

# Material Safety Data Sheet

**Material Name: Ammonium Chloride**

**ID: C1-103**

**\*\*\* Section 1 - Chemical Product and Company Identification \*\*\***

**Part Number:** FCC, Feed, Technical Treated & Untreated

**Chemical Name:** Ammonium Chloride

**Product Use:** For Manufacturing Use

**Synonyms:** Ammonium chloride; Amchlor; Ammoneric; Darammon; Sal ammoniac; Ammonium muriate; Salmiac.

**Supplier Information**

Chem One Ltd.

Phone: (713) 896-9966

14140 Westfair East Drive

Fax: (713) 896-7540

Houston, Texas 77041-1104

Emergency # (800) 424-9300 or (703) 527-3887

**General Comments: FOR COMMERCIAL USE ONLY; NOT TO BE USED AS A PESTICIDE.**

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

**\*\*\* Section 2 - Composition / Information on Ingredients \*\*\***

CAS #	Component	Percent
12125-02-9	Ammonium Chloride	99-100

**Component Information/Information on Non-Hazardous Components**

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

**\*\*\* Section 3 - Hazards Identification \*\*\***

**Emergency Overview**

Colorless, odorless crystals or powder. May cause irritation to eye, skin, and respiratory system. May form explosive mixtures with incompatible materials. When heated to decomposition, this product may emit very toxic fumes of ammonia, hydrogen chloride, and nitrogen oxides.

**Hazard Statements**

Warning! May be harmful if inhaled or ingested. May cause eye, skin and respiratory irritation. Avoid breathing dusts or fumes. Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Do not take internally. Wash thoroughly after handling.

**Potential Health Effects: Eyes**

Dust or solution is severely irritating to the eyes, causing pain and redness.

**Potential Health Effects: Skin**

May cause mild skin irritation and redness. Repeated or prolonged contact may cause dermatitis (red, dry, itchy skin).

**Potential Health Effects: Ingestion**

Ingestion may cause irritation to mouth, esophagus, and gastric system, and result in nausea and vomiting. Ingestion of approximately 100 mg/kg has caused mild metabolic acidosis in humans. Larger doses have caused severe metabolic acidosis with symptoms such as headache, drowsiness, vomiting and confusion. Ingestion of large amounts may also cause thirst, and hyperventilation.

**Potential Health Effects: Inhalation**

Product dusts and fumes can cause irritation to the respiratory tract. Symptoms may include sore throat and coughing. There is conflicting information that inhalation of fumes from Ammonium Chloride during heating may cause respiratory sensitization.

**HMIS Ratings: Health Hazard: 2 Fire Hazard: 0 Physical Hazard: 0**

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe \* = Chronic hazard

**\*\*\* Section 4 - First Aid Measures \*\*\***

**First Aid: Eyes**

Immediately flush eyes with large amounts of room temperature water, occasionally lifting the lower and upper lids, for at least 15 minutes. If symptoms persist after 15 minutes of irrigation, seek medical attention.

**First Aid: Skin**

Remove all contaminated clothing. For skin contact, wash thoroughly with soap and water for at least 20 minutes. Seek immediate medical attention if irritation develops or persists.

**First Aid: Ingestion**

Get immediate medical attention. DO NOT INDUCE VOMITING. Have victim rinse mouth thoroughly with water, if conscious. Never give anything by mouth to a victim who is unconscious or having convulsions. Contact a physician or poison control center immediately.

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## \*\*\* Section 4 - First Aid Measures (Continued) \*\*\*

### First Aid: Inhalation

Remove source of contamination or move victim to fresh air. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Get immediate medical attention.

### First Aid: Notes to Physician

Provide general supportive measures and treat symptomatically. In cases of oral ingestion, measures should be taken to prevent absorption. Monitor for development of acidosis and hypokalemia. Treatment may require administering intravenous sodium bicarbonate to correct acidosis, or administering potassium salts to correct hypokalemia. Monitor patient for ammonia-induced encephalopathy.

## \*\*\* Section 5 - Fire Fighting Measures \*\*\*

**Flash Point:** Not combustible

**Method Used:** Not applicable

**Upper Flammable Limit (UEL):** Not applicable

**Lower Flammable Limit (LEL):** Not applicable

**Auto Ignition:** Not applicable

**Flammability Classification:** Nonflammable

**Rate of Burning:** Not applicable

### General Fire Hazards

Ammonium Chloride does not burn, but will decompose when exposed to high temperatures.

