



Safety Data Sheet (SDS)

AMMONIA SOLUTION

Section 1: Product and Company Identification

Product Name:	AMMONIA SOLUTION	Index Number:	007-001-01-2
Product Number(s):	S010701, S010701-SSEE03, S010701-SSEE05, S010701-SSEH03, S010701-SSEH04, S010701-SSEH05, S010701-SSEH06, S010701-SSEH11, S010701-SSEH43, S010701-SSEH61, S010701-SSEH63, S010701-SSEH64, S010701-SSNH03, S010701-SSNH04, S010701-SSNH05, S010701-SSNH06, S010701-SSNH11, S010701-SSNH43, S010701-SSNH61, S010701-SSNH63, S010701-SSNH64, S010701-SSNQ03, S020701, S020701-SSEJ01, S020701-SSEJ02, S020701-SSEJ03, S020701-SSEJ04, S020701-SSEJ05, S020701-SSEJ06, S020701-SSNJ01, S020701-SSNJ02, S020701-SSNJ03, S020701-SSNJ04, S020701-SSNJ05, S020701-SSNJ06, S020701-SSRJ01, S020701-SSRJ02, S020701-SSRJ03, S020701-SSRJ04, S020701-SSRJ05, S020701-SSRJ06, S050701, S050701-SSEH05, S050701-SSEH06, S050701-SSEH63, S050701-SSEH64, S050701-SSNH05, S050701-SSNH06, S050701-SSNH63, S050701-SSNH64, S050702, S050702-SSEH05, S050702-SSEH06, S050702-SSEH63, S050702-SSEH64, S050702-SSNH05, S050702-SSNH06, S050702-SSNH63, S050702-SSNH64		
Synonyms:	Ammonia water; Ammonium hydrate; Ammonium hydroxide; Aqueous ammonia		
Chemical names:	DE Ammoniak; ES Amoniaco; FR Ammoniac; IT Ammoniaca; NL Ammoniak		
Supplier:	SEASTAR CHEMICALS Inc.		
Address:	10005 McDonald Park Road, Sidney, BC V8L 5Y2 CANADA		
Phone Number:	250-655-5880	Fax Number:	250-655-5888
CANUTEC (CAN):	613-996-6666		

Section 2: Hazards Identification

Emergency Overview			
Appearance:	Colourless to milky liquid		
Target Organs:	Eyes, skin, respiratory tract.		
GHS			
Classification:	Skin corrosion – Category 1B Aquatic toxicity, Acute – Category 1	Pictograms:	 
Signal Word:	Danger	GHS05	GHS09

Hazard Statements:

H314: Causes severe skin burns and eye damage.

H400: Very toxic to aquatic life.

Precautionary Statements:

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash thoroughly after handling.

P273: Avoid release to the environment.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310: Immediately call a POISON CENTER or doctor/physician.

P363: Wash contaminated clothing before reuse.

P391: Collect spillage.

P405: Store locked up.

P501: Dispose of contents/container according to federal, regional and local government requirements.

Section 3: Composition/Information on Ingredients

CAS No.	Chemical Name	Percent	EINECS / ELINCS No.
1336-21-6 (Ammonia 7664-41-7)	Ammonia solution (Ammonium hydroxide)	20-22% (as NH ₃)	215-647-6
7732-18-5	Water	Balance	231-791-2

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Section 4: First Aid Measures

In case of contact:

