

Praxair™ Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Ammonia, Anhydrous (MSDS No. P-4562-E)	Trade Name: Ammonia, Anhydrous
Chemical Name: Ammonia	Synonyms: Ammonia Gas, Spirit of Hartshorn
Formula: NH ₃	Chemical Family: Alkaline Gas
Telephone:	Company Name: Praxair, Inc. 39 Old Ridgebury Road Danbury CT 06810-5113
Emergencies: 1-800-645-4633* CHEMTREC 1-800-424-9300* Routine: 1-800-PRAXAIR	

**Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information contact your supplier, Praxair sales representative, or call 1-800-PRAXAIR (1-800-772-9247).*

2. Composition / Information on Ingredients

For custom mixtures of this product request a Material Safety Data Sheet for each component. See Section 16 for important information about mixtures.

INGREDIENT NAME	CAS NUMBER	PERCENTAGE	OSHA PEL	ACGIH TLV
Ammonia, Anhydrous	7664-41-7	>99%*	50 ppm	25 ppm (TLV-STEL, 15 min = 35 ppm)

**The symbol ">" means "greater than."*

3. Hazards Identification

EMERGENCY OVERVIEW

**DANGER! Corrosive liquid and gas under pressure.
Harmful if inhaled.
Causes eye, skin, and respiratory tract burns.
May cause kidney and respiratory system damage,
Can catch fire.
Self-contained breathing apparatus must
be worn by rescue workers.
Odor: Pungent, irritating**

THRESHOLD LIMIT VALUE: TLV-TWA = 25 ppm, TLV-STEL (15 min) = 35 ppm (ACGIH 1997). TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION—Overexposure to concentrations moderately above the Threshold Limit Value (TLV) of 25 ppm may irritate the eyes, nose, and throat. Higher concentrations may cause breathing difficulty, chest pain, bronchospasm, pink frothy sputum, and pulmonary edema. Overexposure may predispose to acute bronchitis and pneumonia.

SKIN CONTACT—Liquid may cause moderate to severe redness, swelling, and ulceration of the skin, depending on the degree and duration of contact. At high concentrations, gas may cause chemical burns. Prolonged or widespread skin contact may result in the absorption of potentially harmful amounts of material.

SWALLOWING—An unlikely route of exposure; this product is a gas at normal temperature and pressure. But exposure, should it occur, may cause chemical burns of the mouth, throat, esophagus, and stomach.

EYE CONTACT—Liquid may cause pain, severe redness, and swelling of the conjunctiva, damage to the iris, corneal opacification, glaucoma, and cataracts. Gas may cause pain and excessive tearing with acute corneal injury at high concentrations.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: Chronic exposure may cause chemical pneumonitis and kidney damage.

OTHER EFFECTS OF OVEREXPOSURE: None known.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Inhalation may aggravate asthma and inflammatory or fibrotic pulmonary disease. Skin irritation may aggravate an existing dermatitis.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: None known.

CARCINOGENICITY: Ammonia, Anhydrous is not listed by NTP, OSHA, and IARC.

4. First Aid Measures

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. **WARNING: Rescuer may receive chemical burns from giving mouth-to-mouth resuscitation.** If breathing is difficult, qualified personnel may give oxygen. Keep patient warm. Call a physician.

SKIN CONTACT: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Discard clothing and shoes. Call a physician.

SWALLOWING: An unlikely route of exposure; this product is a gas at normal temperature and pressure. Give at least two glasses of water or milk at once. Do not induce vomiting. Call a physician.

EYE CONTACT: Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN: *Victims of overexposure should be observed for at least 72 hours for delayed edema.*

The hazards of this material are mainly due to its severe irritant and corrosive properties on the skin and mucosal surfaces. There is no specific antidote, and treatment should be directed at the control of symptoms and clinical condition.

5. Fire Fighting Measures

FLASH POINT (test method)	Flammable Gas	AUTOIGNITION TEMPERATURE	1204°F (651°C)
FLAMMABLE LIMITS IN AIR, % by volume	LOWER	15%	UPPER 28%

EXTINGUISHING MEDIA: CO₂, dry chemical, water spray, or fog.

SPECIAL FIRE FIGHTING PROCEDURES:

DANGER! Toxic, corrosive, flammable liquefied gas under pressure (see section 3). Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool cylinders with water spray from maximum distance, taking care not to extinguish flames. Remove sources of ignition if without risk. If flames are accidentally extinguished, explosive reignition may occur. Reduce corrosive vapors with water spray or fog. Stop flow of gas if without risk, while continuing cooling water spray. Remove all containers from area of fire if without risk. Allow fire to burn out. On-site fire brigades must comply with OSHA 29 CFR 1910.156

UNUSUAL FIRE AND EXPLOSION HAZARDS: Forms explosive mixtures with air and oxidizing agents. Heat of fire can build pressure in cylinder and cause it to rupture; no part of cylinder should be subjected to a temperature higher than 125°F (52°C). Ammonia cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT—in this case, where the cylinders contain less than 165 pounds of product.) If leaking or spilled product catches fire, do not extinguish flames. Flammable and toxic vapors may spread from leak and could explode if reignited by sparks or flames. Explosive atmospheres may linger. Before entering area, especially a confined area, check atmosphere with an appropriate device. Reverse flow into cylinder may cause it to rupture. To protect persons from cylinder fragments and toxic fumes should a rupture occur, evacuate the area if the fire cannot be brought under immediate control.

