	Nitrogen oxides (NO, NO2 no).
FIRE HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES	May ignite in the presence of open flames and sparks. Narrow lower to upper flammability limits (16-25%) makes ignition difficult.
EXPLOSION HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES	Slightly explosive in the presence of reducing materials (hypochlorites or other halogenated compounds). Non-explosive in presence of open flames and sparks, of shocks, of heat, of oxidizing materials, of combustible materials, of organic materials, of metals, of acids, of alkalis, of moisture.
FIRE FIGHTING MEDIA AND INSTRUCTIONS	Corrosive. Fire fighters should wear a self contained breathing apparatus and full bunker gear or encapsulated suits. Approach from upwind. If anhydrous ammonia catches fire, stop flow of gas or liquid if it may be done safely. Cool containing vessels with water in order to prevent pressure build-up, auto ignition or explosion. Move containing vessels from fire if without risk. Use water fog to suppress vapors. Do not direct water into spilled ammonia. Ammonia is a cryogenic liquid which will cool with evaporation thereby limiting vapor release. Fire water at supply temperature will increase liquid ammonia's temperature resulting in greater evaporation. Contain run-off water for treatment.
SPECIAL REMARKS ON FIRE HAZARDS	When heated to decomposition it emits toxic fumes. Hazardous Combustion Products: Nitrogen oxides.
SPECIAL REMARKS ON EXPLOSION HAZARDS	Explosive when mixed with chlorinated materials such as hypochlorite. Forms nitrogen trichloride which explodes spontaneously in air. Reacts similarly with other halogenated materials.

Section VI. Accidental Release Measures**SMALL SPILL**

Warn personnel to move away. Keep unprotected personnel upwind of spill area. DO NOT APPROACH LIQUID OR VAPOR CLOUD WITHOUT ENCAPSULATING SUIT AND SCBA. If possible to do so without hazard, isolate leak by shutting off supply of ammonia from containing vessel. Use water fog to suppress airborne vapors from leak or spill.

DO NOT DIRECT WATER INTO SPILLED LIQUID! ANHYDROUS AMMONIA WILL AUTOREFRIGERATE REDUCING VAPOR RELEASE. ADDITION OF WATER WILL WARM CRYOGENIC LIQUID RESULTING IN GREATER GASIFICATION.

Contain run-off water for later recovery and treatment. Call emergency number on this MSDS sheet for assistance.

LARGE SPILL

Corrosive gas.

Material will auto refrigerate under accidental release presenting a cold dense heavier than air vapor cloud or fog. Warn personnel to move away. Keep unprotected personnel upwind of spill area. Evacuate any unprotected personnel who are downwind of spills. Consider an exclusion zone of 1500 meters or 5000 feet around the incident area. Incident Commander may adjust size of exclusion zone based on the circumstances of the emergency and analysis of the threat presented by the release. See Exposure Limits Section for Evacuation Guidelines.

Community Emergency Response Instructions:

- Stay indoors (unless evacuation has been called)
- Close all windows and doors
- Shut off furnace, exhaust fans, and air conditioners
- Wait for and follow advice from local police or authorities
- If smell is very strong, breath through a wet cloth

Eliminate all sources of ignition. DO NOT APPROACH LIQUID OR VAPOR CLOUD WITHOUT ENCAPSULATING SUIT AND SCBA. If possible, and personnel are protected by appropriate personal protective equipment, turn leaking container so that gas escapes rather than liquid, or isolate leak by shutting off supply of ammonia from containing vessel. If possible, apply patch or otherwise restrict size of leak. Use water fog to suppress airborne vapors from leak or spill. DO NOT DIRECT WATER INTO SPILLED LIQUID! ANHYDROUS AMMONIA WILL AUTOREFRIGERATE REDUCING VAPOR RELEASE. ADDITION OF WATER WILL WARM CRYOGENIC LIQUID RESULTING IN GREATER GASIFICATION. Contain run-off water for later recovery and treatment. Call Emergency Number on this MSDS sheet for assistance.

Section VII. Handling and Storage**PRECAUTIONS**

Keep ammonia handling facilities locked. Keep storage vessels away from direct heat. Ground all equipment. Keep away from incompatible materials such as oxidizing agents, reducing agents, metals, and acids. Keep children away from ammonia storage and handling equipment.

