

Material Safety Data Sheet Anhydrous Ammonia

Section 1 - Product Identification

Synonyms : Anhydrous Ammonia
Molecular Weight : 17.031 g/mol
Chemical Formula : NH_3
Company Identification : Tradeasia International Pte. Limited
Address : 133 Cecil Street # 12-03 Keck Seng Tower, Singapore
Tel: +65-6227 6365
Fax: +65-6225 6286
Email: contact@chemtradeasia.com

Recommended use of the chemical and restrictions on use

The product is used in agricultural industries and commercial use, particularly in :

- Fertilizer
- Fermentation
- Antimicrobial agent for food products

Section 2 – Composition/Information on Ingredients

The product contains greater than 99.9 percent (%) cream of tartar (potassium bitartrate)

Chemical Name	EC No/CAS No	Purity, %
Anhydrous Ammonia	7664-41-7	99

Section 3 – Hazards Identification

3.1 Classification of the substance according to GHS

Cream of Tartar is not classified as dangerous

Classification according to EC REG. No. 1272/2008: Not qualified

Classification according to REG. 67/548 / EEC and 1999/45 / EC: Not qualified

Physiochemical hazards: None identified **Hazards for humans:** None Identified

Dangerous for animals and the environment: None Identified

Section 4 – First-Aid Measures

First Aid for Eyes: Immediately flush eyes with copious amounts of tepid water for at least 15 minutes. If irritation, pain, swelling, excessive tearing, or light sensitivity persists, the patient should be seen in a health care facility and referral to an ophthalmologist considered.

First Aid for Skin: Immediately flush exposed area with copious amounts of tepid water for at least 15 minutes followed by washing area thoroughly with soap and water. The patient should be seen in a health care facility if irritation or pain persists.

First Aid for Inhalation: Move patient to fresh air. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. If trained to do so administer supplemental oxygen with assisted ventilation as required. Administer artificial respiration if patient is not breathing.

First Aid for Ingestion: Call a physician. If conscious, give the patient 4 to 8 ounces of milk or water to drink immediately. Do not induce vomiting.

Caution: Clothing frozen to the skin should be thawed before being removed.

Section 5 – Fire Fighting Measures

Flash Point:	Not Applicable
Lower Flammable Limit:	15.5 % Volume in Air
Upper Flammable Limit:	27.0 % Volume in Air
Autoignition Temperature	1204° F (651° C)

Extinguishing Media: Stopping the flow of gas rather than extinguishing the fire is usually the best procedure to follow when escaping gas is burning.

Small Fire: Dry chemical or CO₂

Large Fire: Water spray, fog or foam

Special Fire Fighting Procedures:

- Do not get water inside container.
- Move container from fire area if you can do it without risk.
- Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks due to exploding potential when tanks are involved in a fire.
- Isolate area until gas has dispersed.
- Use water spray or foam to control vapors.
- Positive pressure self-contained breathing apparatus (SCBA) should be used when there is a potential for inhalation of vapors and/or fumes.
- Chemical protective clothing that is safe for use with ammonia involved in a fire should be worn.

Section 6 – Accidental Release Measures

Spill or Leak Measures: Stop leak if you can do so without risk. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Evaluate the affected area to determine whether to evacuate or shelter-in-place by taping windows and doors, shutting off outside air intakes (attic fans, etc.), and placing a wet towel or cloth over the face (if needed). With proper training, self-contained breathing apparatus (SCBA) and structural firefighter's protective clothing used in conjunction with water spray will provide limited protection in outdoor releases for short-term exposure. Fully encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire. Use water spray or foam to control vapors. Mixing of water and liquid ammonia will increase vaporization rate. Do not put water on liquid ammonia unless more than 100 volumes of water are available for each volume of liquid ammonia.

CAUTION:

- a. Personal protective clothing may become brittle when exposed to liquid ammonia.
- b. Runoff from vapor control or dilution may cause pollution.

Determining Spill Size: Generally, a small spill is one that involves a single, small container (55-gallon capacity or less), or a small (non-continuing) leak from a larger tank or vessel.