HAZARDOUS COMBUSTION PRODUCTS: See section 10.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

DANGER! Toxic, corrosive, flammable liquefied gas under pressure (see section 3). Forms explosive mixtures with air (see section 5). Keep personnel away. Before entering area, especially a confined area, check atmosphere with an appropriate device. Use self-contained breathing apparatus and protective clothing where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray. Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area. Contain spills in protected areas; prevent runoff from exposing personnel to liquid and vapors and contaminating the surrounding environment.

WASTE DISPOSAL METHOD: Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local supplier for assistance.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN STORAGE: Store and use with adequate ventilation. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 125°F (52°C). Store full and empty

cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

PRECAUTIONS TO BE TAKEN IN HANDLING: Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. For other precautions in using ammonia, anhydrous, see section 16.

For additional information on storage and handling, refer to Compressed Gas Association (CGA) pamphlet P-1, "Safe Handling of Compressed Gases in Containers," available from the CGA. Refer to section 16 for the address and phone number along with a list of other available publications.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—Use a local exhaust ventilation system with sufficient air flow velocity to maintain concentration below the TLV in the worker's breathing zone.

MECHANICAL (general)—Not recommended as a primary ventilation system to control worker's exposure.

SPECIAL—Use only in a closed system. An explosion-proof, corrosion-resistant, forced-draft fume hood is preferred.

OTHER—None.

RESPIRATORY PROTECTION: Use air-supplied respirators for concentrations up to 10 times the applicable permissible exposure limit. For higher concentrations, a full-face, self-contained breathing apparatus operated in the pressure demand mode is required. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134.

PROTECTIVE GLOVES: Neoprene.

EYE PROTECTION: **EYE PROTECTION:** Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or wherever contact with product is possible. Wear safety glasses when handling cylinders; vapor-proof goggles where needed. Select per OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Protective clothing where needed. Select per OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

9. Physical and Chemical Properties

MOLECULAR WEIGHT: 17.031	EXPANSION RATIO: Not applicable
SPECIFIC GRAVITY (air=1): At 32°F (0°C) and 1 atm: .5970	SOLUBILITY IN WATER: Appreciable
GAS DENSITY: At 32°F (0°C) and 1 atm: .0481 lb/ft ³ (.771 kg/m ³)	VAPOR PRESSURE: AT 70°F (21.1°C): 114.1 psig (786.7 kPa)
PERCENT VOLATILES BY VOLUME: 100	EVAPORATION RATE (Butyl Acetate=1): High
BOILING POINT (1 atm): -28°F (33.3°C)	pH: Not applicable

FREEZING POINT (1 atm): -107.9°F (-77.7°C)

APPEARANCE, ODOR, AND STATE: Colorless gas at normal temperature and pressure; pungent, irritating odor.

10. Stability and Reactivity

STABILITY:	Unstable		Stable	X
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INCOMPATIBILITY (materials to avoid): Gold, silver, mercury, oxidizing agents, halogens, halogenated compounds, acids, copper, copper-zinc alloys (brass), aluminum, chlorates, zinc

HAZARDOUS DECOMPOSITION PRODUCTS: The normal products of combustion are nitrogen and water. Hydrogen may be formed at temperatures above 1,544°F (840°C).

HAZARDOUS POLYMERIZATION:	May Occur		Will Not Occur	X
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CONDITIONS TO AVOID: None known.

11. Toxicological Information

LC₅₀ = 7338 ppm, 1 hr, rat.

12. Ecological Information

Ammonia, Anhydrous does not contain any Class I or Class II ozone-depleting chemicals. Ammonia, Anhydrous is not listed as a marine pollutant by DOT.

13. Disposal Considerations

WASTE DISPOSAL METHOD: Keep waste from contaminating surrounding environment. Keep personnel away. Do not dispose of unused quantities. Return cylinder to supplier.

14. Transport Information

DOT/IMO SHIPPING NAME: Ammonia, anhydrous, liquefied	HAZARD CLASS: 2.2 (domestic shipment) 2.3 (international shipment)
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IDENTIFICATION NUMBER: UN 1005	PRODUCT RQ: 100 lbs (4.54 kg)
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SHIPPING LABEL(s): NONFLAMMABLE GAS (domestic); TOXIC GAS, CORROSIVE (international)	PLACARD (When required): NONFLAMMABLE GAS (domestic); TOXIC GAS, CORROSIVE (international)
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SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of a vehicle can present serious safety hazards.

