

Material Safety Data Sheet

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(Sections changed: No Changes)

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Section I - Chemical Product And Company Identification

Product Name: Anhydrous Ammonia

CAS Number: 7664-41-7

HBCC MSDS No. CA10000



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Section II - Composition/Information On Ingredients

Chemical Name	CAS Number	%
Ammonia	7664-41-7	100

See Section VIII for exposure guidelines

Section III - Hazard Identification

Summary of Acute Health Hazards

Ingestion: This material is a gas under normal atmospheric conditions and ingestion is unlikely. Ingestion of liquid ammonia may result in severe irritation or ulceration of the mouth, throat and digestive tract which may be displayed by nausea, vomiting, diarrhea and, in severe cases, collapse, shock and death.

Inhalation: Irritation to the mucous membranes of the nose, throat and lungs is noticeable at 100 ppm. Concentrations above 400 ppm will cause throat irritation and may destroy mucous surfaces upon prolonged contact. High concentrations can cause pulmonary edema. Breathing air containing concentrations greater than 5,000 ppm may cause sudden death from spasm or inflammation of the larynx.

Skin: Liquid Ammonia produces severe skin burns on contact. Ammonia gas may cause skin irritation, especially if skin is moist. The liquid can cause skin damage resulting from combined freezing and corrosive action on the skin. Atmospheric concentrations above 30,000 ppm will burn and blister skin after a few seconds of exposure.

Eyes: Exposure to high gas concentrations may cause temporary blindness and severe eye damage. Direct contact of the eyes with liquid ammonia will produce serious eye burns.

Signs and Symptoms of Exposure: Can cause burning of the eyes, conjunctivitis, skin irritation, swelling of the eyelids and lips, dry red mouth and tongue, burning in the throat, and coughing, and in more severe cases of exposure, difficulty in breathing, signs and symptoms of lung congestion, and, ultimately, death from respiratory failure due to pulmonary edema may occur.

Effects of Overexposure: Can cause irritation and burns of the skin and mucous membranes, and headache, salivation, nausea, and vomiting. Difficult or labored

breathing and cough with bloody mucous discharge. Can cause bronchitis, laryngitis, hemoptysis, and pulmonary edema or pneumonitis. Death may result. Can cause ulceration of the conjunctiva and cornea, and corneal and lenticular opacities. Damage to the eyes may be permanent.

Medical Conditions Generally Aggravated by Exposure: Ammonia is a respiratory irritant. Persons with impaired pulmonary function may be at an increased risk from exposure. Also pre-existing skin disorders may be aggravated by exposure.

Section IV - First Aid Measures

Ingestion: If this gas is swallowed in liquid form, keep victim warm and OBTAIN IMMEDIATE MEDICAL ATTENTION. If signs of respiratory obstruction develop, immediately transport to medical facility. Do not induce vomiting. Never give fluids or induce vomiting if patient is unconscious or having convulsions.

Inhalation: Remove victim to fresh air. Give oxygen if breathing is difficult. If breathing has stopped, start artificial respiration. OBTAIN IMMEDIATE MEDICAL ATTENTION.

Skin: Apply water immediately to exposed areas of skin and continue for at least 30 minutes. Remove contaminated clothing, shoes, and constrictive clothing while continuing to apply water, being careful not to tear the skin. If skin surface is damaged, apply a clean dressing. If skin surface is not damaged, cleanse the affected area(s) thoroughly with mild soap and water. Do not apply salves or ointments to affected areas. OBTAIN IMMEDIATE MEDICAL ATTENTION.

Eyes: Remove victim to fresh air. Immediately flush with plenty of water for at least 30 minutes with the eyelids held apart. OBTAIN IMMEDIATE MEDICAL ATTENTION.

Section V - Fire Fighting Measures

Flash Point: N/A

Autoignition Temperature: 651° C;
1204°F

Lower Explosive Limit: 16% by
Volume

Upper Explosive Limit: 25% by Volume

Unusual Fire and Explosion Hazards: Gas may ignite at vapor concentrations between 16% and 25% in air. However, ammonia-air mixtures are difficult to ignite and burn with little vigor. In the absence of oxygen enrichment, the risk of initiating an accidental fire or explosion is low. Do not allow ammonia vapors to accumulate in confined areas where ignition may occur. Intense heating particularly in contact with hot metallic surfaces may cause decomposition of ammonia generating hydrogen, a flammable gas.

