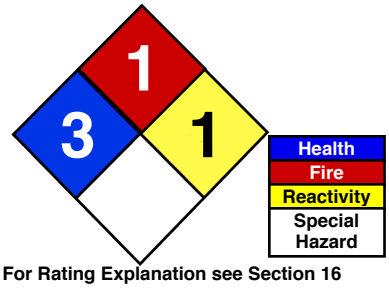
Material Safety Data Sheet

Martrex, Inc.

Section 1: Chemical Product and Company Information

Product name: Anhydrous Ammonia
Supplier/ Further Information: **Martrex, Inc.**
P. O. Box 1709
14525 Highway 7
Minnetonka, Minnesota 55345-3793
Phone: 952/933-5000
Toll Free: 800/328-3627
FAX: 952/933-1889
Web: www.martrexinc.com
EPA Registration Number: n/a
CAS#: 7664-41-7
Chemical Name: Anhydrous Ammonia
Synonyms: Ammonia, Ammonia Gas
Chemical Family: Ammonia
MSDS Number: n/a



For Rating Explanation see Section 16

24 Hour Emergency Phone - Chemtrec Transport: 1-800-424-9300; Medical: 1-800-441-3637

Section 2: Composition/Information on Ingredients

Hazardous Component	CAS#	%	OSHA PEL	OSHA STEL	OSHA CEIL
Ammonia	7664-41-7	99%+	50ppm(35mg/m^3)	n/a	n/a

OTHER LIMITS	RTECS#	ACGIH TLV	ACGIH STEL	ACGIH CEIL
See Section 15	n/a	25ppm(17 mg/m^3)	35ppm(24mg/m^3)	n/a

Non-Hazardous Component	CAS#	%
Water		trace

Section 3: Hazards Identification

Emergency Overview: Stay upwind. Isolate the release area and deny entry. Evaluate the affected areas to determine whether to evacuate or shelter in place. Anhydrous ammonia causes severe eye injury, severe damage to lungs and respiratory system, and severe skin damage. Harmful or fatal if swallowed or inhaled. This product is acutely toxic by inhalation as defined by OSHA. This product is classified as an Inhalation Hazard (DOT) and can cause chemical burns. If spilled into a waterway, ammonia can be toxic to aquatic life and may cause eutrophication. See NAERG, Guide 125.

NFPA: Health: **3** Flammability: **1** Reactivity: **1**

Potential Health Effects:

Primary Routes of Exposure / Entry: Inhalation (breathing), eye contact, skin contact. (Ingestion is unlikely, ammonia exists as a gas at normal atmospheric conditions.)

Target Organs: Anhydrous ammonia has acute effects on the respiratory tract, lungs, eyes, and skin. There is also limited evidence reported of kidney damage from prolonged exposure to elevated concentrations.

Acute Exposure Symptoms

Inhalation: Ammonia gas causes varying degrees of irritation and damage based on the concentration and duration of exposure. The severity of damage from exposure to ammonia vapors is proportional to the exposure concentration and duration. Immediate, mild irritation of the respiratory tract can occur at con-

centrations exceeding 50-100 ppm ammonia. Severe irritation of the respiratory tract can occur at concentrations exceeding 400-700 ppm ammonia. Exposure to concentrations exceeding 4000-5000 ppm can be rapidly fatal. Exposure can cause immediate and delayed effects.

Eye Contact: The severity of damage from exposure to ammonia vapors is proportional to the exposure concentration and duration. Mild eye irritation can occur at ammonia concentrations exceeding 50- 100 ppm. Severe eye irritation can occur at ammonia concentrations exceeding 400 ppm. Exposure to concentrations of ammonia vapor above 1000 ppm and/or liquid ammonia may result in permanent damage to the eye resulting in temporary or permanent blindness. Aqueous ammonia rapidly penetrates ocular tissue and may cause permanent damage.

Skin Contact: The severity of damage from exposure to ammonia vapors is proportional to the exposure concentration and duration. Splashes of liquid ammonia can cause severe damage to the skin. Ammonia is corrosive to the skin..

Ingestion: Ingestion will result in severe damage to the gastro-intestinal tract.

Chronic Exposure Symptoms

Inhalation: Chronic inhalation of concentrations that exceed recommended or regulatory levels may result in immediate and delayed lung irritation and injury. There is also limited evidence reported of kidney damage from prolonged exposure to elevated concentrations.