Additional Marking Requirement: Inhalation Hazard (for international shipment)

Shipment of compressed gas cylinders that have been filled without the owner's consent is a violation of federal law [49 CFR 173.301(b)].

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

U.S. FEDERAL REGULATIONS:

EPA (Environmental Protection Agency)

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302):

Reportable Quantity (RQ): 100 lbs (45.4 kg)

SARA: Superfund Amendment and Reauthorization Act:

- **SECTIONS 302/304:** Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of extremely hazardous substances (40 CFR Part 355):

Threshold Planning Quantity (TPQ): 500 lbs (226.8 kg)

Extremely Hazardous Substances (40 CFR 355): None

- **SECTIONS 311/312:** Require submission of Material Safety Data Sheets (MSDSs) and chemical inventory reporting with identification of EPA hazard categories. The hazard categories for this products are as follows:

IMMEDIATE: Yes

PRESSURE: Yes

DELAYED: Yes

REACTIVITY: Yes

FIRE: Yes

- **SECTION 313:** Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Ammonia, Anhydrous requires reporting under Section 313.

40 CFR 68: Risk Management Program for Chemical Accidental Release Prevention: Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Ammonia, Anhydrous is listed as a regulated substance in quantities of 10,000 lbs (4536 kg) or greater.

TSCA: Toxic Substances Control Act: Ammonia, Anhydrous is listed on the TSCA inventory.

OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION):

29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals: Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

Ammonia, Anhydrous is listed in Appendix A as a highly hazardous chemical in quantities of 10,000 pounds (4536 kg) or greater.

STATE REGULATIONS:

CALIFORNIA: This product is not listed by California under the Safe Drinking Water Toxic Enforcement Act of 1986 (Proposition 65).

PENNSYLVANIA: This product is subject to the Pennsylvania Worker and Community Right-To-Know Act (35 P.S. Sections 7301-7320).

16. Other Information

Be sure to read and understand all labels and instructions supplied with all containers of this product.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: *Toxic, corrosive, flammable, liquefied gas under pressure.* Do not breathe gas. Do not get vapor or liquid in eyes, on skin, or on clothing. (See section 3.) Have safety showers and eyewash fountains immediately available. Use piping and equipment adequately designed to withstand pressures to be encountered. Store and use with adequate ventilation at all times. **Prevent reverse flow.** Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. **May form explosive mixtures with air.** Keep away from heat, sparks or open flame. Ground all equipment. Use only spark-proof tools and explosion-proof equipment. Store and use with adequate ventilation at all times. Use only in a closed system. Close valve after each use; keep closed even when empty. Keep away from oxidizing agents and from other flammables. **Never work on a pressurized system.** If there is a leak, close the cylinder valve. Blow the system down in an environmentally safe manner in compliance with all federal, state, and local laws, then repair the leak. **Never ground a compressed gas cylinder or allow it to become part of an electrical circuit.**

NOTE: Prior to using any plastics, confirm their compatibility with ammonia, anhydrous.

MIXTURES: When you mix two or more gases or liquefied gases, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist, or other trained person when you evaluate the end product. Remember, gases and liquids have properties that can cause serious injury or death.

HAZARD RATING SYSTEMS:**NFPA RATINGS:**

HEALTH = 2 (gas) 3 (liquid)
 FLAMMABILITY = 1 (gas) 1 (liquid)
 REACTIVITY = 0 (gas) 0 (liquid)
 SPECIAL None

HMIS RATINGS:

HEALTH = 3
 FLAMMABILITY = 1
 REACTIVITY = 0

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: CGA-705, CGA-240 Standard,
 CGA-660 Limited Standard

PIN-INDEXED YOKE: Not applicable

ULTRA-HIGH-INTEGRITY CONNECTION: CGA-720

Use the proper CGA connections. **DO NOT USE ADAPTERS.**

Additional limited-standard connections may apply. See CGA Pamphlet V-1 listed below.

Ask your supplier about free Praxair safety literature as referenced on the label for this product; you may also obtain copies by calling 1-800-PRAXAIR. Further information about ammonia, anhydrous, can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 1725 Jefferson Davis Highway, Arlington, VA 22202-4102, Telephone (703) 412-0900.

- P-1 *Safe Handling of Compressed Gases in Containers*
- V-1 *Compressed Gas Cylinder Valve Inlet and Outlet Connections*
Handbook of Compressed Gases, Third Edition

Praxair asks users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents and contractors of the information on this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

Praxair MSDSs are furnished on sale or delivery by Praxair or the independent distributors and suppliers who package and sell our products. To obtain current Praxair MSDSs for these products, contact your Praxair sales representative or local distributor or supplier. If you have questions regarding Praxair MSDSs, would like the form number and date of the latest MSDS, or would like the names of the Praxair suppliers in your area, phone or write the Praxair Call Center (**Phone:** 1-800-PRAXAIR; **Address:** Praxair Call Center, Praxair, Inc., PO Box 44, Tonawanda, NY 14150-7891).

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Praxair, Inc.
39 Old Ridgebury Road
Danbury CT 06810-5113