### Hazardous Combustion Products

When heated to decomposition, this product may emit very toxic fumes of ammonia, hydrogen chloride, and nitrogen oxides.

### Extinguishing Media

Fight fires with water. Water spray will effectively reduce fume and irritant gases. Extinguish fire using agent suitable for type of surrounding fire (material itself does not burn or burns with difficulty).

### Fire Fighting Equipment/Instructions

Firefighters should wear full protective clothing including self contained breathing apparatus.

**NFPA Ratings: Health: 2 Fire: 0 Instability: 0 Other:**

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

## \*\*\* Section 6 - Accidental Release Measures \*\*\*

### Containment Procedures

Stop the flow of material, if this can be done without risk. Contain the discharged material. If sweeping of a contaminated area is necessary use a dust suppressant agent, which does not react with product (see Section 10 for incompatibility information).

### Clean-Up Procedures

Wear appropriate protective equipment and clothing during clean-up. Shovel the material into waste container. Thoroughly wash the area after a spill or leak clean-up. Neutralize spill area with soda ash (sodium carbonate) or lime (calcium oxide). Avoid contamination of soil, and prevent spill residue from running to groundwater or storm drains.

### Evacuation Procedures

Evacuate the area promptly and keep upwind of the spilled material. Isolate the spill area to prevent people from entering. Keep materials that burn away from spilled material. In case of large spills, follow all facility emergency response procedures.

### Special Procedures

Remove soiled clothing and laundry before reuse. Avoid all skin contact with the spilled material. Have emergency equipment readily available.

## \*\*\* Section 7 - Handling and Storage \*\*\*

### Handling Procedures

All employees who handle this material should be trained to handle it safely. Do not breathe dust. Avoid all contact with skin and eyes. Use this product only with adequate ventilation. Wash thoroughly after handling.

### Storage Procedures

Keep container tightly closed when not in use. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Storage areas should be made of fire-resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Use corrosion-resistant structural materials, lighting, and ventilation systems in the storage area.

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## \*\*\* Section 7 - Handling and Storage (Continued) \*\*\*

### Storage Procedures (continued)

Floors should be sealed to prevent absorption of this material. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Have appropriate extinguishing equipment in the storage area (i.e., sprinkler system, portable fire extinguishers). Empty containers may contain residual particulates; therefore, empty containers should be handled with care. Do not cut, grind, weld, or drill near this container. Never store food, feed, or drinking water in containers that held this product. Keep this material away from food, drink and animal feed. Do not store this material in open or unlabeled containers. Limit quantity of material stored.

## \*\*\* Section 8 - Exposure Controls / Personal Protection \*\*\*

### Exposure Guidelines

#### A: General Product Information

Follow ACGIH recommended exposure limits.

#### B: Component Exposure Limits

##### Ammonium Chloride [fume] (12125-02-9)

ACGIH: 10 mg/m<sup>3</sup> TWA

20 mg/m<sup>3</sup> STEL

OSHA: 10 mg/m<sup>3</sup> TWA (vacated 1989 PEL)

20 mg/m<sup>3</sup> STEL (vacated 1989 PEL)

NIOSH: 10 mg/m<sup>3</sup> TWA

20 mg/m<sup>3</sup> STEL

### Engineering Controls

Use mechanical ventilation such as dilution and local exhaust. Use a corrosion-resistant ventilation system and exhaust directly to the outside. Supply ample air replacement. Provide dust collectors with explosion vents.

### PERSONAL PROTECTIVE EQUIPMENT

*The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132). Please reference applicable regulations and standards for relevant details.*

#### Personal Protective Equipment: Eyes/Face

Wear safety glasses with side shields (or goggles) and a face shield. If necessary, refer to U.S. OSHA 29 CFR 1910.133.

#### Personal Protective Equipment: Skin

Where contact is likely, wear chemical resistant gloves, rubber boots, and coveralls. Butyl rubber, natural rubber, or neoprene gloves are recommended. Gloves should be tested to determine their suitability for prolonged contact with this material. If necessary, refer to U.S. OSHA 29 CFR 1910.138.

