



MATERIAL SAFETY DATA SHEET

AMMONIA, AQUEOUS (AQUA AMMONIA)

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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WHMIS#: 00060171
Index: GCD0006/14A
Effective Date: 2017 January 23
Date of Revision: 2017 January 23

Website: <http://www.brenntag.ca>

EMERGENCY TELEPHONE NUMBER (For Emergencies Involving Chemical Spills or Releases) 1 855 273 6824

PRODUCT IDENTIFICATION

Product Name: Ammonia, Aqueous.
Chemical Name: Ammonium Hydroxide Solution.
Synonyms: Aqua Ammonia 13 to 26 Baume; Ammonium Hydroxide; Ammonia Water.
Chemical Family: Alkali.
Molecular Formula: NH₄OH.
Product Use: Chemical intermediate. plastics. detergents. Intermediate in production of fertilizers and explosives.

WHMIS Classification / Symbol:

D-1B: Toxic (acute effects)
E: Corrosive



READ THE ENTIRE MSDS FOR THE COMPLETE HAZARD EVALUATION OF THIS PRODUCT.

2. COMPOSITION, INFORMATION ON INGREDIENTS (Not Intended As Specifications)

Ingredient	CAS#	ACGIH TLV (TWA)	% Concentration
Ammonium Hydroxide	1336-21-6	—	5 - 30
Decomposition product:			
Ammonia	7664-41-7	25 ppm	Trace

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Corrosive! May be fatal if inhaled or swallowed. Causes severe skin and eye burns. Vapours are extremely irritating to eyes and respiratory tract. See "Other Health Effects" Section. Can decompose at high temperatures forming toxic gases. Contents may develop pressure on prolonged exposure to heat.

POTENTIAL HEALTH EFFECTS

Inhalation Corrosive! Product may cause severe irritation of the nose, throat and respiratory tract. Repeated and/or prolonged exposures may cause productive cough, running nose, bronchopneumonia, pulmonary oedema (fluid build-up in lungs), and reduction of pulmonary function. Can cause injury to entire respiratory tract. Severe exposure may cause lung damage. See "Other Health Effects" Section.

Skin Contact: Corrosive! Burns (chemical) can occur if not promptly removed. Prolonged, confined (especially under the finger nails, under rings or watch bands) or repeated exposure may cause skin irritation and possibly lead to (chemical) burns. Prolonged and repeated contact may lead to dermatitis. Toxic effects may be delayed.

Skin Absorption: Not likely to be absorbed through the skin. Skin absorption is a secondary concern to the continual destruction of tissue while the product is in contact with the skin. Burns (chemical) can occur if not promptly removed.

Eye Contact Extremely corrosive! This product causes corneal scarring and clouding. Glaucoma, cataracts and permanent blindness may occur.

Ingestion: Corrosive! This product causes severe burning and pain in the mouth, throat and abdomen. Vomiting, diarrhea and perforation of the esophagus and stomach lining may occur.

Other Health Effects Corrosive effects on the skin and eyes may be delayed, and damage may occur without the sensation or onset of

pain. Strict adherence to first aid measures following any exposure is essential.

May cause anosmia, bronchopneumonia, pulmonary oedema, liver damage, kidney damage, central nervous system (CNS) depression. Anosmia is a term that describes the loss of the sense of smell. Signs and symptoms of kidney damage generally progress from oliguria, to blood in the urine, to total renal failure. Liver damage is characterized by the loss of appetite, jaundice (yellowish skin colour), and occasional pain in the upper left-hand side of the abdomen. CNS depression is characterized by headache, dizziness, drowsiness, nausea, vomiting and incoordination. Severe overexposures may lead to coma and possible death due to respiratory failure. Pulmonary oedema is the build-up of fluid in the lungs that might be fatal. Symptoms of pulmonary oedema, such as shortness of breath, may not appear until several hours after exposure and are aggravated by physical exertion. (4)

4. FIRST AID MEASURES

FIRST AID PROCEDURES

General Guideline

Prompt removal of the material and obtaining medical attention are essential for all contact. Remove all contaminated clothing and immediately wash the exposed areas with copious amounts of water. Continue the flushing during transportation to the emergency department. Corrosive effects may be delayed (up to 72 hours), and damage may occur without the sensation or onset of pain. Contact local poison control centre for further guidance.

Inhalation:

Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Oxygen administration may be beneficial in this situation but should only be administered by personnel trained in its use. Obtain medical attention IMMEDIATELY.

Skin Contact

Prompt removal of the material from the skin is essential. Remove all contaminated clothing and immediately wash the exposed areas with copious amounts of water for a minimum of 60 minutes. Obtain medical attention IMMEDIATELY. See "Note to Physicians" below.