Extinguishing Media: Use Water Spray or Water Fog, Carbon Dioxide, Polar or Alcohol Foam, Dry Chemical. Halon may decompose into toxic materials. Carbon dioxide can displace oxygen. Use caution when applying halon or carbon dioxide in confined spaces.

Special Firefighting Procedures: Stop flow of gas. Use water fog to keep fire-exposed containers cool and to protect personnel effecting the shut-off. Wear self-contained breathing apparatus (SCBA) and encapsulating chemical protective clothing. Approach fire upwind and evacuate area downwind. Emergency responders in the danger area should wear bunker gear and self-contained breathing apparatus

for fires beyond the incipient stage (29CFR 1910.156). In addition, wear other appropriate protective equipment as conditions warrant (See Section VIII). Isolate damage area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. If this cannot be done, allow fire to burn. Move undamaged containers from danger area if it can be done with minimal risk. Stay away from ends of container. Water spray may be useful in minimizing or dispersing vapors. Cool equipment exposed to fire with water, if it can be done with minimal risk.

Section VI - Accidental Release Measures

Steps To Be Taken In Case Material Is Released Or Spilled: Isolate and evacuate the leak or spill area immediately for at least 150 feet in all directions. For larger spills, isolate at least 300 feet in all directions and then evacuate area downwind at least 0.4 miles in width and at least 0.8 miles in length. Keep area isolated until gas has dispersed. Note that although ammonia gas is lighter than air, sudden release may generate an aerosol of liquefied ammonia which may cling to the ground for long distances. May ignite in the presence of open flames and sparks. Narrow lower to upper combustion range (16-25%) makes ignition difficult. Keep all sources of ignition away from spill/release. Do not apply water onto leaking tank. Stop the flow of gas or liquid. Wear full protective clothing and self-contained breathing apparatus. Use water to protect personnel effecting the shut-off. Approach from upwind. Dike liquid spills to contain liquid. Evacuate the area immediately. Eliminate all open flames in vicinity of indoor spills or released vapor. Water fog can be used to cleanse atmosphere of ammonia vapor. Downwind areas can be protected by water fog nozzles positioned downwind.

Section VII - Handling and Storage

Contents are under pressure. The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276. Protect against physical damage. Outside shaded area or detached storage is preferred. Inside storage should be in a cool, dry, well ventilated, noncombustible location, away from all possible sources of ignition. Separate from other chemicals, particularly oxidizing gases, chlorine, bromine, iodine, and acids. Avoid ingestion, inhalation, and contact with skin or eyes.

Section VIII - Exposure Controls/Personal Protection

Exposure Controls

Engineering Controls: Local exhaust is essential. Spark-proof fans desirable with mechanical ventilation. Ducts should be located at ceiling level and lead upwards to the outside. Eyewash fountain and safety shower should be available in work area.
Work/Hygienic Practices: Avoid contact with skin and avoid breathing vapors. Do not eat, drink, or smoke in work area. Wash hands before eating, drinking, or using restroom. Do NOT place food, coffee or other drinks in the area where dusting or splashing of solutions is possible.

Exposure Guideline(s): Anhydrous Ammonia: CAS Number 7664-41-7, Exposure Limits (TWAs) in Air: ACGIH TLV: 25 ppm, 18 mg/m³; OSHA PEL: 50 ppm, 35

mg/m³; CAL-OSHA: 25 ppm, 18 mg/m³ Oregon-OSHA: 25 ppm, 18 mg/m³; STEL: 35 ppm, 27 mg/m³

Personal Protection

Personal Protection Equipment (PPE): Unless ventilation is adequate to keep concentration below permissible exposure limit (PEL), wear NIOSH approved ammonia chemical cartridge or canister full facepiece chin-style respirators with an air-purification factor (APF=50). In emergency or planned entry into unknown concentrations, use self-contained breathing apparatus (SCBA) or any supplied-air full facepiece chin-style respirators. Protective Clothing: Rubber or synthetic chemical gloves and boots should be worn as well as cotton clothing and underwear. Rubber or synthetic chemical coats or aprons should be available, an encapsulating chemical protective clothing garment is desirable for heavy exposures. The use of long sleeved clothing closed at the neck is advised. Change if clothing becomes contaminated.

Eye Protection: Chemical splash goggles should be worn when handling Anhydrous Ammonia to protect from liquids or mists. A face shield can be worn over chemical splash goggles as additional protection. Do not wear contact lenses when handling Anhydrous Ammonia. A full-face air-purifying respirator (APR) or supplied-air respirator (SAR) should be worn to protect from chemical vapors.