#### Personal Protective Equipment: Respiratory

None required where adequate ventilation conditions exist. If airborne concentrations are above the applicable exposure limits, use NIOSH-approved respiratory protection. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

#### Personal Protective Equipment: General

Wash hands thoroughly after handling material. Do not eat, drink or smoke in work areas. Have a safety shower or eye-wash fountain available.

## \*\*\* Section 9 - Physical & Chemical Properties \*\*\*

### Physical Properties: Additional Information

The data provided in this section are to be used for product safety handling purposes. Please refer to Product Data Sheets, Certificates of Conformity or Certificates of Analysis for chemical and physical data for determinations of quality and for formulation purposes.

**Appearance:** Colorless/white solid

**Odor:** None

**Physical State:** Crystals

**pH:** 5.5 (1% soln @ 25 deg C)

**Vapor Pressure:** 1 mm Hg @ 160.4 deg C (320 deg F)

**Vapor Density:** 1.9

**Boiling Point:** 520 deg C(968 deg F) [sublimes]

**Freezing/Melting Point:** 338 deg C 640 deg F (sublimes)

**Solubility (H<sub>2</sub>O):** 28.3% (@ 25 deg C)

**Specific Gravity:** 1.53 @ 20 deg C (H<sub>2</sub>O = 1)

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## \*\*\* Section 9 - Physical & Chemical Properties (Continued) \*\*\*

<b>Saturated Vapor Concentration:</b>	Not available	<b>Particle Size:</b>	Not determined
<b>Softening Point:</b>	Not available	<b>Bulk Density:</b>	Not available
<b>Molecular Weight:</b>	53.49	<b>VOC:</b>	Not determined
<b>Octanol/H<sub>2</sub>O Coefficient:</b>	Not available	<b>Heat Value:</b>	Not available
		<b>Chemical Formula:</b>	NH <sub>4</sub> Cl

## \*\*\* Section 10 - Chemical Stability & Reactivity Information \*\*\*

### Chemical Stability

Under normal conditions Ammonium Chloride is stable. Concentrated solutions of Ammonium Chloride may crystallize when exposed to low temperatures. Ammonium Chloride is slightly hygroscopic and will cake when exposed to moisture. Solutions become more acidic on standing through loss of ammonia.

### Chemical Stability: Conditions to Avoid

Avoid high temperatures, excessive heat and incompatible materials.

### Incompatibility

Contact with strong acids may evolve hydrogen gas. Contact with strong bases may evolve ammonia gas. Contact with interhalogens or strong oxidizers may cause violent reaction and explosion. Contact with potassium chlorate, ammonium nitrate, and bromine trifluoride may cause explosive reaction. A violent reaction may occur, with ignition upon contact with bromine pentafluoride, ammonium, nitrate, and iodine fluoride. Contact with hydrogen cyanide reaction may produce explosive nitrogen trichloride. Contact with silver salts may form unstable silver compounds. Contact with alkalis and their carbonates can evolve ammonia gas. Contact with lead and silver salts may lead to the formation of shock-sensitive, explosive salts. Ammonium Chloride is corrosive to ferrous metals, aluminum, copper and its alloys). Ammonium Chloride corrodes most metals at fire temperatures.

### Hazardous Decomposition

When heated to decomposition, this product may emit very toxic fumes of ammonia, hydrogen chloride, and nitrogen oxides.

### Hazardous Polymerization

Will not occur.

## \*\*\* Section 11 - Toxicological Information \*\*\*

### Acute Toxicity

#### A: General Product Information

Dust or solution is severely irritating to the eyes, causing pain and redness. May cause mild skin irritation and redness. Repeated or prolonged contact may cause dermatitis (red, dry, itchy skin). Ingestion may cause irritation to mouth, esophagus, and gastric system, and result in nausea and vomiting. Ingestion of large amounts may cause thirst, headache, hyperventilation, drowsiness, confusion and metabolic acidosis. Acute ingestion of 40 to 50 grams in an adult may be sufficient to produce acidosis. Ammonium Chloride dusts and fumes can cause irritation to the respiratory tract. Symptoms may include sore throat and coughing. Adverse local effects can also include pain, rash, bradycardia, progressive drowsiness, mental confusion and phases of excitement alternating with coma. Calcium-deficient tetany, hyperglycemia, glycosuria, twitching, hyperreflexia and EEG abnormalities have been reported. Persons with pre-existing eye or respiratory diseases might be at increased risk, as might those exposed to other ammonium salts or chloride salts. Persons with severe liver disease might be at risk for developing tremor and CNS effects.

