

AMMONIUM HYDROXIDE

PRODUCT IDENTIFICATION

Chemical Name and Synonyms: Ammonium hydroxide; Ammonia water; Ammonium hydrate

Chemical Family: Inorganic nitrogen compound

Chemical Formula: NH₄OH

Product Use: Laboratory reagent

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HAZARDOUS INGREDIENTS OF MATERIALS

Ingredients, %, TLV Units, CAS No: Ammonium hydroxide, up to 30.0, 25 ppm, 1336-21-6

PHYSICAL DATA

Physical State: Liquid

Odour and Appearance: Colourless to milky coloured liquid. Intense, pungent odour of ammonia

Odour Threshold (ppm): Reports vary widely 0.043-53 ppm (detection); not reliable warning properties; vary too widely.

Vapour Pressure (mm Hg): ~112.5 mm Hg at 20C (10%)

Vapour Density (Air = 1): 0.6

Evaporation Rate: Not available.

Boiling Point (degrees C): 27.2C

Freezing Point (degrees C): -77C

pH: 11.6 (1N)

Specific Gravity: 0.895 at 15C (30%)

Coefficient of Water/Oil distribution: No data

SHIPPING DESCRIPTION

UN: 2672

T.D.G. Class: 8

Pkg. Group: III

REACTIVITY DATA

Chemical Stability: Stable.

Incompatibility with other substances: May react violently or explosively with strong oxidizing agents, acids, acid chlorides, acid anhydrides, chloroformates, dimethyl sulphate, galvanized iron.

Reacts violently, or forms explosive products, with all four halogens, with many interhalogens, and with calcium, hypochlorite bleaches, gold, mercury, or silver. Corrosive to aluminum, lead, zinc, copper, silver, nickel, tin and their alloys. May form shock-sensitive compounds that may explode when dry, with heavy metals and their salts, especially halide salts. Increases the sensitivity of nitromethane to detonation, and may form explosive salts. Reacts with calcium, evolving heat; may ignite at higher temperatures. Mixture with acrolein, propiolactone, or propylene oxide, cause temperature and pressure to rise.

Reactivity: Contact with strong oxidizers will cause fires and explosions. Avoid elevated temperatures, ignition sources, all incompatible materials, generation of mist.

FIRE AND EXPLOSION DATA

Flammability: Liquid is non flammable. Gas is considered non-flammable, but an intense energy source can cause ignition and/or explosion. Mixtures of ammonia and air have exploded in confined spaces. Vapours may travel to distant source of ignition and flash back.

Extinguishing Media: CO₂, dry chemical, foam, water spray. Fight fire from a safe distance and from upwind. Do not extinguish burning gas if flow cannot be shut off immediately. Use water as a spray or fog to cool containers, absorb heat, disperse vapours, and to flush spill away from ignition sources. Containers may explode in heat of fire; withdraw immediately in case of rising sound from vent or discoloration of tank. Move containers away from the fire if it is safe to do so. Firefighters must wear protective equipment and clothing sufficient (encapsulating chemical splash suit; Bunker Gear is not adequate) to prevent inhalation of mists or vapours and contact with skin and eyes.

Flash Point (Method Used): Not available.

Autoignition Temperature: 651C (ammonia)

Upper Flammable Limit (% by volume): 25% (ammonia)

Lower Flammable Limit (% by volume): 15.5% (ammonia)

Hazardous Combustion Products: Ammonia, irritating and toxic gases, acrid smoke.

Sensitivity to Impact: Ammonia reacts with some heavy metals (mercury, silver, gold) and their salts to produce shock-sensitive materials

Sensitivity to Static discharge: Liquid is not sensitive, but may release gas, which, under certain conditions, may be ignited by static discharge.

TOXICOLOGICAL PROPERTIES AND HEALTH DATA**Toxicological Data:**

LD50: (oral, rat) 350 mg/kg

LDLO: (oral, human) 43 mg/kg

LC50: (mouse) 2,115 ppm/4h

LCL0: (human) 30,000 ppm

Effects of Acute Exposure to Product: Existing skin disorders and respiratory disease may be aggravated by exposure to this product.

Inhaled: Corrosive. Mists or vapours are destructive to tissue of upper respiratory tract. Can cause coughing, chest pain, breathing difficulty, pulmonary edema. Exposure to 20-25 ppm of ammonia gas causes discomfort. Exposure to 130 ppm for 5 minutes causes irritation. Brief exposure to 5,000 ppm can cause death due to suffocation or pulmonary edema. The symptoms of pulmonary edema, shortness of breath, cyanosis, chest pain, may not be evident until 1 to 24 hours after exposure. If exposure is not fatal, it can cause permanent damage to lung tissue.

In contact with skin: Contact with liquid causes severe burns, with ulceration and permanent scarring. High vapour concentrations may cause irritation. Extent of damage depends on the concentration of the solution and the duration of contact.

In contact with eyes: Liquid and vapours are corrosive. Damage can range from severe irritation and mild scarring to blistering, ulceration, corneal burns, severe scarring and clouding of the cornea, temporary or permanent blindness. Extent of damage depends on the concentration of the solution and the duration of contact.

AMMONIUM HYDROXIDE

Ingested: Ingestion is not a normal route of exposure for humans. Where ingestion of strong alkalis has occurred in humans, symptoms included severe pain, vomiting, diarrhea, and collapse. If death does not occur in the first 24 hours, the patient may improve for 2-4 days and then have a sudden onset of severe abdominal pain, and rapid fall of blood pressure, indicating delayed gastric or esophageal perforation. Damage to the esophagus and stomach after ingestion may progress for 2-3 weeks. Death from peritonitis may occur as late as 1 month after ingestion. Even though the patient recovers from the immediate damage, esophageal stricture may occur weeks, months or even years later to make swallowing difficult. Aspiration may occur during ingestion or vomiting, and can cause serious lung damage, pulmonary edema, and death.