Small Spill:

- a. Flush area with flooding amounts of water.
- b. First isolate 100 feet in all directions and then protect persons downwind 0.1 miles during daylight and 0.1 miles at night.

Large Spill:

- a. Dike far ahead of liquid spill for later disposal.
- b. Follow local emergency protocol for handling.
- c. First isolate 200 feet in all directions, than protect persons downwind 0.4 miles during daylight and 1.4 miles at night.

Section 7 – Handling and Storage

Follow the current ANSI-K61.1 Standard, "Safety Requirements for the Storage and Handling of Anhydrous Ammonia", or applicable Ammonia Manufacturing Industry Standards. (See Section 15 for information on Equipment, Pressure Vessels and Testing).

Handling Precautions: Use proper personal protective equipment when working with or around ammonia. See Section 8.

Section 8 – Exposure Controls/Personal Protection

Respiratory Protection Requirements:

<25 ppm:	No protection required.
25 to 35 ppm:	Protection required if the daily TWA is exceeded.
35 to 50 ppm:	Protection required if exposed for more than 15 minutes.
50 to 250 ppm:	Minimum of an air-purifying respirator equipped with ammonia canister(s) or cartridge(s).
250 to 300 ppm:	Minimum of a full-face air-purifying respirator equipped with ammonia canister(s) or cartridge(s).
>300 ppm:	A fresh air supply system must be used (i.e. positive pressure self contained breathing apparatus).

Skin Protection Requirements: Skin protection is required for exposure to liquid, mist, and > 1000 ppm of ammonia gas or vapors. Neoprene or rubber gauntlet-type gloves, ammonia resistant clothing (overalls, jacket, and boots) or vapor suit, as required.

Eye Protection Requirements: Use chemical (indirectly vented) goggles when there is a potential for contact with liquid or mist. A full-face shield is recommended in addition to goggles for added protection.

Other Protective Equipment: Safety shower and eyewash fountain should be provided in the ammonia handling area. In agricultural distribution, provide easily accessible shower and/or at least 100 gallons of clean water in open top container (check regulations). When transporting, provide at least 5 gallons of readily accessible, clean water and personal protective equipment.

Engineering Controls: Maintain adequate ventilation to keep ammonia concentrations below applicable standards when possible.

NOTE: See Section 2 for regulatory exposure limits.

Section 9 – Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical Form:	Gas (liquid under pressure)
Color:	Colorless gas and liquid, forms white vapor in contact with moisture
Odor:	Strong pungent penetrating odor, ammonia.
Boiling Point:	-28.1° F (-33° C) at 1 atm
Melting point:	-107.9° F (-78° C)
Ph:	Approximately 12.0 (neat)

Solubility: 510 - 530 g/L @ 20° C
 Specific Gravity: 0.6818 @ -33.35° C and 1 atm
 Vapor Density: 0.597 @ 0° C (0.60 @ 60° F)
 Vapor Pressure: 7,600 mm Hg @ 25° C (93 psig @ 60° F)
 % Volatile by Volume: 100
 Molecular Weight: 17.03
 Density: 0.696 g/L @ 20° C (5.14 lb./gal. @ 60° F)
 Critical Temperature: 271° F (133° C)
 Critical Pressure: 1636 psia

Section 10 – Stability and Reactivity

Stability: This is a stable material.

Hazardous Polymerization: Will not occur.

Decomposition: Hydrogen is released on heating above 850° F (454° C). The decomposition temperature may be lowered to 575° F (300° C) by contact with certain metals such as nickel. At 1290° F (690° C) or in the presence of an electric spark, ammonia decomposes into nitrogen and hydrogen gases, which **may** form a flammable mixture in the air.