Inhalation:	This chemical is toxic. Take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment, use the "buddy" system). Remove source of contamination or move victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. DO NOT allow victim to move about unnecessarily. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure. If breathing has stopped, trained personnel should begin artificial respiration (AR) or, if the heart has stopped, cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED) immediately. Avoid mouth-to-mouth contact by using mouth guards or shields. Quickly transport victim to an emergency care facility.
Skin:	Avoid direct contact. Wear chemical protective clothing, if necessary. As quickly as possible, remove contaminated clothing, shoes and leather goods. Immediately flush with lukewarm, gently flowing water for at least 30 minutes. If irritation persists, repeat flushing. DO NOT INTERRUPT FLUSHING. If necessary and it can be done safely, continue flushing during transport to emergency care facility. Quickly transport victim to an emergency care facility. Double bag, seal, label and leave contaminated clothing, shoes and leather goods at the scene for safe disposal. NOTE: Any skin contact will also involve significant inhalation exposure.
Eye:	Avoid direct contact. Wear chemical protective gloves, if necessary. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 30 minutes, while holding the eyelid(s) open. If a contact lens is present, DO NOT delay irrigation or attempt to remove the lens. Neutral saline solution may be used as soon as it is available. DO NOT INTERRUPT FLUSHING. If necessary, continue flushing during transport to emergency care facility. Take care not to rinse contaminated water into the unaffected eye or onto the face. Quickly transport victim to an emergency care facility. NOTE: Any eye contact will also involve significant inhalation exposure.
Ingestion:	NEVER give anything by mouth if victim is rapidly losing consciousness, is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. If vomiting occurs naturally, have victim rinse mouth with water again. Quickly transport victim to an emergency care facility.
Notes to Physician/Doctor:	After inhalation exposure, observe for 24 to 72 hours as pulmonary edema may be delayed. Provide general supportive measures (comfort, warmth, rest). Consult a doctor and/or the nearest Poison Control Centre for all exposures. Some first aid procedures recommended above require advanced first aid training. Protocols for undertaking advanced procedures must be developed in consultation with a doctor and routinely reviewed. All first aid procedures should be periodically reviewed by a doctor familiar with the material and its conditions of use in the workplace.

Section 5: Fire Fighting Measures

Fire Hazard Summary:

Ammonium hydroxide solutions are not flammable at normal temperatures. However, ammonia gas may be generated from ammonium hydroxide. Ammonia gas concentrations within the flammable range (15-28%) can be ignited and pose a significant fire and explosion hazard, especially in a confined space. Ammonium hydroxide containing 5% or less ammonia does not produce ammonia gas in the flammable range at any temperature. More concentrated solutions of ammonium hydroxide can give off ammonia gas within the flammable range. A large and intense energy source is necessary to ignite ammonia gas. A number of major fires and explosions involving ammonia gas have occurred in industry. For example, it has been reported that welding operations on a vessel containing ammonium hydroxide caused a violent explosion.

In a fire, ammonium hydroxide will give off very toxic, flammable ammonia gas. Ammonia gas decomposes to flammable hydrogen gas and nitrogen at about 450-500 °C. The main products of combustion in air are nitrogen, with small amounts of toxic and irritating nitrogen dioxide, and ammonium nitrate. Containers may rupture violently due to overpressurization, if exposed to fire or excessive heat for a sufficient period of time, releasing flammable and toxic gases.

Do not enter without wearing specialized protective equipment suitable for the situation. Firefighter's normal protective clothing (Bunker Gear) will not provide adequate protection. Chemical protective clothing (e.g. chemical splash suit) and positive pressure self-contained breathing apparatus (SCBA) may be necessary.

Extinguishing Media:	Ammonium hydroxide will not burn. If ammonia 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 for the surrounding fire conditions.
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Extinguishing Media to be Avoided:	Not available.
Flash Point:	Not flammable under normal conditions
Lower Flammable (Explosive) Limit (LFL/LEL):	15-16% (ammonia gas)
Upper Flammable (Explosive) Limit (UFL/UEL):	25-28% (ammonia gas)
Autoignition (Ignition) Temperature:	651 °C (1204 °F) (25% solution); 850 °C (1562 °F) (ammonia gas)
Sensitivity to Mechanical Impact:	Probably not sensitive. Normally stable.
Sensitivity to Static Charge:	Not available.
Electrical Conductivity:	Not available.
Minimum Ignition Energy:	680 mJ (ammonia gas)
Combustion and Thermal Decomposition Products:	Ammonia gas, ammonium nitrate, hydrogen, nitrogen/nitrogen dioxide.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) HAZARD IDENTIFICATION – AMMONIA, anhydrous, liquefied

Health:	3
Flammability:	1
Reactivity:	0
Special Hazard:	Not applicable

Section 6: Accidental Release Measures

Spill Precautions:

Notify government environmental agencies if there is a release of ammonium hydroxide into the environment. Evacuate the area immediately. Isolate the hazard area. Keep out unnecessary and unprotected personnel. Evacuate downwind locations.