Medical Conditions Aggravated By Long-Term Exposure: Existing skin disorders and lung disorders (such as asthma) may be aggravated by long-term exposure.

Section 4: First Aid Measures

Inhalation: Remove from area of exposure immediately. GET MEDICAL ATTENTION IMMEDIATELY. Exposure to ammonia vapor causes both immediate and delayed effects, which may be serious. See Section 3.

Eye Exposure: Wash eyes IMMEDIATELY and thoroughly (for 30 minutes). Hold eyelids apart to ensure complete irrigation of all eye and eyelid tissues. GET MEDICAL ATTENTION IMMEDIATELY.

Skin Exposure: Flush skin immediately and thoroughly (for 20 minutes), while removing contaminated clothing. GET MEDICAL ATTENTION IMMEDIATELY.

Ingestion: Drink large amounts of water, DO NOT INDUCE VOMITING. NEVER give anything by mouth to an unconscious person. GET MEDICAL ATTENTION IMMEDIATELY.

NOTE TO THE PHYSICIAN: Pneumonitis should be anticipated after inhalation or ingestion. If severe exposure is suspected, observe for 48-72 hours for delayed pulmonary edema. Do not apply salves or ointments for first 24 hours.

Section 5: Fire Fighting Measures

Flammability Classification:

NFPA= 1
HMIS = 1
DOT= Nonflammable Gas
Flash Point: Not Applicable
Auto-ignition Temperature: 1204ºF
Lower explosion limit (LEL): 16% by volume, in air
Upper explosion limit (UEL): 25% by VOlume, in air
Extinguishing Media: Use water fog or spray.
Unusual Fire and Explosive Hazards: Airborne concentrations between 16-25% can explode when exposed to an ignition source. See Section 10 for Chemical Incompatibilities.
Hazardous Decomposition Materials: Nitrogen oxides, hydrogen
Special Procedures:

Fire-Fighting Instructions: Stopping the flow of gas is recommended when escaping gas is ignited, rather than extinguishing the fire. Use water spray to allow personnel access to shut off valves. Keep containers cool by application of water spray. Do not put water on liquid ammonia. Mixing of liquid ammonia and water will generate heat and vapors. Do not release runoff from fire control methods to sewers or waterways. See NAERG, Guide 125.

Personal Protective Equipment: Because of ammonia presence and the potential that the fire may produce toxic decomposition products, wear chemical resistant suit, gloves, boots, and a self-contained breathing apparatus (SCBA) with a full face piece operated in positive-pressure mode. Suits must be rated for use with anhydrous ammonia.

CAUTION: Normal fire fighting gear does not provide adequate protection. Liquid ammonia can cause PPE to become brittle and crack.

Section 6: Accidental Release Measures

Spill and Leak Procedures: Wear chemical resistant suit, gloves, and boots or a fully encapsulated suit rated for use with anhydrous ammonia, based on spill/leak volume and conditions. Wear a self-contained breathing apparatus (SCBA) with a full face piece. Stop the leak if possible. Use water spray to control vapors. See Section 10 for Chemical Incompatibilities.

Containment of Spill: **SMALL SPILLS:** Use water spray to control vapors. Dilute with water. Do not release into sewers or waterways. **LARGE SPILLS:** Place dirt berms or other barriers down gradient to prevent loss into sewers or waterways. DO NOT USE MOBILE EQUIPMENT OR INTRODUCE A POTENTIAL IGNITION SOURCE IN AREAS OF AMMONIA VAPOR CONCENTRATIONS BETWEEN LEL & UEL. Use water fog or spray to absorb ammonia vapors.

Cleanup and Disposal of Spill: Recovery of liquid ammonia should only be conducted by highly trained personnel.

Environmental and Regulatory Reporting: Follow applicable OSHA regulations (29 CFR 1910.120) to protect workers during cleanup. See Section 15 for additional regulatory requirements. Additional information is available in the NAERG, Guide 125.

Section 7: Handling and Storage

Minimum/maximum Storage Temperature: Protect storage containers from excessive temperatures.

Handling: Wear splash proof chemical goggles, ammonia resistant gloves, and protective clothing as a minimum while handling ammonia. Additional full-face protection is recommended. Respiratory selection should be based on known or anticipated exposure levels. See Section 8 for additional information. CAUTION: Liquid ammonia can cause PPE to become brittle and crack.