Incompatibilities:

- Ammonia has potentially explosive or violent reactions with interhalogens, strong oxidizers, Nitric Acid, Fluorine, and Nitrogen Oxide.
- Ammonia forms sensitive explosive mixtures with air and hydrocarbons, Ethanol and Silver Nitrate, and Chlorine; and explosive products are formed by the reaction of ammonia with Silver Chloride, Silver Oxide, Bromine, Iodine, Gold, Mercury, and Tellurium Halides.
- Ammonia is incompatible or has potentially hazardous reactions with Silver, Acetaldehyde, Acrolein, Boron, Halogens, Perchlorate, Chloric Acid, Chlorine Monoxide, Chlorites, Nitrogen Tetroxide, Tin, and Sulfur.

NOTE: The incompatibilities above are a partial list taken from two books by Sax & Lewis: "Dangerous Properties of Industrial Materials", 7th. ed., 1989 and "Hawley's Condensed Chemical Dictionary", 11th. ed. 1987, both published by Van Nostrand Reinhold Company, New York. It is recommended that if additional information is required, the reader refer to these and other published information.

Section 11 – Toxicological Information

Toxicity

Acute Inhalation Toxicity

LC₅₀ Rat, mouse: 4,200 - 19,060 mg NH₃/m³ (1 hr)

Acute Toxicity, Other Routes

LC₅₀ Rat, mouse: 45.5 - 195.1 mg NH₃/kg bw (1 hr intravenous)

Corrosiveness / Irritation

Skin Irritation / Corrosion: Corrosive to skin

Eye Irritation / Corrosion: Subacute and chronic exposure to 200 – 1,000 ppm produced eye damage. 100 – 200 ppm produced moderate to severe irritation.

Repeated Dose Toxicity

Rats, guinea pigs, rabbits, etc.:.....No mortality (Inhalation up to 770 mg/m³)

Genetic Toxicity in vitro

Salmonella typhimurium, etc.:.....Negative (Bacterial gene mutation assay)

Chick fibroblasts:.....Induced chromosomal clumping, polyploidy, and arrested spindle formation. No data showing that ammonia is mutagenic in mammals. (Cytogenetic assay)

Genetic Toxicity in vivo

Drosophila melanogaster:.....No evidence for mutagenicity

Carcinogenicity

All:.....No carcinogenic effects

Toxicity to Reproduction

Pig:.....Temporarily depressed mean daily gain (MDG) at 35 mg/kg in gilts (One generation study)

Human Experience

Inhalation, human volunteers:.....Nasal and pulmonary irritation at concentrations of about 100 ppm and higher.

Ecotoxicity

Acute Toxicity to Fish

LC₅₀ Many species:.....0.09– 3.51 mg un-ionized NH₃/L (96 hr)

Acute Toxicity to Aquatic Invertebrates

LC₅₀ *Daphnia magna*:.....2.94 mg un-ionized NH₃-N/L (48 hr)

Toxicity to Aquatic Plants

LOEC Benthic diatoms:0.5 – 1.0 mg N/L (Up to 25 days)

LOEC *Chlorella vulgaris*:500 mg N/L (21 days)

Toxicity to Bacteria

EC₅₀ *Photobacterium phosphoreum*:1.49 mg un-ionized NH₃/L (5 min)

Section 12 – Ecological Information

- Ammonia is harmful to aquatic life in very low concentrations and may be hazardous if it enters water intakes.
- Local health and wildlife authorities, as well as operators of water intakes in the vicinity, should be notified of water releases.
- Waterfowl toxicity may occur at elevated concentrations.
- Ammonia does not concentrate in the food chain.
- The conversion of ammonia to nitrites/nitrates by bacteria in aquatic systems can reduce the concentration of dissolved oxygen (referred to as nitrogenous oxygen demand).

Effect on water treatment process: Chlorination will produce chloramines, which are more readily detected by taste and odor.

Note: See Ecotoxicity information in section 11.

Section 13 – Disposal Considerations

13.1. Pesticide Disposal

Reclaim as fertilizer if possible. Waste must be disposed of in accordance with federal, state, and local environmental control regulations.