Ensure cleanup is conducted by trained personnel only. Wear adequate personal protective equipment. Do not touch damaged containers or spilled product unless wearing appropriate protective equipment. Increase ventilation to area or move leaking container to a well-ventilated and secure area. Remove or isolate incompatible materials as well as other hazardous materials.

Vapour or gas may accumulate in hazardous amounts in low-lying areas especially inside confined spaces, if ventilation is not sufficient. Before entry, especially into confined areas, check atmosphere with an appropriate monitor.

Clean-up:

Do not allow into any sewer, on the ground or into any waterway. If the spill is inside a building, prevent product from entering drains, ventilation systems and confined areas.

SMALL SPILLS: Stop or reduce leak if safe to do so. Ventilate the area. Contain and soak up spill with absorbent that does not react with spilled product. Flush area with water. Place used absorbent into suitable, covered, labelled containers for disposal. Contaminated absorbent poses the same hazard as the spilled product.

LARGE SPILLS: Contact supplier, local fire and emergency services for help. Dike spilled product to prevent runoff. Cover the spill surface with the appropriate type of foam to reduce the release of vapour/ammonia gas. Ventilate the area to prevent the gas from accumulating, especially in confined spaces. Knock down gas with fog or fine water spray.

Remove or recover liquid using pumps or vacuum equipment. Flush spill area. Dike and recover contaminated water for appropriate disposal. Store recovered product in suitable containers that are: tightly-covered, corrosion-resistant.

Section 7: Handling and Storage

Handling:

This material is a TOXIC, CORROSIVE liquid. Ammonium hydroxide readily gives off ammonia gas which is also an EXPLOSION HAZARD, especially in confined spaces. Before handling, it is extremely important that engineering controls are operating and that protective equipment requirements and personal hygiene measures are being followed. People working with this chemical should be properly trained regarding its hazards and its safe use. Maintenance and emergency personnel should be advised of potential hazards.

If ammonium hydroxide is released, immediately put on a suitable respirator and leave the area until the severity of the release is determined. In case of leaks, escape-type respiratory protective equipment should be available in the immediate work area. Immediately report leaks, spills or failures of the engineering controls. Unprotected persons should avoid all contact with this chemical including contaminated equipment.

Consider using a closed handling system for large-scale use of this material. If a closed handling system is not possible, use the smallest possible amounts in a well-ventilated area separate from the storage area. Avoid generating vapours or mists. Prevent the release of vapours, mists or ammonia gas into the workplace air. For large-scale operations consider the installation of an ammonia gas leak detection system with an alarm. For large-scale handling operations use non-sparking ventilation systems, approved explosion-

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proof equipment and intrinsically safe electrical systems in areas of use.

Do not use with incompatible materials such as oxidizing agents (e.g. nitrogen oxide), halogens (e.g. chlorine, fluorine) and heavy metals (e.g. mercury, silver). See Section 10 for more information.

Inspect containers for damage or leaks before handling. Use the type of containers recommended by the manufacturer. Cautiously, dispense into sturdy containers made of compatible materials. Pour carefully from the container to avoid splashing and spurting. Stand upwind of all opening, pouring and mixing operations. Use corrosion-resistant transfer equipment. Regularly check storage tanks and transfer equipment for evidence of corrosion or leakage. Have suitable emergency equipment for fires, spills and leaks readily available. Practice good housekeeping. Maintain handling equipment. Comply with applicable regulations.

Storage:

Store in a cool, well-ventilated area, out of direct sunlight and away from heat sources. Do not store below ground level or in confined spaces. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Keep storage area separate from work areas. Post warning signs. Inspect periodically for damage or leaks.

Keep quantities stored as small as possible. For large-scale storage of this material consider the installation of an ammonia leak detection system with an alarm. Store away from incompatible materials, such as chlorine or copper. See Section 10 for more information.

Inspect all incoming containers to make sure they are properly labelled and not damaged. Always store in original labelled container, or in the type of container recommended by the manufacturer/supplier. Protect the label and keep it visible. Keep containers tightly closed when not in use and when empty. Protect from damage. Store empty containers separately. Empty containers may contain hazardous residues. Keep closed.

Walls, floors, shelving, fittings, lighting and ventilation systems in storage area should be made from carbon steel or stainless steel which do not react with ammonium hydroxide. Storage facilities should be made of fire-resistant materials. Store this material according to applicable occupational health and safety regulations and fire and building codes. Have appropriate fire extinguishers and spill clean-up equipment in storage area.