Effects of Chronic Exposure to Product: Prolonged and repeated skin contact may lead to drying, cracking, and inflammation of the skin (dermatitis).

Carcinogenicity: Not considered carcinogenic.

Teratogenicity: No human or animal information available.

Reproductive Effects: No human or animal information available.

Mutagenicity: No human information available. Animal and bacterial studies inconclusive.

Synergistic Products: None known.

PREVENTIVE MEASURES

Engineering Controls: Local, corrosion-proof, exhaust ventilation required.

Respiratory Protection: Up to 250 ppm (ammonia) - NIOSH/MSHA approved cartridge respirator with cartridge to protect against ammonia. Up to 300 ppm (ammonia) - powered air-purifying respirator with cartridge to protect against ammonia or full face-piece supplied-air respirator. Higher or unknown concentrations, as in fire or spill conditions - positive-pressure, full face-piece self-contained breathing apparatus, or full face-piece supplied-air respirator with auxiliary positive-pressure self-contained breathing apparatus.

Eye Protection: Chemical safety goggles or face shield.

Skin Protection: Butyl rubber gloves. For shorter exposures (<4 hours), or for concentrations <30% , neoprene, nitrile rubber, Saranex, Viton, or Teflon are adequate. Impermeable overalls, apron and other protective clothing sufficient to prevent contact if splash occurs.

Other Personal Protective Equipment: Eye wash fountain and safety shower in work area.

Leak and Spill Procedure: Remove ignition sources. Evacuate and ventilate area. Clean up personnel must be thoroughly trained in the hazards of this chemical and must wear protective equipment and clothing sufficient to prevent inhalation of mist or vapours, and contact with skin and eyes. Stop and contain leak or spill. Dike with inert material and collect for reclaim or disposal. Prevent from entering sewers or waterways, or confined spaces. Collect in suitable containers (plastic, iron or stainless steel), and carefully dilute with water or cautiously neutralize with dilute hydrochloric acid. Flush area of spill thoroughly with copious amounts of running water.

Waste Disposal: Follow all federal, provincial and local regulations.

Handling Procedures and Equipment: TOXIC, CORROSIVE. Before working with this product, ensure that engineering controls are operating. Personnel working with this material must be thoroughly trained in its hazards and its safe use. Material will attack copper, tin, zinc and their alloys, and some forms of rubber, plastics, and coatings; ensure that equipment is resistant. Use the smallest amount possible for the purpose in a designated area with adequate ventilation. Avoid generating mist. Maintain temperature <50C; above this temperature, ammonia vapour can be a serious hazard. Avoid all contact with skin, eyes, and clothing. Empty containers may contain hazardous residues; treat with caution.

Storage Requirements: Store in suitable, labelled containers, in a cool, dry, well-ventilated area, out of direct sunlight and away from sources of heat and ignition. Maintain temperature <50C. Keep away from incompatible materials. Storage area should be constructed of fire-resistant materials, with sealed floors to prevent absorption, and with raised sills or a trench to a safe location. Walls, floors, shelving, fittings, lighting and ventilation systems should be made of resistant materials, such as carbon steel or stainless steel. Keep containers tightly closed. Protect from damage and inspect frequently for signs of leaking.

FIRST AID MEASURES**Specific Measures:**

Eyes: IMMEDIATELY flush eyes with running water for at least sixty (60) minutes, holding eyelids open while flushing. Do not interrupt flushing. Take care not to flush contaminated water into unaffected eye or onto the face. Wear protective gloves to prevent contact during first aid procedures. Flushing may be continued while casualty is transported to medical facility. GET MEDICAL ATTENTION IMMEDIATELY.

Skin: Remove contaminated clothing (including rings, watches, belts and shoes). IMMEDIATELY flush the exposed area with large amounts of running water for at least sixty (60) minutes, being particularly careful to clean folds, groin area, fingernails. Wear protective gloves to prevent contact during first aid procedures. Take care not to flush contaminated water into the unaffected eye. GET MEDICAL ATTENTION IMMEDIATELY. Decontaminate clothing before reuse, or discard.

Inhalation: IMMEDIATELY remove to fresh air (caution must be used by rescuers to avoid exposure to the contaminating fumes). Give oxygen for breathing difficulty. If breathing has stopped give artificial respiration. If breathing and pulse are absent give CPR. GET MEDICAL ATTENTION IMMEDIATELY. Continue observation of the victim; symptoms of pulmonary edema may be delayed up to 24 hours.

Ingestion: DO NOT INDUCE VOMITING. If casualty is alert and NOT convulsing; rinse mouth with water and give 2 cups of water or milk to drink to dilute material. IMMEDIATELY OBTAIN MEDICAL ATTENTION. If spontaneous vomiting occurs; have casualty lean forward with head down to avoid breathing in of vomitus. Rinse mouth thoroughly and administer more water or milk.

REFERENCES USED

Budavari: The Merck Index, 12th ed., 1997

CCINFO disc: MSDSs, January 2007

Royal Society of Chemistry: Chemical Safety Data Sheets, Vol. 3,
1990

Sax, Lewis: Hawleys Condensed Chemical Dictionary, 11th ed.,
1987

Suppliers Material Safety Data Sheets:

ADDITIONAL INFORMATION

Date Issued: March 10, 1989

Revision: Jan 2013

Proposed WHMIS Designation: D1B; E

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