STORAGE

Keep away from combustible materials, heat, and incompatible materials, especially dry or liquid bleach. Ensure facilities are well maintained and emergency response and first aid equipment is readily available. Always ensure there is a nearby source of water for first aid purposes and spill response. Facilities storing or handling ammonia should be equipped with an eyewash and safety shower. See requirements under 29 CFR 1910.111.

Section VIII. Exposure Controls / Personal Protection**ENGINEERING CONTROLS**

Workers must be trained in the safe handling and use of ammonia. Adequate, well engineered systems must be provided for storage, transfer and use. Process block valves, equipment enclosures and other isolation facilities may be necessary. Provide adequate general or local exhaust systems to maintain concentrations within exposure guidelines.

PERSONAL PROTECTION

The selection of personal protective equipment varies, depending upon conditions of use.

Respiratory Protection: Use a NIOSH approved chemical cartridge respirator with full face piece for ammonia concentrations up to 300 PPM. Use a positive pressure (pressure demand) SCBA for concentrations above 300 PPM, for emergency response, or for entry into unknown concentrations.

Eye Protection: Contact lenses should not be worn when handling anhydrous ammonia. Use chemical goggles and a face shield or full face piece air purifying or air supplied respirator.

Skin Protection: Where chemical contact is unlikely, wear butyl rubber, nitrile, or polyvinyl chloride boots, gloves, rain jacket and pants.

PERSONAL PROTECTION IN CASE OF LARGE RELEASE

Under emergency conditions, where contact with liquid anhydrous ammonia or high concentration gas is probable, chemically resistant, gastight totally encapsulating suits with 60minute positive pressure SCBA are required.

Section VIII. Exposure Controls / Personal Protection**EXPOSURE LIMITS**

Consult local authorities for acceptable exposure limits in your jurisdiction.

ACGIH TLV-TWA: 25 ppm, TLV-STEL: 35 ppm.

MSHA STANDARD-air: TWA 25 ppm (18 mg/m³)

U.S. OSHA:

OSHA PEL (Gen Industry):8H TWA 50 ppm (35 mg/m³)

REFERENCE: Code of Federal Regulations 29:1910.1000

OSHA PEL (Construction):8H TWA 50 ppm (35 mg/m³)

REFERENCE: Code of Federal Regulations 29:1926.55

OSHA PEL (Shipyards):8H TWA 50 ppm (35 mg/m³)

REFERENCE: Code of Federal Regulations 29: 1915.1000

NIOSH REL, AMMONIA in air:10H TWA 25 ppm; STEL 35 ppm, IDLH 300 ppm

AIHA Emergency Response Planning Guidelines:

- ERPG-1: <25 PPM for 1 hour. Objectionable odor.
- ERPG-2: 25-200 PPM for 1 hour. Strong objectionable odor, some eye, nose and throat irritation.
- ERPG-3: 200-1000 PPM for 1 hour. Severe eye and respiratory irritation, without development of life threatening health effects.

Section IX. Physical and Chemical Properties**PHYSICAL STATE AND APPEARANCE**

Colorless cryogenic liquid or gas

MOLECULAR WEIGHT

17.03

COLOR

Colorless

pH (10% SOLN/WATER)

12

ODOR

Ammoniacal. (Strong)

BOILING POINT

-33.35°C (-28°F)

ODOR THRESHOLD

Not available.

MELTING POINT

-77.7°C (-107.9°F)

TASTE

Burning. (Strong)

CRITICAL TEMPERATURE

Not available

VOLATILITY

100% (w/w)

SPECIFIC GRAVITY g/cc

0.638 (Water = 1)

SOLUBILITY

Easily soluble in cold water. Soluble in hot water. Partially soluble in methanol. Very lightly soluble in diethyl ether, n-octanol, acetone.

BULK DENSITY kg/m³ ; lbs/ft³

639kg/m³;
5.14 lbs/gal (US)

DISPERSION PROPERTIES

See solubility in water, methanol.

VAPOR PRESSURE VAPOR DENSITY

6610 mm of Hg (@ 20°C) 92.9psi @
16°C/60°F 0.6 (Air = 1)

WATER/OIL DIST. COEFF.

Between 50 and 5000

Section X. Stability and Reactivity Data**STABILITY**

The product is stable.

INSTABILITY TEMPERATURE

Not applicable

CONDITIONS OF INSTABILITY

No additional remark.