Section 8: Exposure Controls/Personal Protection

General Exposure Precautions:

NOTE: Exposure to this material can be controlled in many ways. The measures appropriate for a particular worksite depend on how this material is used and on the extent of exposure. This general information can be used to help develop specific control measures. Ensure that control systems are properly designed and maintained. Comply with occupational, environmental, fire, and other applicable regulations.

Engineering Controls:

Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification (e.g. substitution of a less hazardous material). Administrative controls and personal protective equipment may also be required.

Because of the high potential hazard associated with ammonium hydroxide, stringent control measures such as enclosure or isolation may be necessary for large-scale handling operations.

For large-scale handling operations, use non-sparking, corrosion-resistant ventilation systems, approved explosion-proof equipment and intrinsically safe electrical systems in areas of use. Consider the installation of an ammonia leak detection system with an alarm. Supply sufficient replacement air to make up for air removed by exhaust systems.

Walls, floors, shelving, fittings, lighting and ventilation systems should be made from carbon steel or stainless steel which do not react with ammonia or ammonium hydroxide. Have a safety shower and eye-wash fountain readily available in the immediate work area.

Personal Protective Equipment:

If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection. Have appropriate equipment available for use in emergencies such as spills or fire.

If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Refer to the CSA Standard Z94.4-11, "Selection, Use and Care of Respirators," available from the Canadian Standards Association.

Eye / Face protection:	Wear chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. A face shield may be necessary.
Skin protection:	Chemical protective gloves, coveralls, boots, and/or other chemical protective clothing. An impervious full-body encapsulating suit and respiratory protection may be required in some operations. Have a safety shower and eye-wash fountain readily available in the immediate work area. Choose body protection according to the amount and concentration of the substance at the work place.

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Resistance of Materials for Protective Clothing:	Guidelines for ammonium hydroxide less than 30%: RECOMMENDED (resistance to breakthrough longer than 8 hours): butyl, neoprene and nitrile rubber; Viton™; Viton™/Butyl rubber. RECOMMENDED (resistance to breakthrough longer than 4 hours): polyvinyl chloride; Silver Shield/4H® (polyethylene/ethylene vinyl alcohol). CAUTION, use for short periods only (resistance to breakthrough within 1 to 4 hours): natural rubber; Tychem™ CPF 3 and BR/LV. NOT RECOMMENDED for use (resistance to breakthrough less than 1 hour): polyethylene; polyvinyl alcohol; Barrier (PE/PA/PE).
Inhalation / Ventilation:	Use in a chemical fume hood. Where risk assessment shows air-purifying respirators are appropriate use a full-facepiece respirator with cartridge(s) to protect against ammonia (US) or type K (P3) (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Personal Hygiene:	Remove contaminated clothing immediately and keep in closed containers. Discard or launder before re-wearing. Inform laundry personnel of contaminant's hazards. Do not eat or drink in work areas. Wash hands thoroughly after handling this material. Handle in accordance with good industrial hygiene and safety practice.

EXPOSURE GUIDELINES – Listed under Ammonia, as NH₃

NIOSH:	REL-TWA: 25 ppm (18 mg/m ³); REL-STEL: 35 ppm (27 mg/m ³); IDLH: 300 ppm
ACGIH:	TLV-TWA: 25 ppm (18 mg/m ³); TLV-STEL: 35 ppm (27 mg/m ³)
OSHA PEL:	PEL-TWA: 50 ppm (35 mg/m ³)

Section 9: Physical and Chemical Properties

Unless otherwise specified, all w/w percents are expressed in terms of Mass NH₄OH / Mass Solution.