Storage: Protect storage containers from impact and excessive temperatures. Use only system components and containers rated for use with anhydrous ammonia. Zinc, copper, silver, cadmium, and their alloys should not be used in ammonia systems due to their potential for rapid corrosion when exposed to ammonia. Storage systems must have adequate pressure relief valves. Refer to the current ANSI K61.1 Standard, Safety Requirements for the Storage and Handling of Anhydrous Ammonia for additional information.

Shelf Life: Indefinite

REGULATORY REQUIREMENTS: See Section 8 for employee exposure controls and Section 15 for other regulatory requirements.

Section 8: Exposure Controls / Personal Protection

Ventilation Protection: Provide general or local exhaust ventilation systems or other engineering controls to maintain airborne concentrations below regulatory levels (See Section 15).

Respiratory Protection (specify type)**:** If concentrations exceed recommended exposure levels, use a NIOSH-approved ammonia vapor respirator suitable for the exposure conditions (as a minimum level of protection). Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134). Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. WARNING! AIR-PURIFYING RESPIRATORS DO NOT PROTECT WORKERS IN OXYGEN DEFICIENT ATMOSPHERES. If respirators are required, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Eye Protection: Wear protective splash proof safety goggles and face protection, per OSHA eye- and face protection regulations (29 CFR 1910.133). Contact lenses should not be worn while handling anhydrous ammonia.

Skin Protection: Wear chemical resistant gloves and boots (such as neoprene or rubber) and appropriate chemical resistant clothing to prevent skin contact.

Other Protective Clothing and Equipment: **SAFETY STATIONS:** Make emergency eyewash stations and showers available in the immediate work area. Agricultural distribution requires shower and/or > 100 gallons fresh water in open top container. Field transportation requires >5 gallons of fresh water.

Hygienic Work Practices: Decontaminate and air dry all contaminated personal protective equipment prior to storage and inspection for possible reuse. Separate heavily contaminated work clothes from street clothes. Launder before reuse. COMMENTS: Practice good personal hygiene during and after use of this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9: Physical and Chemical Properties

Chemical Name: Anhydrous Ammonia
Physical State: Gas under atmospheric conditions, liquid under pressure
Color and Appearance: Colorless gas or clear liquid.
Odor: Sharp, irritating, pungent odor.
Odor Threshold: 25 ppm (in air)
pH (in water)**:** 11.6 (1 N), 11.1 (0.1 N), 10.6 (0.01N)
Specific Gravity: n/a
Vapor Pressure, 8.5 atm @ 20ºC
Vapor Density: (Air=1): 0.5967
Density: Gas=0.7710 g/L; Liq=0.6818 g/L(-33.4ºC/1 atm)
Volatiles by Volume: 100%
Boiling Point: -33.35ºC
Softening Point: n/a
Melting Point: -77.7ºC
Evaporation Rate: n/a
Solubility in water 42.8% (0ºC) Hydroscopic material
Other Solubilities: Soluble in alcohol, ether, organic solvents
Chemical Formula: NH_3
Formula Wt: 17.03

Section 10: Stability and Reactivity

Chemical Stability: Stable__X__ Unstable____
Hazardous Polymerization: May Occur____
Will Not Occur__X__
Conditions to Avoid: Exposure to elevated temperatures and fire.
Chemical Incompatibility: Strong acids, oxidizing gases. Under certain conditions ammonia reacts with chlorine, bromine, fluorine, or iodine (halogens) to form compounds that explode spontaneously. May form explosive compounds on contact with gold, silver, mercury, or hypochlorite. Reacts with copper, copper alloys, aluminum alloys, and galvanized surfaces.
Hazardous Decomposition Products: Nitrogen oxides, hydrogen.

Section 11: Toxicological Information

Acute Data

Eye Effects: 100-200 ppm -- moderate to severe
200-1000 ppm -- eye damage
Skin Effects: Liquid Ammonia = severe burns
Ammonia Vapor = mild to severe irritation, relative to exposure concentration & duration

Oral LD_{50}: No data (Not a likely route of exposure.)
Dermal LD_{50}: no data
Inhalation LC_{50}(rat): 4230 - 19960 mg/m3/1-hr ; This product has been determined to be acutely toxic per the criteria of OSHA 1910.1200, Appendix A.
Skin Sensitization: no data

Chronic Data

Chronic Effects: See Section 3
Chronic Toxicity Studies: no data
Mutagenicity Data: no data
Reproductive and Teratological Data: no data
Carcinogenicity Data: See Section 3. 'See NIOSH, RTECS BO 0875000 for additional information.
NTP: no data **OSHA:** no data **IARC Monograph:** no data **Not Listed:**