Eye Contact

Prompt removal of the material is essential. Immediately flush eyes with running water for a minimum of 60 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport.

Ingestion:

Do not attempt to give anything by mouth to an unconscious person. IMMEDIATELY contact local Poison Control Centre. If victim is alert and not convulsing, rinse mouth out and give 1 to 2 glasses of milk. Water may be used if milk is not available but it is not as effective. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more milk or water. IMMEDIATELY transport victim to an emergency facility. DO NOT give acidic agents (e.g., citrus juices or vinegar) to "neutralize" the alkali. This action may cause an exothermic reaction and burn the esophagus.

Note to Physicians: Immediate consultation with the local Poison Control Centre should be initiated. Severe and sometimes delayed (up to 72 hours) local and systemic reactions can occur.

Treatment for corrosive chemical contact with skin after initial flushing procedures:

1. Immerse the exposed part immediately in ice water to relieve pain and to prevent swelling and blistering. Place cold packs, ice or wet cloths on the burned area if immersion is not possible.
2. Remove anything that is constrictive, such as rings, bracelets or footwear, before swelling begins.
3. Cover the exposed part with a clean, preferably sterile, lint-free dressing.
4. For severe exposure, immediately seek medical attention and monitor breathing and treat for shock.

Due to the severely irritating or corrosive nature of the material, swallowing may lead to ulceration and inflammation of the upper alimentary tract with hemorrhage and fluid loss. Also, perforation of the esophagus or stomach may occur, leading to mediastinitis or peritonitis and the resultant complications. Mucosal injury following ingestion of this corrosive material may contraindicate the induction of vomiting in the treatment of possible intoxication. Similarly, if gastric lavage is performed, intubation should be done with great care. If oral burns are present or a corrosive ingestion is suspected by the patient's history, perform esophagoscopy as soon as possible. Scope should not be passed beyond the first burn because of the risk of perforation.

This product contains materials that may cause severe pneumonitis if aspirated. If ingestion has occurred less than 2 hours earlier, carry out careful gastric lavage; use endotracheal cuff if available, to prevent aspiration. Observe patient for respiratory difficulty from aspiration pneumonitis. Give artificial resuscitation and appropriate chemotherapy if respiration is depressed.

Medical conditions that may be aggravated by exposure to this product include neurological and cardiovascular disorders, diseases of the skin, eyes or respiratory tract, preexisting liver and kidney disorders.

5. FIRE-FIGHTING MEASURES

Flashpoint (°C)	Autolgnition	Flammability Limits in Air (%):	
	Temperature (°C)	LEL	UEL
Does not flash.	650 (Ammonia)	15 (Ammonia)	28 (Ammonia)
Flammability Class (WHMIS):	Not regulated.		
Hazardous Combustion Products:	Thermal decomposition products are toxic and may include ammonia and oxides of nitrogen.		

Unusual Fire or Explosion Hazards:	Ammonia concentrations in the range of 16 to 25 % by volume in air can be ignited or caused to explode if heated to the autoignition temperature. The presence of oil or other combustible materials increases the fire hazard. (3) Not normally a fire hazard. Water content of product prevents ignition. The product can support combustion if water evaporates. Closed containers exposed to heat may burst.
Sensitivity to Mechanical Impact:	Not expected to be sensitive to mechanical impact.
Rate of Burning	Not available.
Explosive Power:	Not available.
Sensitivity to Static Discharge:	Not expected to be sensitive to static discharge.

EXTINGUISHING MEDIA

Fire Extinguishing Media:	Aqueous solution containing 5 % or less of Ammonia in water do not produce flammable vapours at any temperature. More concentrated solutions of Ammonia give off flammable vapours when the solution is between certain temperatures. If ammonia vapour or gas is burning, use dry chemical powder or carbon dioxide for small fires and water spray, fog or foam for large fires. Otherwise, use extinguishing media appropriate to the surrounding fire conditions. (4)
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FIRE FIGHTING INSTRUCTIONS

Instructions to the Fire Fighters:	Use water spray to cool fire-exposed containers or structures. Use water spray to disperse vapours. Isolate materials that are not involved in the fire and protect personnel. Cool containers with flooding quantities of water until well after the fire is out. Spilled material may cause floors and contact surfaces to become slippery.
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Fire Fighting Protective Equipment:	Use self-contained breathing apparatus and protective clothing. Protective clothing for skin and eye protection should be worn to protect against highly alkaline materials.
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6. ACCIDENTAL RELEASE MEASURES

Information in this section is for responding to spills, leaks or releases in order to prevent or minimize the adverse effects on persons, property and the environment. There may be specific reporting requirements associated with spills, leaks or releases, which change from region to region.