Form:	Liquid	Melting/Freezing Point:	20% w/w: -34.9 °C (-30.8 °F)
Color:	Colourless		24% w/w: -44.5 °C (-48.1 °F)
Odour:	Strong odour – ammonia-like		25% w/w: -72.4 °C (-98.3 °F)
Odour Threshold:	17 ppm (detection, geometric mean for ammonia gas)	Boiling Point:	25% w/w: 38 °C (100.4 °F) 29.4% w/w: 27.2 °C (81 °F)
Chemical Formula:	NH ₄ OH (NH ₃ aq. solution)	pH:	10.6 (0.01 N); 11.1 (0.1 N); 11.6 (1 N)
Formula Weight:	35.0411 g/mol (17.0304, NH ₃ aq.)	Density: (@ 20 °C)	20% w/w: 0.925 g/cm ³
Solubility:	Very soluble in water	Vapour Pressure: (Partial pressure @ 21.1 °C)	19.1% w/w: 29.5 kPa (221.3 mmHg)
Vapour Density: (@ 21.1 °C)	0.588 (ammonia gas) (air=1)		23.9% w/w: 47.4 kPa (355.2 mmHg)

Section 10: Stability and Reactivity

Normally stable. Ammonia gas may be given off under normal conditions.

Incompatibility – Materials to Avoid:

NOTE: Chemical reactions that could result in a hazardous situation (e.g. generation of flammable or toxic chemicals, fire or detonation) are listed here. Many of these reactions can be done safely if specific control measures (e.g. cooling of the reaction) are in place. Although not intended to be complete, an overview of important reactions involving common chemicals is provided to assist in the development of safe work practices.

OXIDIZING AGENTS (e.g. perchlorates, chlorates, hydrogen peroxide, chromic trioxide, nitrogen oxides, calcium or sodium hypochlorite) - can react with generation of heat. Reaction may become violent or explosive.

HEAVY METALS AND THEIR SALTS (e.g. silver, gold, lead, mercury or zinc, especially halide salts) - may form shock-sensitive compounds that may explode when dry.

HALOGENS (e.g. chlorine, bromine, fluorine or iodine) or INTERHALOGENS (e.g. bromine pentafluoride, chlorine trifluoride) - can react violently or form explosive chemicals.

NITROMETHANE - Increases the sensitivity of nitromethane to detonation. Form salts which are explosive when dry.

STRONG MINERAL ACIDS (e.g. sulfuric acid, hydrochloric acid, hydrofluoric acid or nitric acid) - reaction is exothermic (gives off heat); mixture becomes boiling hot and reaction may become violent.

DIMETHYL SULFATE - reacts violently.

ACROLEIN, ACRYLIC ACID, CHLOROSULFURIC ACID, PROPIOLACTONE or PROPYLENE OXIDE - mixing with 28% ammonium hydroxide in a closed container caused the temperature and pressure to rise.

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Conditions to avoid:	High temperatures, open flames, electric sparks, welding.
Hazardous Decomposition Products:	Ammonia gas (decomposes at 450-500 °C into hydrogen gas and nitrogen), ammonium nitrate, nitrogen/nitrogen dioxide.
Hazardous Polymerization:	None reported.

Corrosivity to Metals:

Dilute ammonium hydroxide solutions initially rapidly attack aluminum alloys. The attack rate drops as the concentration and pH increase. Ammonium hydroxide solutions (10-30%) are corrosive at normal temperatures to type 5052 aluminum and Cast B-356 aluminum, types 1075 and 1085 carbon steel, ductile cast iron, copper and copper alloys, bronze, high silicon bronze, low silicon bronze, silicon copper, aluminum bronze, architectural bronze, naval bronze, 90-10 copper-nickel, 70-30 copper nickel, brass, admiralty brass, naval brass, yellow brass, cartridge brass, nickel (4-27%) and nickel-base alloys, Monel, zinc, zinc alloys, galvanized surfaces and tantalum.

Ammonium hydroxide solutions are not corrosive at concentrations up to 30% at normal temperatures to stainless steels (such as types 303, 304, 306, 316, 347, 17-4 PH, 403, 410, 430 and 440), type 3003 aluminum, nickel-base alloys, Hastelloy B and C, Inconel 600 and 690, Incolloy 800 and 825, types 1010 and 1020 carbon steel, cast iron (unspecified), high nickel cast iron (25%), high silicon cast iron, Carpenter 29 Cb-3 (10-30%), titanium and zirconium.

Corrosivity to Non-Metals:

At normal temperatures, ammonium hydroxide solutions attack plastics, such as polyvinylidene chloride (Saran), polybutylene terephthalate, polyethylene terephthalate, isophthalic acid and general-purpose thermoset polyesters and polyurethane (riged); and elastomers, such as polyacrylate, polyurethane, natural rubber, synthetic isoprene, hard rubber and polysulfide.