#### B: Component Analysis - LD<sub>50</sub>/LC<sub>50</sub>

##### Ammonium Chloride (12125-02-9)

LD<sub>50</sub> (Oral-Rat) 1650 mg/kg; LD<sub>50</sub> (Oral-mouse) 1300 mg/kg; LD<sub>50</sub> (Intramuscular-Rat) 30 mg/kg; LD<sub>50</sub> (Intraperitoneal-Mouse) 485 mg/kg; LD<sub>50</sub> (Intravenous-Mouse) 358 mg/kg; Behavioral: convulsions or effect on seizure threshold, coma Lungs, Thorax, or Respiration: respiratory stimulation

#### B: Component Analysis - TDLo/LDLo

##### Ammonium Chloride (12125-02-9)

LDLo (Oral-Infant) 2 gm/kg; LDLo (Oral-Dog) 600 mg/kg; LDLo (Oral-Rabbit) 1 gm/kg; LDLo (Oral-Domestic) 1500 mg/kg; Sense Organs and Special Senses (Eye): mydriasis (pupillary dilation); Behavioral: tremor Lungs, Thorax, or Respiration: respiratory stimulation; LDLo (Subcutaneous-Mouse) 500 mg/kg; LDLo (Subcutaneous-Rabbit) 200 mg/kg; LDLo (Subcutaneous-Guinea Pig) 72 mg/kg; LDLo (Intravenous-Rabbit) 78 mg/kg; LDLo (Intravenous-Guinea Pig) 220 mg/kg

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## \*\*\* Section 11 - Toxicological Information (Continued) \*\*\*

### **Carcinogenicity**

#### **A: General Product Information**

No information available.

#### **B: Component Carcinogenicity**

Ammonium Chloride is not listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

### **Epidemiology**

No information available.

### **Neurotoxicity**

Overexposure to Ammonium chloride may cause progressive drowsiness, headache, and mental confusion. If untreated, progressive obtundation and coma may ensue.

### **Mutagenicity**

Positive results were obtained in a chromosomal aberration test using cultured Chinese hamster fibroblast cells. Negative results were reported in the Ames test.

### **Teratogenicity**

Pregnant mice administered Ammonium chloride in drinking water produced small offspring. It caused missing digits in mice when given at a very high dose which may have been close to the LD50. When injected into pregnant rats, it produced fewer living pups with lower birth weights and CNS damage. When ingested in large amounts, Ammonium chloride can cause metabolic acidosis, which may be harmful to the human fetus. Ammonia has been mentioned in the literature in connection with unspecified reproductive problems in women.

### **Other Toxicological Information**

Cytogenetic analysis (Hamster-Fibroblast) 400 mg/L

## \*\*\* Section 12 - Ecological Information \*\*\*

### **Ecotoxicity**

LC<sub>50</sub> (*Daphnia magna*) 24 hours = 202 mg/L; LC<sub>50</sub> (*Daphnia magna*) 48 hours = 161 mg/L; LC<sub>50</sub> (*Daphnia magna*) 72 hours = 67 mg/L; LC<sub>50</sub> (*Daphnia magna*) 96 hours = 50 mg/L; LC<sub>50</sub> (*Daphnia magna*) 100 hours = 139 mg/L; LC<sub>50</sub> (*Lymnaea sp.* Snail egg) 24 hours = 241 mg/L; LC<sub>50</sub> (*Lymnaea sp.* Snail egg) 48 hours = 173 mg/L; LC<sub>50</sub> (*Lymnaea sp.* Snail egg) 72 hours = 73 mg/L; LC<sub>50</sub> (*Lymnaea sp.* Snail egg) 96 hours = 70 mg/L; LC<sub>50</sub> (*Lepomis macrochirus*) 24-96 hours = 725 mg/L; LC<sub>50</sub> (*Carassius carassius*) 24 hours = 640 mg/L; LC50 (48 hr) Carp: 109 mg/l(total ammonia), 1.6 mg/l (unionized ammonia) static bioassay; Invertebrates: Ammonium chloride was tested at 5, 10, 25 or 50 mg/l NH<sub>4</sub><sup>+</sup>. Decreased the fertility of *Daphnia magna* at 50 mg/l NH<sub>4</sub><sup>+</sup>, disrupted embryonic development at 10, 25 or 50 mg/l NH<sub>4</sub><sup>+</sup>, and impaired postembryonic growth of the crustacea.