Containment and Clean-Up Procedures:	In all cases of leak or spill contact vendor at Emergency Number shown on the front page of this MSDS. See Section 13, "Deactivating Chemicals". Wear respirator, protective clothing and gloves. Do not use combustible materials such as sawdust as an absorbent. Eliminate all sources of ignition. Collect product for recovery or disposal. For release to land, or storm water runoff, contain discharge by constructing dikes or applying inert absorbent; for release to water, utilize damming and/or water diversion to minimize the spread of contamination. Ventilate enclosed spaces. Notify applicable government authority if release is reportable or could adversely affect the environment.
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7. HANDLING AND STORAGE

HANDLING

Handling Practices:	Use normal "good" industrial hygiene and housekeeping practices. Containers exposed to heat may be under internal pressure. These should be cooled and carefully vented before opening. A face shield and apron should be worn. Vent container frequently, and more often in warm weather, to relieve pressure. Attacks some types of rubber, plastics and coatings. Do not store or transport with food or feed.
Ventilations Requirements:	See Section 8, "Engineering Controls".
Other Precautions:	Use only with adequate ventilation and avoid breathing aerosols (vapours or mists). Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Wash contaminated clothing thoroughly before re-use.

STORAGE

Storage Temperature (°C)	See below.
Ventilation Requirements:	General exhaust is acceptable. Ventilation should be corrosion proof.
Storage Requirements:	Store in a clean, cool well ventilated area, away from organic chemicals, strong bases, strong acids, metal powders, carbides, sulfides, and any readily oxidizable material. Protect from direct sunlight. Protect against physical damage. Storage area should be equipped with corrosion-resistant floors, sumps and should have controlled drainage to a recovery tank.
Special Materials to be Used	Materials of construction for storing the product include: carbon steel, stainless steel or plastics. Reacts with For Packaging or Containers: most metals to produce hydrogen gas which could make an explosive mixture with air. Equipment for storage, handling or transport should NOT be made from the following material, or, where applicable, its alloys: copper, aluminum, lead, nickel, tin, zinc, brass, galvanized materials, silver or gold. Solutions are corrosive to mild steel. Attacks some types of rubber, plastics and coatings. Many materials, particularly plastics, become brittle on contact with liquid ammonia. (3) Confirm suitability of any material before using.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Recommendations listed in this section indicate the type of equipment, which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

ENGINEERING CONTROLS:

Engineering Controls:	Local exhaust ventilation required. Ventilation should be corrosion proof. Make up air should be supplied to balance air that is removed by local or general exhaust ventilation. Ventilate low lying areas such as sumps or pits where dense vapours may collect.
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For personnel entry into confined spaces (i.e. bulk storage tanks) a proper procedure must be followed. It must include consideration of, among other things, ventilation, testing of tank atmosphere, provision and maintenance of SCBA, and emergency rescue. Use the "buddy" system. The second person should be in view and trained and equipped to execute a rescue. (6)

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye Protection: Safety glasses with side shields are recommended to prevent eye contact. Use full face-shield and chemical safety goggles when there is potential for contact. Contact lenses should not be worn when working with this material.

Skin Protection: Gloves and protective clothing made from butyl rubber, neoprene, nitrile rubber or viton should be impervious under conditions of use. Attacks some types of rubber, plastics and coatings. Discard contaminated gloves. Prior to use, user should confirm impermeability.

Respiratory Protection: Ammonia: Up to 250 ppm: chemical cartridge respirator with cartridge(s) to protect against ammonia; or supplied-air respirator (SAR). Up to 300 ppm: SAR operated in a continuous-flow mode; or powered air-purifying respirator with cartridge(s) to protect against ammonia; or full-face piece chemical cartridge(s) to protect against ammonia; or gas mask with canister to protect against ammonia; or full-face piece SCBA; or full-face piece SAR. (4)

If while wearing a respiratory protection, you can smell, taste or otherwise detect anything unusual, or in the case of a full face piece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator to face seal is still good. If it is, replace the filter, cartridge or canister. If the seal is no longer good, you may need a new respirator. (6)

Ammonia: Immediately Dangerous to Life and Health (IDLH) value: 300 ppm. The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory equipment. In the event of failure of respiratory protective equipment, every effort should be made to exit immediately. (4)

Other Personal Protective Wear an impermeable apron and boots. Locate safety shower and eyewash station close to chemical handling area.
Take all precautions to avoid personal contact.