At normal temperatures, ammonium hydroxide solutions do not attack plastics such as Teflon and other fluorocarbons like ethylene tetrafluoroethylene (ETFE; Tefzel), ethylene chlorotrifluoroethylene (ECTFE; Halar), chlorotrifluoroethylene (CTFE; Kel-F) and polyvinylidene fluoride (PVDF; Kynar), chlorinated polyvinyl chloride (CPVC), polyvinyl chloride (PVC), polypropylene, nylon, acrylonitrile-butadiene-styrene (ABS), styrene-acrylonitrile (SAN), polyetherether ketone (Peeek), chlorinated polyether (Penton), high density polyethylene (HDPE), ultra high molecular weight polyethylene (UHMPE), crosslinked polyethylene (XPE), polyphenylene oxide (Noryl), bisphenol A-fumarate and chlorinated thermoset polyesters, thermoset epoxy, thermoset vinyl ester and ethylene vinyl acetate; elastomers such as nitrile rubber (NBR; nitrile Buna N), ethylene propylene (EP); ethylene propylene diene (EPDM), Viton A and other fluorocarbons like Chemraz and Kalrez, chloroprene (CR; neoprene), butyl rubber (butyl rubber (isobutylene isoprene; IIR), chlorosulfonated polyethylene (Hypalon; CSM), low density polyethylene, nylon 11, flexible polyvinyl chloride and ethylene vinyl acetate (EVA); and coatings such as such as coal tar epoxy, epoxy polyamide, epoxy (general purpose and chemical resistant), polyester, urethanes, vinyls at room temperature.

Section 11: Toxicological Information

Potential Health Effects

Inhalation:	May be fatal if inhaled. Ammonia gas causes severe respiratory tract irritation and inflammation with coughing, dyspnea and chest pain. Destructive to tissues of mucous membranes. Brief exposure to high concentrations can cause pulmonary edema, a potentially fatal accumulation of fluid in the lungs. Symptoms of pulmonary edema (tightness in the chest and shortness of breath) can develop up to 48 hours after exposure and are aggravated by physical exertion.
Skin:	Ammonium hydroxide is corrosive. Corrosive materials are capable of producing severe burns, blisters, ulcers and permanent scarring, depending on the concentration of the solution and the duration of contact. May cause brown skin discoloration and possible hardening of the outer skin layer. If respiratory protection is not used, skin exposure may result in fatal inhalation health effects.
Eye:	Ammonium hydroxide is corrosive. Corrosive materials are capable of producing severe eye burns, and permanent injury, including blindness, depending on the concentration of the solutions and duration of contact.
Ingestion:	Can cause burns to the lips, tongue, throat, esophagus and stomach; abdominal pain; nausea; vomiting; diarrhea and death. Exposure may cause death from shock or asphyxia and as little as one teaspoonful (5 mL) of 28% NH ₄ OH solution has been recorded as fatal.
Chronic:	May cause dermatitis, liver and kidney damage, chronic bronchitis and olfactory fatigue (the odour and irritation effects are detected at higher concentrations). Prolonged or repeated exposure may cause corneal damage and the development of cataracts and glaucoma. To the best of our knowledge, the chronic toxicity of this substance has not been fully investigated.

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Effects of Long-Term (Chronic) Exposure

RTECS#:	BQ9625000
Descriptor:	Mutagen; Human; Primary Irritant
LD50/LC50:	TCLo (lowest published toxic concentration) Inhalation, human – 408 ppm – Lungs, Thorax or Respiration: fibrosis, focal (pneumoconiosis), acute pulmonary edema JISMAB Journal of the Iowa State Medical Society. 34ZIAG "Toxicology of Drugs and Chemicals": LDLo (lowest published lethal dose) Oral, human – 43 mg/kg LCLo (lowest published lethal concentration) Inhalation, human – 5,000 ppm LD50 (lethal dose, 50% kill) Intravenous, mouse – 91 mg/kg – Behavioural: convulsions or effect on seizure threshold, coma; Lungs, Thorax or Respiration: respiratory stimulation JCINAO Journal of Clinical Investigation.
Epidemiology:	Standard Draize test – Eye, rabbit – 44 µg, severe reaction AROPAW Archives of Ophthalmology (Chicago). Rinsed with water – Eye, rabbit – 1 mg/30S, severe reaction TXYAC Toxicology.
Teratogenicity:	Ammonium hydroxide is not known to cause developmental toxicity.
Reproductive Effects:	Ammonium hydroxide is not known to cause reproductive toxicity.
Neurotoxicity:	Ammonia is a normal component of the body, used and formed in various metabolic reactions. Impairment of metabolic processes which result in elevated levels in the human body can cause serious harmful effects on the brain. There is some concern that similar effects may occur from accidental high exposures to ammonia but little information is available.
Mutagenicity:	Mutation in microorganisms – <i>E. coli</i> – 10 mg/disc ANYAA9 Annals of the New York Academy of Sciences.
Carcinogenicity:	Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

