 MATERIAL SAFETY DATA SHEET(MSDS)	AMMONIA SOLUTION CAS No.: CAS No.: 1336 - 21 – 6
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IN CASE OF EMERGENCY, PLEASE CALL NEAREST FIRE / POLICE / AMBULANCE &/OR DISTRICT AUTHORITIES.

1. Identification of the substance/mixture and of the company/undertaking

CHEMICAL NAME: AMMONIUM HYDROXIDE **COMPOSITION:** 25% by weight of Ammonia gas in Water

CHEMICAL FAMILY: Ammonia **FORMULA:** NH₄OH or NH₃(Aq) **MOLAR MASS:** 35.04 g/mol

SYNONYMS: Aqua Ammonia, Aqueous Ammonia, Liquor Ammonia, Liquor Ammonia, Ammoniacal Liquor, Ammonia Water and Ammonia Solution

2. Hazards Identification

DESCRIPTION: Is an irritant, and corrosive to skin, eye, respiratory tract and mucous membranes. May cause severe burns, eye and lung-injuries. Skin and respiratory related diseases aggravated by exposure. Not recognized by OSHA as a carcinogen. Not listed in the National Toxicology Program annual report. Not listed as a carcinogen by the International Agency for Research on Cancer.

EXPOSURE LIMITS: Vapor

OSHA	Permissible Exposure Limit (PEL) 35 ppm (27 mg/m ³)	as a 15-minute STEL
NIOSH	Recommended Exposure Level (REL) 25 ppm (17 mg/m ³)	as 8-hour TWA (Time-Weighted Average)
NIOSH	Recommended Exposure Level (REL) 35 ppm	as a 15-minute STEL
ACGIH	Threshold Limit Value (TLV) 25 ppm (17 mg/m ³)	as 8-hour TWA (Time-Weighted Average)
ACGIH	Short Term Exposure Limit (STEL) 35 ppm (24 mg/m ³)	as a 15-minute STEL

3. EMERGENCY TREATMENT

EFFECTS OF OVEREXPOSURE: Eye & Skin: Overexposure can severely irritate and burn the skin or eye causing permanent damage. Inhalation: Severe irritation to nose, throat and lungs causing headaches, coughing, severe lung congestion, breathing difficulty, convulsion, or shock.

EMERGENCY AID: Skin: Flush with copious amounts of water while removing contaminated clothing and shoes. Wash clothing before re-use. Do not rub or apply ointment on the affected area. Ingestion: if conscious, give large amount of water to drink and follow with vinegar or fruit juice. Refer immediately to physician. Eye: flush with copious amount of water for 15 min. Eyelids should be held apart and away from eyeball for thorough rinsing. SPEED AND THOROUGHNESS IN RINSING THE EYE IS MOST IMPORTANT IN PREVENTING LATENT PERMANENT INJURIES. Inhalation: remove to fresh air. Administer oxygen or artificial respiration if necessary. SEEK IMMEDIATE MEDICAL HELP.

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NOTE TO PHYSICIAN: Respiratory injury may appear as delayed phenomenon, pulmonary edema may follow chemical bronchitis. Supportive treatment with necessary ventilation actions, including oxygen, may warrant consideration.

4. PHYSICAL DATA

BOILING POINT: 94°F (Approximately)

FREEZING POINT: (-99°F)

VAPOR PRESSURE @ 60°F: 6.4 psi

VAPOR DENSITY (Air=1): less than 1

SPECIFIC GRAVITY @ 60°F: 0.9089

SOLUBILITY IN WATER: Complete

PERCENT VOLATILE: 100% @ 212°F

EVAPORATION RATE (Water=1): Similar

APPEARANCE & ODOUR: Colorless liquid and pungent odor

SURFACE TENSION: 63 dynes/cm

5. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT

None

AUTO-IGNITION TEMPERATURE

Not applicable.

FLAMMABLE LIMITS IN AIR

For evolved ammonia: LEL 16% UEL 25%

EXTINGUISHING MEDIA

Non-combustible

6. FIRE-FIGHTING PROCEDURES


SPECIAL FIRE-FIGHTING PROCEDURES: Must wear protective clothing & respiratory protection. See PROTECTIVE EQUIPMENT. Stop source if possible. Cool fire exposed containers with water spray. Stay upwind and use water spray to knock down vapor and dilute.

7. FIRE AND EXPLOSION HAZARDS

UNUSUAL FIRE AND EXPLOSION HAZARDS: Not generally a fire hazard, if relief valves are inoperative, heat exposed storage containers may become explosion hazards. Ammonia contacts with chemicals such as mercury, chlorine, iodine, bromine, silver oxide, or hypochlorite can form explosive compounds. Special hazards with chlorine to form chloramine gas, also a primary skin irritant and sensitizer. Combustion may form toxic nitrogen oxides.

8. STABILITY & CHEMICAL REACTIVITY

Stable at room temperature. Ammonia will react exothermically with Acids and Water.

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9. CONDITIONS TO AVOID

Avoid mixing with sulfuric acid or other strong mineral acids. Avoid mixing with hypochlorite's (chlorine bleach) or other halogens and sodium hydroxide. Avoid contact with galvanized surfaces, copper, brass, bronze, aluminum alloys, mercury, gold, silver, and strong oxidizers. Avoid heating.

10. HAZARDOUS DECOMPOSITION PRODUCTS

Ammonia decomposes to Hydrogen and Nitrogen gases above 450o C (842oF) in the presence of a catalyst.

11. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN: Wear respiratory protection and protective clothing (see PROTECTIVE EQUIPMENT). Stop source if possible. Stay upwind and use water spray which will absorb the evolved gas. Dilute with large amounts of water. Contain spill by diking.

WASTE DISPOSAL: Listed as hazardous substance under CWA (40 CFR 116.40 cfe 117.3 Reportable Quantity Category C. 1000 lbs. / 454kg). Comply with all regulations. Suitably diluted product may be disposed of on agricultural land as fertilizer. Keep spills from entering streams or lakes.

12. RESPIRATORY PROTECTION

MSHA/NIOSH approved respiratory protection with full face for gas and vapor contaminants effective for anhydrous ammonia and able to be used for entry and escape in emergencies. Refer to 29 CFR 1910. 134 and ANSI: Z88.2 for requirement and selection.

13. VENTILATION

Local exhaust sufficient to keep ammonia gas below Permissible Exposure Limits. Refer to 29 CFR 1910. 134 and ANSI: Z9.2 for requirement and selection.

14. PROTECTIVE EQUIPMENT

Splash-proof, chemical safety goggles, rubber gloves and boots to prevent contact. Respiratory protection. Cotton work clothes recommended. Refer to 29 CFR 1910. 132 to 1910.136 for requirements.

SPECIAL PRECAUTIONS

STORAGE AND HANDLING: Store in cool, well-ventilated area with containers tightly closed.

OSHA 29 CFR 1910. 111 prescribes handling and storage requirements for anhydrous ammonia as a hazardous material.

WORK-PLACE PROTECTIVE EQUIPMENT: Should be near, but outside of Ammonia area.

Eye-Wash and Safety-Shower should be in the immediate vicinity. See 29 CFR 1910.141 for workplace requirements.

DISPOSAL: Aqua Ammonia is listed as a hazardous substance under FWPCA. See WASTE DISPOSAL.

Classified as RCRA Hazardous waste due to corrosivity with designation D002 if disposed of in original form.

PERSONAL: Avoid unnecessary exposure. Use protective equipment as needed. Do not wear contact lenses.

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