EXPOSURE GUIDELINES

SUBSTANCE (STEL)	ACGIH TLV	OSHA PEL		NIOSH REL	
		(TWA)	(STEL)	(TWA)	(STEL)
Decomposition product:					
Ammonia	35 ppm	50 ppm	—	25 ppm	35 ppm

9. PHYSICAL AND CHEMICAL PROPERTIES (Not intended as Specifications)

Physical State: Liquid.

Appearance: Clear, colourless liquid.

Odour: Strong, pungent odour.

Odour Threshold (ppm): 0.043 - 5 (30%)

Boiling Range (°C): 27 (30%)

Melting/Freezing Point (°C): -72 (30%)

Vapour Pressure (mm Hg at 20° C): 475 (30 %)

Vapour Density (Air = 1.0): 0.618 (30 %)

Relative Density (g/cc): 0.88 - 0.99

Bulk Density: Not available.

Viscosity: Similar to water.

Evaporation Rate (Butyl Acetate = 1.0): Not available.

Solubility: Miscible in water.

% Volatile by Volume: 100.

pH: 13 (10%)

Coefficient of Water/Oil Distribution: Not available.

Volatile Organic Compounds (VOC): 0.

Flashpoint (°C) Does Not Flash

10. CHEMICAL STABILITY

Under Normal Conditions: Stable.

Under Fire Conditions: Not flammable.

Hazardous Polymerization: Will not occur

Conditions to Avoid: High temperatures, sparks, open flames and all other sources of ignition. Avoid contact with water.

Materials to Avoid:	Strong oxidizers. Lewis or mineral acids. Strong bases. Reducing agents. Alkalis. Heavy metal salts. Acid Anhydrides. Acid Chlorides. Dimethyl Sulphide. Halogens. Calcium. Reacts with most metals to produce hydrogen gas which could make an explosive mixture with air. Finely divided metals. Heavy metals. Metals. Alkali metals and their hydroxides. Copper and its alloys. Aluminum and its alloys. Lead. Nickel. Tin. Zinc and its alloys. Brass. Galvanized Materials. Silver. Gold. Solutions are corrosive to mild steel.
Decomposition or Combustion Products:	Thermal decomposition products are toxic and may include ammonia and oxides of nitrogen.

11. TOXICOLOGICAL INFORMATION

TOXICOLOGICAL DATA:

SUBSTANCE	LD50 (Oral, Rat)	LD50 (Dermal, Rabbit)	LC50 (Inhalation, Rat, 4h)
Ammonium Hydroxide	350 mg/kg (1)	---	3 670 ppm (3)
Carcinogenicity Data:	The ingredient(s) of this product is (are) not classed as carcinogenic by ACGIH, IARC, OSHA or NTP. See "Other Studies Relevant to Material".		
Reproductive Data:	No adverse reproductive effects are anticipated.		
Mutagenicity Data:	No adverse mutagenic effects are anticipated.		
Teratogenicity Data:	No adverse teratogenic effects are anticipated.		
Respiratory / Skin Sensitization Data:	None known.		
Synergistic Materials:	None known.		
Other Studies Relevant to Material:	<p>Ammonia: Volunteers exposed to varying concentration levels of Ammonia (30 to 134 ppm) have reported irritation of the nose and throat. At concentrations above 500 ppm the volunteers experienced immediate and severe irritation of the nose and throat. (4)</p> <p>There was no significant differences in lung function to workers exposed to 9.2 ppm Ammonia for an average of 12.2 years, compared to controls with very low exposure (less than 1 ppm). People with repeated exposure to Ammonia may develop a tolerance to the irritating effects after a few weeks. (4)</p> <p>Studies in animals have shown that the respiratory system can be severely affected following inhalation exposure. There were also signs of toxicity in the liver, kidney and spleen. (4)</p> <p>No conclusions can be made from a poorly conducted study on a single group of mice exposed to 12,000 ppm Ammonia. There were pre-cancerous changes in the nasal cavities of a small number of mice and 1 case of cancer observed. (4)</p>		

12. ECOLOGICAL INFORMATION

Ecotoxicity:	Harmful to aquatic life at low concentrations. Toxicity is primarily associated with pH. 96-hour LC50 (Fathead Minnow) = 8.2 mg/L (3) 48-hour EC50 (Daphnia magna) = 0.66 mg/L (3)
Environmental Fate:	Not available. Can be dangerous if allowed to enter drinking water intakes. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers. Ammonia dissipates relatively quickly in ambient air and rapidly return to the soil via combination with sulfate ions or washout by rainfall. Ammonia strongly absorbs to soil, sediment particles and colloids in water under aerobic conditions. Biodegradation of ammonia to nitrate occurs in water under aerobic conditions resulting in a biological oxygen demand (BOD). (3) In low concentrations in water and soil, Ammonia acts as a fertilizer to promote plant growth. Under aerobic conditions Ammonia will oxidize to nitrate and does not bioaccumulate in the environment. Sublethal concentrations in water can have an adverse physiological effects in marine species. Free Ammonia concentrations of 2.5 mg/L at pH 7.4 to 8.5 are considered harmful to marine life. In water free, NH3 is considered to be the primary toxic form while the much more prevalent NH4OH form is less toxic. (3)