Section 12: Ecological Information

Eco-acute Toxicity: Ammonia in elevated concentrations can cause vegetation kill and contribute to eutrophication. Ammonia has been determined to be slightly toxic to aquatic organisms per USEPA criteria.
Environmental Fate: Ammonia is a naturally occurring compound. Ammonia in soil can be rapidly transformed to nitrate by the microbial population through nitrification. The nitrate form will either leach through the soil or be taken up by plants or other organisms. In water ammonia can undergo sequential transformation by two processes in the nitrogen cycle, nitrification and denitrification, which would produce ionic nitrogen compounds, and from these, elemental nitrogen.

Section 13: Disposal Considerations

Disposal Procedures: Contact federal or state regulatory agencies for acceptable disposal/use of the recovered materials. Ammonia contaminated water from vapor control may be suitable for use as fertilizer or may need to be sent to a waste treatment facility.
Disposal Regulatory Requirements: Follow applicable Federal, state, and local regulations if disposal is necessary.
Container Cleaning And Disposal: Not applicable.

Section 14: Transport Information

DOT Transportation Data (49 CFR 172.101):
Proper Shipping Name: Ammonia, anhydrous
Hazard Class: 2.2
ID NO.: UN1005
Packing Group: n/a
LABEL: Nonflammable Gas with "Inhalation Hazard" marking (See 172.102, Special Provision 13)
PLACARD: Nonflammable Gas with "Inhalation Hazard" marking (See 172.102, Special Provision 13)

Section 15: Regulatory Information

EPA Regulations:
RCRA Hazardous Waste Number (40 CFR 261.33): Not listed
CERCLA Hazardous Substance (40 CFR 302.4)**:** Yes
CERCLA Reportable Quantity (RQ): 100 lbs.
SARA 311/312 Codes: Yes-Acute**,** Sudden Release of Pressure.
SARA Toxic Chemical (40 CFR 372.65)**:** Yes
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Yes
SARA EHS Threshold Planning Quantity (TPQ): 500 lbs.
CAA/RMP (Toxic Substances) (40 CFR 68.130): Yes, Ammonia (anhydrous)
CAA/RMP (TQ): 10,000 lbs.
OSHA Regulations:

AIR CONTAMINANT (29 CFR 1910.1000, Table Z-1, Z-1-A): OSHA, ACGIH, and NIOSH data for ammonia follows:
OSHA: TWA = 50 ppm (35 mg/m3)
ACGIH: TWA = 25 ppm (17 mg/m3), **STEL** = 35 ppm (24 mg/m3)
NIOSH: TWA = 25 ppm (18 mg/m3), **STEL** = 35 ppm (27 mg/m3)
IDLH = 300 ppm
Process Safety Management (29 CFR 1910.119): Yes
Threshold Quantity (TQ): 10,000 lbs.
Storage And Handling Of Anhydrous Ammonia (29 CFR 1910.111): Yes

State Regulations: This product is regulated in commerce by state agricultural and/or consumer protection laws. This product is listed in various state Right-to-know, worker protection, and/or environmental protection laws. If you are unable to determine the proper status of this product under your respective state laws contact the manufacturer.

Section 16: Other Information

ACGIH - American Conference of Governmental Industrial Hygienists
ANSI - American National Standards Institute
CAS - Chemical Abstracts Service
CFR - Code of Federal Regulations
CHEMTREC - Chemical Transportation Emergency Center
DOT - U.S. Department of Transportation
EHS - Extremely Hazardous Substance
EPA - U.S. Environmental Protection Agency
HMIS - Hazardous Material Identification System
IARC - International Agency for Research on Cancer
LEL/UEL - Lower and Upper Explosive Limit
mg/m³ - Milligrams per cubic meter
MSDS - Material Safety Data Sheet
NAERG - North American Emergency Response Guidebook
NIOSH - National Institute of Occupational Safety and Health
NFPA - National Fire Protection Association NTP - National Toxicology Program
OSHA - Occupational Safety and Health Administration
PEL - Permissible Exposure Limit (set by OSHA)
PPE - Personal Protective Equipment
SARA - Superfund Amendments and Reauthorization Act
TLV - Threshold Limit Value (set by ACGIH)

MSDS Issue Date: n/a
Revised Date: 6-18-2013
Supersedes: 5-4-2009