

Material Safety Data Sheet



Ammonium Hydroxide Solution

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Ammonium Hydroxide Solution, 28-30% (various grades)

OTHER/GENERIC NAMES: Ammonium Hydroxide; Ammonia solution; ammonia, aqueous; aqua ammonia.

PRODUCT USE: Electronics manufacturing; industrial.

MANUFACTURER: General Chemical Corporation
90 East Halsey Road
Parsippany, NJ 07054

FOR MORE INFORMATION CALL: 973-515-1840
(Monday-Friday, 9:00am-4:30pm)

IN CASE OF EMERGENCY CALL: 800-631-8050
(24 Hours/Day, 7 Days/Week)

2. COMPOSITION/INFORMATION ON INGREDIENTS

<u>INGREDIENT NAME</u>	<u>CAS NUMBER</u>	<u>WEIGHT %</u>
Ammonia, anhydrous	7664-41-7	28-30
Water	7732-18-5	70-72

Trace impurities and additional material names not listed above may also appear in Section 15 towards the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

OSHA Hazard Communication Standard: *This product is considered hazardous under the OSHA Hazard Communication Standard.*

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: A water-white liquid with a strong, pungent ammonia odor. Causes severe irritation and/or burns to the skin and eyes. Causes severe irritation if inhaled and may be fatal if swallowed.

POTENTIAL HEALTH HAZARDS

SKIN: Liquid contact: Corrosive burns or blister formation if contact is prolonged for more than a few minutes. Vapors and mist can irritate moist skin.

EYES: Liquid contact: Immediate intense irritation and pain; in extreme exposure, corneal ulceration or blindness may result. Vapors or mist in air will irritate the eyes. The intensity is proportional to the NH_3 concentration.

INHALATION: Vapors are severely irritating to the throat and respiratory tract at about 400 ppm. Excessive inhalation of vapors causes difficult breathing, chest pain, bronchospasm, pulmonary edema, and possibly death. Some symptoms may be delayed and/or accompanied by pink frothy sputum.

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INGESTION: Ingestion of ammonia solutions causes effects similar to those of other corrosive alkalis; severe burning of the esophagus, stomach, mouth and throat; gastritis. Possible death from shock or asphyxia may result. Although human lethal dose has not been established, any amount can be dangerous. As little as 1 teaspoon (5 ml) of 28% NH₄OH solution has been recorded as fatal.

DELAYED EFFECTS: No significant cumulative effects of chronic exposure found, possibly due to the fact that inhalation or ingestion of ammonia fumes does not permit absorption of toxicologically significant amounts.

Ingredients found on one of the three OSHA designated carcinogen lists are listed below.

<u>INGREDIENT NAME</u>	<u>NTP STATUS</u>	<u>IARC STATUS</u>	<u>OSHA LIST</u>
No ingredients listed in this section.			

4. FIRST AID MEASURES

SKIN: Immediately flush with large amounts of water while removing contaminated clothing and shoes. Get medical attention if large areas are affected or if irritation symptoms persist after washing. Wash clothing before reuse.

EYES: Immediately flush with large amounts of water, for at least 15 minutes, lifting eyelids occasionally. Get prompt medical attention, preferably from an ophthalmologist.

INHALATION: Wear respiratory protection, as necessary, and remove patient promptly to fresh air. Restore breathing, if required and, if breathing is difficult, give oxygen provided a qualified operator is available. Keep patient warm and at rest. Get medical attention.

INGESTION: Do not induce vomiting. If conscious, encourage patient to drink large amounts of water, substituting, as available, diluted vinegar, lemon juice, orange juice or other fruit juice. Follow with a demulcent such as egg white, olive oil, or milk, as available. Get medical attention.

ADVICE TO PHYSICIAN: Treat symptomatically.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Not flammable
FLASH POINT METHOD:	Not applicable
AUTOIGNITION TEMPERATURE:	651C (as NH ₃)
UPPER FLAME LIMIT (volume % in air):	25 (as NH ₃)
LOWER FLAME LIMIT (volume % in air):	16 (as NH ₃)
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	Not applicable

EXTINGUISHING MEDIA:

Use any standard fire fighting agent (water, dry chemical, foam, etc.) as appropriate to surrounding fire conditions.

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UNUSUAL FIRE AND EXPLOSION HAZARDS:

Limited potential exists for containers to rupture in fire due to overpressurization. NH₃ vapors in the presence of oil or other combustible materials will increase the fire hazard. Accumulations of ammonia in confined spaces may explode if exposed to a strong ignition source.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Use self-contained, NIOSH-approved, breathing apparatus and full protective clothing, including eye and skin protection. Use water to keep fire-exposed containers cool or move from fire area if without risk.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (See section 8 for recommended personal protective equipment.)

Evacuate unprotected personnel and provide ventilation. Clean-up personnel, properly protected against contact with liquid and inhalation of mists and vapors, may shut off leak and remove ignition sources. Use water spray to knock down NH₃ gas and to protect personnel. Flush small spills with large quantities of water. Contain large spills by diking with sand or other inert material. Pump into drums, close and label "Corrosive". Any release to the environment of this material may be subject to federal AND/OR STATE REPORTING REQUIREMENTS. Check with appropriate agencies.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (See section 8 for recommended personal protective equipment.)

Avoid all contact of liquid with the body. Avoid inhalation of vapors. Follow good maintenance procedures to prevent leaks. Keep containers away from heat and open flame. Use caution in opening sealed containers for proper pressure relief. Handle as a corrosive liquid.