13. DISPOSAL CONSIDERATIONS

Deactivating Chemicals:	Aqueous Ammonia can be diluted with water, neutralized as required with dilute Hydrochloric Acid (HCl) or dilute Sulphuric Acid (H2SO4), and then highly diluted with water for discharge. (3) Neutralization is expected to be exothermic.
Waste Disposal Methods:	This information applies to the material as manufactured. Reevaluation of the product may be required by the user at the time of disposal since the product uses, transformations, mixtures and processes may influence waste classification. Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial and federal regulations. Do not dispose of waste with normal garbage, or to sewer systems.
Safe Handling of Residues:	See "Waste Disposal Methods".
Disposal of Packaging:	See Section 13, "Deactivating Chemicals". Empty containers retain product residue (liquid and/or vapour) and can be dangerous. Do not dispose of package until thoroughly washed out.

14. TRANSPORTATION INFORMATION

CANADIAN TDG ACT SHIPPING DESCRIPTION:

AMMONIA SOLUTION, Class 8, UN2672, PG III.

Label(s): Corrosives. Placard: Corrosives.

ERAP Index: ----- . Exemptions: None known.

May also be shipped / labelled as : Ammonium Hydroxide, Class 8, UN2672, PG III.

Ammonia solutions with less than 10% ammonia are not TDG regulated.

US DOT CLASSIFICATION (49CFR 172.101, 172.102):

AMMONIA SOLUTION, Class 8, UN2672, PG III.

Label(s): Corrosive. Placard: Corrosive.

CERCLA-RQ: 1 000 lbs / 454 kg. Exemptions: None known.

15. REGULATORY INFORMATION

CANADA

CEPA - NSNR: All components of this product are included on the DSL.

CEPA - NPRI: Ammonia.

Controlled Products Regulations Classification (WHMIS):

D-1B: Toxic (acute effects)

E: Corrosive

USA

Environmental Protection Act: All components of this product are included on the TSCA inventory.

OSHA HCS (29CFR 1910.1200): Toxic. Corrosive.

NFPA: 3Health, 0 Fire, 0 Reactivity (3)

HMIS: 3 Health, 0 Fire, 0 Reactivity (3)

INTERNATIONAL

Not available.

16. OTHER INFORMATION

ADDITIONAL INFORMATION

The Baume Scale

% NH3 : Specific Gravity at 15.6 Degrees_Celsius Degrees Baume (3)

5.02	0.9790	13.0
6.74	0.9722	14.0
8.49	0.9655	15.0
10.28	0.9589	16.0
11.18	0.9556	16.5
12.10	0.9524	17.0
13.02	0.9492	17.5
13.96	0.9459	18.0
14.90	0.9428	18.5
15.84	0.9396	19.0
17.76	0.9333	20.0
19.68	0.9272	21.0
20.64	0.9241	21.5
21.60	0.9211	22.0
23.52	0.9151	23.0
25.48	0.9091	24.0
27.44	0.9032	25.0
28.42	0.9003	25.5
29.40	0.8974	26.0
31.36	0.8917	27.0

REFERENCES

1. RTECS-Registry of Toxic Effects of Chemical Substances, Canadian Centre for Occupational Health and Safety RTECS database.
2. Clayton, G.D. and Clayton, F.E., Eds., Patty's Industrial Hygiene and Toxicology, 3rd ed., Vol. IIA,B,C, John Wiley and Sons, New York,1981.

3. Supplier's Material Safety Data Sheet(s).
4. CHEMINFO chemical profile, Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.
5. Guide to Occupational Exposure Values, 2011, American Conference of Governmental Industrial Hygienists, Cincinnati, 2011.
6. Regulatory Affairs Group, Brenntag Canada Inc.
7. The British Columbia Drug and Poison Information Centre, Poison Managements Manual, Canadian Pharmaceutical Association, Ottawa, 1981.

The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and Brenntag Canada Inc. will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years.

To obtain revised copies of this or other Material Safety Data Sheets, contact your nearest Brenntag Canada Regional office.

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