INCOMPATIBILITY WITH VARIOUS SUBSTANCES

Extremely reactive or incompatible with acids. Highly reactive with oxidizing agents and reducing agents. Do not use copper, brass, bronze, or galvanized steel in contact with ammonia. Do not use brazed joints in ammonia service. Forms explosive compounds with many heavy metals such as mercury or silver. Reacts explosively with chlorine, hypochlorite (such as bleach or dry chlorinating chemicals) and other halogens (bromine, iodine, fluorine).

CORROSIVITY

Highly corrosive in presence of copper and its alloys. Slightly corrosive to corrosive in presence of aluminum and zinc. Very slightly corrosive in the presence of mild steel. Non-corrosive in presence of glass, or stainless steel (304 or 316).

SPECIAL REMARKS ON REACTIVITY

Incompatible with halogens, aluminum, copper, brass, and zinc. Incompatible with strong acids.

SPECIAL REMARKS ON CORROSIVITY

Corrosive to brass. Incompatible with copper alloys (stress cracking). Will corrode a wide variety of metals. Contact your sales representative or a metallurgical specialist to ensure compatibility with system equipment.

Section XI. Toxicological Information**SIGNIFICANT ROUTES OF EXPOSURE**

Eye contact. Inhalation. Skin contact.

SPECIAL REMARKS ON TOXICITY TO ANIMALS

Hazardous for humans or animal life. Corrosive to skin and eyes on contact. Severe over-exposure can produce lung damage, choking, unconsciousness or death. May cause severe eye irritation.

OTHER EFFECTS ON HUMANS

Slightly dangerous to very dangerous in case of skin contact, of eye contact, of inhalation. Material may be irritating or corrosive.

Section XI. Toxicological Information

SPECIAL REMARKS ON CHRONIC EFFECTS ON HUMANS	Exposure can cause headache, stomach pains, vomiting and diarrhea. Produces methemoglobin which reduces oxygen supply in the circulating blood. Although predominantly affecting infants, nitrate induced methemoglobinemia has also been documented in adults.
SPECIAL REMARKS ON OTHER EFFECTS ON HUMANS	No additional remark.

Section XII. Ecological Information

ECOTOXICITY	Hazardous for humans or animal life. Ammonia is a toxic hazard to fish. In low concentrations in water and soil, ammonia acts as a fertilizer to promote plant growth. Under aerobic conditions ammonia will oxidize to nitrate and does not accumulate in the environment. Sub-lethal concentrations in water can have adverse physiological effects on marine species. Free ammonia concentrations of 2.5 mg per liter at pH 7.4 to 8.5 are considered harmful to marine life. In water, free NH3 is considered to be the primary toxic form while the much more prevalent NH.OH form is much less harmful.
BOD and COD	Not available.
PRODUCTS OF DEGRADATION	Nitrogen oxides (NO, NO2 ...), nitrates.
TOXICITY OF THE PRODUCTS OF DEGRADATION	The products of biodegradation are less toxic than the original product.
SPECIAL REMARKS ON THE PRODUCTS OF DEGRADATION	Product may degrade water quality and taste. Notify downstream water users. Will dissolve and disperse in water.

Section XIII. Disposal Considerations

WASTE DISPOSAL OR RECYCLING	Call for assistance on treatment and disposal.
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Section XIV. Transport Information

DOT / TDG CLASSIFICATION	DOT CLASS 2.2: Non-flammable gas.
PIN and Shipping Name	Proper shipping name: Ammonia, anhydrous PIN #: UN1005
SPECIAL PROVISIONS FOR TRANSPORT	49 CFR 172.102: 13, T50

DOT (U.S.A.) (Pictograms)



National Fire Protection Association (U.S.A)
 Hazards presented under acute emergency conditions only:



NOTICE TO READER

The buyer assumes all risk in connection with the use of this material. The buyer assumes all responsibility for ensuring this material is used in a safe manner in compliance with applicable environmental, health and safety laws, policies and guidelines. **Apache Nitrogen Products, Inc.** assumes no responsibility or liability for the information supplied on this sheet, including any damages or injury caused thereby. **Apache Nitrogen Products, Inc.** does not warrant the fitness of this material for any particular use and assumes no responsibility for injury or damage caused directly or indirectly by or related to the use of the material. The information contained in this sheet is developed from what **Apache Nitrogen Products, Inc.** believes to be accurate and reliable sources, and is based on the opinions and facts available on the date of preparation.