STORAGE RECOMMENDATIONS:

Store in a cool dry, well-ventilated area (preferably outdoors) in closed containers, away from sources of heat, ignition and incompatible materials. Where necessary closed containers should be provided with safety relief valves. Protect containers from corrosion and physical damage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Specialized handling (e.g., bottles) should be done in a closed ventilated system (e.g., exhausted hood), which is customary in the semiconductor industry. Ventilation in areas of heavy handling (e.g., cases, carboys, drums, etc.) should be sufficient to reduce ammonia concentrations below permissible levels. Packaging and unloading areas and open processing equipment may require mechanical exhaust systems.

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PERSONAL PROTECTIVE EQUIPMENT

- SKIN PROTECTION:** Equipment should prevent any possibility of skin contact with product. This may include, as dictated by workplace conditions, alkali-resistant gloves, rubber apron, boots and full protective clothing.
- EYE PROTECTION:** As a minimum, wear safety glasses with non-perforated sideshields. Add a faceshield while pouring liquid. When handling large quantities or under emergency conditions, wear a hard hat, chemical safety goggles and faceshield (if eyes are not covered by respiratory device). Do not wear contact lenses.
- RESPIRATORY PROTECTION:** Generally not required in work areas with closed ventilation system. For spill, leak or other emergency situations above the TLV, but below 300 ppm, use a chemical cartridge respirator, NIOSH-approved for NH₃. Above 300 ppm or for unknown concentrations, use NIOSH-approved, self-contained breathing apparatus or supplied-air respirator with full facepiece.
- ADDITIONAL RECOMMENDATIONS:** Provide quick-drench shower facilities and eyewash stations convenient to the work area.

EXPOSURE GUIDELINES

<u>INGREDIENT NAME</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>OTHER LIMIT</u>
Ammonia	25 ppm TWA 35 ppm STEL	50 ppm TWA	---

¹ = Limit established by General Chemical Corporation.

² = Workplace Environmental Exposure Level (AIHA).

³ = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

None listed.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Water-white liquid.
PHYSICAL STATE:	Liquid.
MOLECULAR WEIGHT:	Mixture
CHEMICAL FORMULA:	NH ₄ OH + H ₂ O
ODOR:	Strong pungent ammonia odor
SPECIFIC GRAVITY (water = 1.0):	0.90 @ 25C
SOLUBILITY IN WATER (weight %):	Complete
pH:	Unknown, but highly alkaline. pH (1.0 N aq. Sol'n) = 11.6 pH (0.1 N aq. Sol'n) = 11.1 pH (0.01 N aq. Sol'n) = 10.6
BOILING POINT:	27C
MELTING POINT:	-77C
VAPOR PRESSURE:	(partial, NH ₃) 501 (28 wt.%) 561 (30 wt.%)

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VAPOR DENSITY (air = 1.0): 0.596 @ 60F (NH₃ gas)
EVAPORATION RATE: <1 **COMPARED TO:** Ether
% VOLATILES: 100
FLASH POINT: Not flammable
(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

Stable under normal conditions. Heat releases NH₃ gas without violence in the absence of incompatible materials.

INCOMPATIBILITIES:

Strong oxidizers, including halogens. Acids: hydrochloric, hydrofluoric, nitric and sulfuric. Also reacts with acrolein, acrylic acid, dimethyl sulfate, gold, silver nitrate, silver oxide, silver oxide plus ethyl alcohol, hypochlorites of calcium or sodium, mercury, propylene oxide, iodine.

HAZARDOUS DECOMPOSITION PRODUCTS:

When heated, material will release NH₃ vapors. Combustion products expected would be nitrogen oxides and unburned NH₃.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

LD₅₀ (oral-rat): 350 mg/kg
LC_{Lo} (inh-human): 5000 ppm
LD_{Lo} (oral-human): 43 mg/kg

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

None.

OTHER DATA:

None

12. ECOLOGICAL INFORMATION

Since ammonium hydroxide is a fertilizer, it may promote eutrophication of waterways.

6.25 ppm / 24 hr / trout / lethal / fresh water
15 ppm / 48 hr / sunfish / TLm / tap water

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Yes

If yes, the RCRA ID number is: D002

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OTHER DISPOSAL CONSIDERATIONS:

Must be disposed of in an approved facility for hazardous waste.

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: 8
US DOT ID NUMBER: UN2672
PROPER SHIPPING NAME: Ammonia solutions

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: On TSCA Inventory.

OTHER TSCA ISSUES: None

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

<u>INGREDIENT NAME</u>	<u>SARA/CERCLA RQ (lb)</u>	<u>SARA EHS TPQ (lb)</u>
Ammonium hydroxide	1000	-----

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Immediate

SARA 313 TOXIC CHEMICALS:

The following ingredients are SARA 313 "Toxic Chemicals" and may be subject to annual reporting requirements. CAS numbers and weight percents are found in Section 2.

<u>INGREDIENT NAME</u>	<u>COMMENT</u>
Ammonia	None

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

<u>INGREDIENT NAME</u>	<u>WEIGHT %</u>	<u>COMMENT</u>
No ingredients listed in this section		

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ADDITIONAL REGULATORY INFORMATION:

None

WHMIS CLASSIFICATION (CANADA):

E (corrosive). Classified in accordance to WHMIS requirements.

FOREIGN CHEMICAL CONTROL INVENTORY STATUS:

Ingredients listed on the Canadian DSL and the EU Inventory

16. OTHER INFORMATION

CURRENT ISSUE DATE: August, 2001

PREVIOUS ISSUE DATE: August, 1996

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:

New MSDS format.

OTHER INFORMATION: None