Section IX - Physical and Chemical Properties

Physical State: Compressed Gas	pH: 11.6 for 1.0 N@70°F
Melting Point/Range: -77.7° C; -107.9°F	Boiling Point/Range: -33.35° C; -28°F
Appearance/Color/Odor: Colorless gas or liquid with extremely pungent odor	
Solubility in Water: 100%	Vapor Pressure (mmHg): 6610 @ 20° C; 68°F
Specific Gravity (Water=1): 0.68 @ -33.4° C; -28°F	Molecular Weight: 17.03
Vapor Density (Air=1): 0.6 (gas), >1 (aerosol)	% Volatiles: 100%
Bulk Density: 630 kg/m ³ ; 39.3 lb/ft ³ ; 5.3 Lbs./Gal. (US).	

Section X - Stability and Reactivity

Stability: Stable **Hazardous Polymerization:** Will not occur

Conditions to Avoid: Avoid all possible sources of ignition. Heat will increase pressure in the storage tank.

Materials to Avoid: Avoid contact with oxidizing gases, chlorine, bromine, mineral hypochlorite, iodine, halogens, calcium, and strong acids. Avoid contact with copper, silver, zinc, and alloys of same. Mercury, silver oxide can form explosive compounds.

Hazardous Decomposition Products: Combustion will generate oxides of nitrogen. Intense heating of the gas, particularly in contact with hot metallic surfaces, may cause decomposition of ammonia to hydrogen and nitrogen.

Section XI - Toxicological Information

Oral LD50	350 mg/kg	Rat	ATSDR 1991
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	96 mg/kg	Mouse	EPA 1989
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Section XII - Ecological Information

Inhalation LC50	19,770 ppm	F Rat	EPA 1989
	14,140 ppm	M Rat	EPA 1989
	17,401 ppm	Rat	ATSDR 1991

Section XIII - Disposal Considerations

Consult Federal, State, or Local Authorities for proper disposal procedures. Diking will contain the liquid and allow it to stabilize. Keep unprotected personnel away from area until it is free of ammonia. Do not apply water directly to ammonia liquid as this will cause boiling and splattering.

Section XIV - Transport Information

Domestic Transportation

DOT Proper Shipping Name: Ammonia, Anhydrous
 DOT Hazard Class/I.D. No.: 2.2; UN1005

International Transportation

DOT Proper Shipping Name: Ammonia, Anhydrous
 DOT Hazard Class/I.D. No.: 2.3, (8); UN1005

Section XV - Regulatory Information

CERCLA Reportable Quantity: 100 Pounds (45.4 Kilograms) (19.43 Gals)

Additional Description Requirement: Inhalation Hazard

NFPA Rating: Health - 3; Flammability - 1; Instability - 0

0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

According to the (UFC) Uniform Fire Code Standard 79-3 (2000), the degree of Hazard is 3-3-0 in a confined space.

EPCRA Section 302 - Ammonia 7664-41-7 - TPQ - 500 Pounds

EPCRA Section 304 RQ - 100 Pounds

EPCRA Section 312 - Ammonia 7664-41-7

EPCRA Section 313 - Ammonia 7664-41-7

CAA 112® TQ - 10,000 Pounds

Ammonia - TSCA Chemical Substance Inventory

IDLH Value*: 300 ppm * The Immediately Dangerous to Life and Health Value

Carcinogenicity Lists: No **NTP:** No **IARC Monograph:** No

OSHA Regulated: Yes



Maximum use level for Anhydrous Ammonia under NSF/ANSI Standard 60

Anhydrous Ammonia

Maximum Use

5 mg/L

Section XVI - Other Information

Synonyms/Common Names: Anhydrous Ammonia; Ammonia; NH₃

Chemical Family/Type: Hydride, (Alkaline Gas), Inorganic Base

Sections changed since last revision: XV

IMPORTANT! Read this MSDS before use or disposal of this product. Pass along the information to employees and any other persons who could be exposed to the product to be sure that they are aware of the information before use or other exposure. This MSDS has been prepared according to the OSHA Hazard Communication Standard [29 CFR 1910.1200]. The MSDS information is based on sources believed to be reliable. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use, or misuse are beyond our control, **Hill Brothers Chemical Company** makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Also, additional information may be necessary or helpful for specific conditions and circumstances of use. It is the user's responsibility to determine the suitability of this product and to evaluate risks prior to use, and then to exercise appropriate precautions for protection of employees and others.