



Terra Industries Inc.
 Terra Centre – 600 Fourth Street
 Sioux City, Iowa 51101

Material Safety Data Sheet

Aqua Ammonia
(19 – 35% NH₃)

MSDS Number 2050 (Revised January 2, 2008)

8 Pages

1. CHEMICAL PRODUCT and EMERGENCY TELEPHONE CONTACT

Product Name:..... Aqua Ammonia (19 – 35% NH₃)
 Chemical Family:..... Inorganic Nitrogen Compound
 Synonyms:..... Ammonium Hydroxide; Ammonia Solution,
 Aqueous Solution; Ammonia Monohydrate;
 Ammonia Water; Ammonia Liquor
 Formula:..... NH₄OH in H₂O
 Product Use:..... Fertilizers; Pharmaceuticals; Lubricants;
 Household Cleaners; SCR NO_x Control

EMERGENCY TELEPHONE NUMBERS

CHEMTREC (U.S.):..... 800-424-9300
 CANUTEC (Canada): 613-996-6666

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient Name/CAS Number	Concentration	Exposure Limits (NH ₃)
Ammonium Hydroxide / 1336-21-6	39-72%	25 ppm TWA
Water / 7732-18-5	28-61%	35 ppm STEL
		50 ppm PEL
Contains between 19 and 35% ammonia as NH ₃		300 ppm IDLH

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Corrosive liquid! May be fatal if swallowed. Vapor is toxic and irritating to eyes, nose, throat and skin. Liquid will burn skin and eyes. Vapor is flammable under limited conditions. Use water to control fire and disperse vapors.

NFPA Hazard Classification (for ammonia vapor)	Health Hazard (Blue)	3
	Flammability (Red)	1
	Reactivity (Yellow)	0

POTENTIAL HEALTH EFFECTS

Primary Routes of Entry: Inhalation, skin contact/absorption and eye contact.

General Acute Exposure: Aqua ammonia may cause caustic injury. The severity of injury depends upon the concentration and duration of exposure. The extent of injury ranges from mild skin irritation or cough to severe burns or laryngeal edema and life-threatening pulmonary edema.

Inhalation:

Corrosive! Ammonia vapor is toxic and a severe irritant of the respiratory tract. It may cause a running nose, coughing, chest pain, cessation of respiration and death. It may cause severe breathing difficulties, which may be delayed in onset. **ADDITIONAL MEDICAL INFORMATION:** Bronchospasm, laryngitis, tracheitis, wheezing, dyspnea, and laryngeal stridor may be noted. Mucosal burns to the tracheobronchial tree, Pulmonary Edema, and associated hypoxemia frequently occur following exposure to concentrated ammonia.

Skin Contact:

Corrosive! Aqua ammonia is a severe irritant of the skin. Skin exposure to high concentrations may cause pain and deep and severe burns to the skin. **ADDITIONAL MEDICAL INFORMATION:** Corrosive effects on the skin and other tissues may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following exposure is essential.

Eye Contact:

Corrosive! Vapors cause irritation. Effects as a result of direct contact with aqua ammonia may range from irritation and lacrimation to severe injury and blindness. **ADDITIONAL MEDICAL INFORMATION:** Eye exposure may result in conjunctivitis, lacrimation and/or corneal irritation. Total corneal epithelial loss may occur.

Ingestion:

Toxic! May cause corrosion to the esophagus and stomach with perforation and peritonitis. Symptoms may include pain in the mouth, chest, and abdomen, with coughing, vomiting and collapse. Ingestion of as little as 3-4 ml of ammonium hydroxide may be fatal.

Note to the Physician: Pneumonitis should be anticipated after severe inhalation or ingestion. If severe exposure is suspected, observe for 48-72 hours for delayed pulmonary edema.

Carcinogenicity:

NTP:	Not Listed
IARC:	Not Listed
OSHA:	Not Regulated

Medical Conditions Aggravated by Exposure: Chronic respiratory or skin disease.

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.

5. FIRE FIGHTING MEASURES

Flash Point: Not Applicable
Lower Flammable Limit: 15.5 % Volume in Air (for NH3)
Upper Flammable Limit: 27.0 % Volume in Air (for NH3)
Autoignition Temperature 1204° F (651° C) (for NH3)

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: Use water to keep fire exposed containers cool. Use water fog or foam to reduce vapor concentrations if necessary. Full protective equipment including a self-contained breathing apparatus should be worn in a fire involving the material.

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 intake (attic fans, etc.), and placing a wet towel or cloth over the face (if needed). 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 to control vapors.

CAUTION:

Runoff from vapor control or dilution of spilled product may cause pollution.

Determining Spill Size: Generally, a small spill is one that involves a single, small Package (i.e. up to a 55 gallon drum), small cylinder, or a small (non-continuing) leak from a large container. **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 (recommended for ammonia vapor).

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, then protect persons downwind 0.4 miles during daylight and 1.4 miles at night (recommended for ammonia vapor).

7. HANDLING AND STORAGE

Handling: Avoid contact with either liquid or vapors. Direct contact with mercury must be avoided. Use proper PPE when working with or around aqua ammonia (See section 8).

Storage: Ambient temperature. Store in dry, well-ventilated area away from incompatible materials. Protect against physical damage. Keep out of direct sunlight and away from heat sources.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION**Respiratory Protection Requirements: (for NH₃)**

<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. SCBA)

Skin Protection Requirements: Nitrile rubber, neoprene, or PVC gloves and protective clothing should be used.