Section 12: Ecological Information

Ecotoxicity: LC50 – *Lepomis macrochirus* (Bluegill) – 0.024-0.093 mg/L/48H; EC50 – *Daphnia magna* – 0.66 mg/L/48H at 22 °C

Section 13: Disposal Considerations

Review local/regional/international regulations or requirements prior to disposal. Store material for disposal as indicated in Storage Conditions. **Contaminated packaging:** Dispose of as unused product.

Section 14: Transport Information

US DEPARTMENT OF TRANSPORT (DOT) HAZARDOUS MATERIALS SHIPPING INFORMATION (49 CFR)

Shipping Name and Description: AMMONIA SOLUTION, relative density between 0.880 and 0.957 at 15 degrees C in water, with more than 10 percent but not more than 35 percent ammonia

Identification Number: UN2672 **Hazard Class or Division:** 8 **Packing Group:** III

NOTE: This information was taken from the US Code of Federal Regulations Title 49 - Transportation and is effective April 30, 2013.

CANADIAN TRANSPORTATION OF DANGEROUS GOODS (TDG) SHIPPING INFORMATION

Shipping Name and Description: AMMONIA SOLUTION, relative density between 0.880 and 0.957 at 15 degrees C in water, with more than 10 per cent but not more than 35 per cent ammonia

UN Number: UN2672 **Class:** 8 **Packing Group/Category:** III
Special Provisions: --- **Marine Pollutant:** --- **Passenger Carrying Road/Railway Vehicle Index:** 5 kg or L

NOTE: This information incorporates the Transportation of Dangerous Goods Regulations SOR/2001-286, effective January 2, 2013.

International Maritime Dangerous Goods (IMDG)

Proper Shipping Name / Description: AMMONIA SOLUTION relative density between 0.880 and 0.957 at 15°C in water, with more than 10% but not more than 35% ammonia

UN Number: 2672 **Class or Division (Sub Risk):** 8 **Packing Group/Category:** III
Special Provisions: --- **Marine Pollutant:** --- **EMS Number:** F-A, S-B

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International Air Transport Association (IATA)

Proper Shipping Name / Description: Ammonia solution relative density (specific gravity) between 0.880 and 0.957 at 15°C in water, with more than 10% but not more than 35% ammonia

UN/ID Number: 2672

Class or Division (Sub Risk): 8

Packing Group: III

Special Provisions: A64, A803

Passenger / Cargo Aircraft: 852 Pkg Inst, 5 L Max Net

Cargo Aircraft Only: 856 Pkg Inst, 60 L Max Net

Section 15: Regulatory Information

Ammonia solution

CAS# 1336-21-6 (Ammonia CAS# 7664-41-7)

US Federal:

TSCA

Listed on the TSCA Inventory.

SARA Title III: Section 302

Not subject to the reporting requirements.

SARA Title III: Section 313

Does not exceed the threshold (De Minimis) reporting level of 1,000 lbs.

US State:

Massachusetts Right To Know

Subject to this act, 50 lbs RQ.

Pennsylvania Right To Know

Subject to this act.

New Jersey Right To Know

Subject to this act, RTK# 0103.

California Prop. 65

Not subject to this act.

Canada

DSL/NDSL Status:

Is listed, record number: 5737

WHMIS Classifications:

D1B – Toxic
E – Corrosive

Section 16: Other Information

Revision Date:

07-2014, Supersedes 05-2014 & 04-2011

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