Section 14 – Transport Information

U.S. DOT and Canadian TGD Act

Shipping Name:..... Ammonia, anhydrous

Shipping Class/Division:..... 2.2 (8) U.S.; 2.3 (8) Canada

Hazard Class: Non-Flammable Gas (Corrosive) U.S.; Toxic
Gas (Canada)

Product Identification Number (PIN): UN1005

DOT Placard: Non-Flammable Gas 2.2, color: green (U.S.):
Class 2.3 or UN1005, color: white (Canada)

DOT Special Provision: 13, "Inhalation Hazard"

OSHA Label Required: Yes

RQ (Reportable Quantity):..... 100 pounds

STCC Number: 4904210

Section 15 – Regulatory Information

Controlled Products Regulations Classification: A: Compressed Gas; E: Corrosive

OSHA: This product is considered a hazardous material under criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200 (Toxic; Corrosive), and is listed as a Highly Hazardous Chemical subject to the requirements of the Process Safety Management Standard 29 CFR 1910.119.

CAA Chemical Accident Prevention: Ammonia is considered a regulated substance subject to the Chemical Accident Prevention provisions of 40 CFR Part 68. The threshold quantity for this substance is 10,000 lbs.

SARA TITLE III:

- a. EHS (Extremely Hazardous Substances) List: Listed (EPA, 1992a)
- b. SARA RQ (Reportable Quantity): 100 pounds
- c. TPQ (Threshold Planning Quantity): 500 pounds
- d. Regulation: "Emergency Planning and Notification" - 40 CFR Part 355 (Appendices A and B).
- e. Section 313: "Specific Toxic Chemical Listings" - 40 CFR Part 372
Ammonia is subject to the reporting requirements of Section 313 "Specific Toxic Chemical Listings" 40 CFR Part 372. Terra is required by 40 CFR 372.45 to notify certain customers as to which of its mixture or trade name products contain those chemicals. The purpose of that notification is to ensure that facilities that may be subject to the reporting requirements of Section 313 and that use products of unknown formulation will have knowledge that they are receiving products that contain chemicals subject to those reporting requirements.

CERCLA Hazardous Substances List:

- a. CERCLA RQ (Reportable Quantity): 100 pounds
- b. Regulation: "Designation, Reportable Quantities, Notification" - 40 CFR 302

TSCA Inventory: Listed (RTECS)

Chemical Facility Anti-Terrorism Standard (CFATS) / 6 CFR Part 27:

Ammonia (anhydrous) is listed in Appendix A as a Chemical of Interest (COI) due to threat of "Release"

Screening Threshold Quantity (STQ): 10,000 pounds

Equipment, Pressure Vessels, Testing, Etc.: All equipment used to handle, store, transfer or apply anhydrous ammonia must be properly engineered, constructed and maintained in compliance with all applicable regulations and standards. Pressure vessels, piping and appurtenances should be regularly inspected and tested using methods designed to reveal external and internal deterioration or defects that may impair the integrity of the equipment such that an unintended release of anhydrous ammonia may result. Consult with your State Department of Agriculture and other experts, as applicable, concerning the methods that would be most appropriate given the particular circumstances. Refer to 29 CFR 1910.111, *Storage and Handling of Anhydrous Ammonia*; 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Materials*; and the current ANSI standard K61.1, *Safety Requirements for the Storage and Handling of Anhydrous Ammonia*, for additional information.

Section 16 : Additional Information

- Dec. 18, 1995: The MSDS was rewritten to comply with ANSI Standard Z400.1-1993.
- July 1, 2003: Added toxicity information from the TFI Product Testing Program April 2003.
- October 4, 2006: Added NFPA hazard classification information and updated isolation / protective action distances per ERG 2004.
- Dec. 19, 2006: Added Equipment, Pressure Vessel and Testing Information.
- August 24, 2007: Reviewed and revised.
- January 2, 2008: Revised 15. Regulatory Information to add CFATS requirements
- April 23, 2008: Revised 14. Transportation Information to change Canadian TDG requirements

16.2. Disclaimer of Liability

The information in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its accuracy, reliability or completeness. The conditions or methods of handling, storage use or disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use.

This MSDS was prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS information may not be applicable.