Eye Protection Requirements: Use chemical (indirectly vented) goggles when there is a potential for eye contact. 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 aqua ammonia handling area. 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.

NOTE: See Section 2 for regulatory exposure limits.

9. PHYSICAL AND CHEMICAL PROPERTIES

Typical for 30% Aqua Ammonia

Physical Form: Liquid
Color: Colorless
Odor: Strong pungent penetrating odor, ammonia.
Boiling Point: 27° C
pH: 12.0 (neat)
Specific Gravity: 0.8974 (@ 15.5° C)
Vapor Density: 0.60 (@ 15.5° C) for NH₃
Vapor Pressure: 475 mm Hg (@ 15.5° C)
Molecular Weight: 35.05
Relative Density: 7.48 lb. per gallon (@ 15.5° C)

10. REACTIVITY

Stability: This is a stable material.

Hazardous Polymerization: Will not occur.

Decomposition: Will liberate ammonia if heated. Hydrogen is released on heating ammonia 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 electric spark ammonia decomposes into nitrogen and hydrogen gases, which may form a flammable mixture in the air.

Conditions to avoid: Excessive heat.

Materials to avoid: Contact with calcium hypochlorite, bleaches, gold, mercury, and silver may form highly explosive products. Contact with iodine, bromine or chlorine may cause violent spattering.

11. TOXICOLOGICAL INFORMATION

Toxicity

Acute Oral Toxicity

LD₅₀ Rat:.....350 mg/kg bw

LD₅₀ Cat:.....750 mg/kg bw

Acute Toxicity, Other Routes

LD_{LO} Rabbit:.....10 mg/kg bw

Skin Irritation / Corrosion

Rabbit:.....Corrosive at 20% but not 10%

Eye Irritation / Corrosion

Rabbit:.....Irritating

Genetic Toxicity *in vitro*

Gene Mutation *E. Coli*:.....Negative

Genetic Toxicity *in vivo*

Gene Mutation *Drosophila melanogaster*:No evidence for mutagenicity

Ecotoxicity

Acute Toxicity to Fish

LC₅₀ *Cyprinus carpio*:1.34 – 1.70 mg un-ionized NH₃/L (48 hr semi-static)

Acute Toxicity to Aquatic Invertebrates

LC₅₀ *Daphnia magna*:32 mg NH₄OH/L (48 hr static)

Chronic Toxicity to Fish

LC₅₀ *Ictalurus punctatus*:37.5 ppm (8 days)

Source: TFI Product Testing Program April 2003

12. ECOLOGICAL INFORMATION

- a. Ammonia is harmful to aquatic life in very low concentrations and may be hazardous if it enters water intakes.
- b. Local health and wildlife authorities, as well as operators of water intakes in the vicinity, should be notified of water releases.
- c. Waterfowl toxicity may occur at elevated concentrations.
- d. Ammonia does not concentrate in the food chain.
- e. 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.

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORTATION INFORMATION

U.S. DOT and Canadian TDG Act

Shipping Name:..... Ammonia solutions, (*more than 10% but not more than 35 % ammonia*)

Hazard Class/Division:..... 8

Label Code: 8 Corrosive Liquid

Product Identification Number (PIN): UN2672

Packing Group..... III

OSHA Label Required: Yes

RQ (Reportable Quantity): 1000 pounds (as NH₄OH)

TDG Reporting Quantity: 5 kg or 5 liters

15. REGULATORY INFORMATION

Controlled Products Regulations Classification:

D-1B: Toxic (Acute Lethality); 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).

CAA Chemical Accident Prevention:

Ammonia solution with a concentration of 20% or greater is considered a regulated substance, subject to the Chemical Accident Prevention provisions of 40 CFR Part 68. The threshold quantity for this substance is 20,000 lbs. Ammonia solution with a concentration less than 20% is not subject to the provisions of 40 CFR Part 68.

CERCLA Hazardous Substances List:

- a. RQ (Reportable Quantity): 1000 pounds (as NH₄OH)
- b. Regulation: "Designation, Reportable Quantities, Notification" - 40 CFR Part 302

SARA TITLE III:

Ammonia (including ammonia solution) is subject to the reporting requirements of Section 313 "Specific Toxic Chemical Listings" 40 CFR Part 372. Terra is required by 40 CFR Part 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.

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

Ammonia (conc. 20% or greater) is listed in Appendix A as a Chemical of Interest (COI) due to threat of "Release"

Screening Threshold Quantity (STQ): 20,000 pounds

16. OTHER INFORMATION

May 5, 2003:	This MSDS was written 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.
March 13, 2007:	Changed the upper range from 30% to 35%.
January 2, 2008:	Revised 15. Regulatory Information to add CFATS requirements

The information and recommendations herein are taken from data contained in independent, industry-recognized references including but not limited to NIOSH, OSHA, ANSI, NFPA, DOT ERG, the TFI Product Testing Program, Global Engineering Documents, MEDITEXT, HAZARDTEXT, SARATEXT, CHRIS, OHM/TADS, and IRIS. Terra Industries Inc. makes no guarantee, warranty or other representation concerning this substance, since conditions of its use are beyond the control of the company. Terra Industries Inc. disclaims any liability for loss or damage incurred in connection with the use of this substance.