### **Environmental Fate**

Water solubility: 28.3% g/100 mL (0°C), 37.840 lb/100 lb (70°F).

Ammonium Chloride can destroy food chain organisms and gamefish in natural waters. Threshold concentrations for fish = 0.5 ppm.

Acute Hazard Level Threshold: For Vegetables and other crops 750 ppm (Cl).

Persistence: Ammonium will be attacked by bacteria and converted to nitrate.

Major Species Threatened: Micro-aquatic life.

Food Chain Concentration Potential: None.

## \*\*\* Section 13 - Disposal Considerations \*\*\*

### **US EPA Waste Number & Descriptions**

#### **A: General Product Information**

As shipped, product is not considered a hazardous waste by the EPA. You must test your waste using methods described in 40 CFR Part 261 to determine if it meets applicable definitions of hazardous wastes.

#### **B: Component Waste Numbers**

No EPA Waste Numbers are applicable for this product's components.

### **Disposal Instructions**

Dispose of in accordance with all applicable Federal, State or provincial, and local regulations.

# Material Safety Data Sheet

**Material Name: Ammonium Chloride**

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## \*\*\* Section 14 - Transportation Information \*\*\*

NOTE: The data in this section (Section 14) are meant as a guide to the overall classification of the product. However, transportation classifications may be subject to change with changes in package size. Consult shipper requirements under I.M.O., I.C.A.O. (I.A.T.A.) and 49 CFR to assure regulatory compliance.

### US DOT Information

**UN/NA #:** Not Applicable

**Shipping Name:** Non-regulated

**Hazard Class:** Not Applicable

**Packing Group:** Not Applicable

**Required Label(s):** None

**Additional Info:·** When shipped as a single bulk package equal to 5000 pounds or more, this material is regulated as a U.S. DOT hazardous material as the following: RQ, UN 3077, Environmentally Hazardous Substance, Solid, n.o.s., (Ammonium Chloride), 9, PG III, Label Class 9.

### 50<sup>th</sup> Edition International Air Transport Association (IATA):

For Shipments by Air transport: This information applies to air shipments both within the U.S. and for shipments originating in the U.S., but being shipped to a different country.

**UN/NA #:** UN 3077

**Proper Shipping Name:** Environmentally Hazardous Substance, solid, n.o.s. (Ammonium Chloride)

**Hazard Class:** 9 (Miscellaneous Dangerous Goods)

**Packing Group:** III

**Passenger & Cargo Aircraft Packing Instruction:** 911

**Passenger & Cargo Aircraft Maximum Net Quantity:** 400 kg

**Limited Quantity Packing Instruction (Passenger & Cargo Aircraft):** Y911

**Limited Quantity Maximum Net Quantity (Passenger & Cargo Aircraft):** 30 kg G

**Cargo Aircraft Only Packing Instruction:** 911

**Cargo Aircraft Only Maximum Net Quantity:** 400 kg

**Excepted Quantities:** E1

**Special Provisions:** A97, A158

**ERG Code:** 9L

**Limited Quantity Shipments:** Shipments for air must be marked with the Proper Shipping Name Environmentally Hazardous Substance, solid, n.o.s. (Ammonium Chloride) and shall be marked with the UN Number (3077) preceded by the letters "UN", placed within a diamond. The width of the line forming the diamond shall be at least 2 mm; the number shall be at least 6 mm high. The total weight of each outer packaging cannot exceed 30 kg.

**Excepted Quantities:** The maximum quantity of this material per inner receptacle is limited to 30 g per receptacle and the aggregate quantity of this material per completed package does not exceed 1kg. The inner receptacles must be securely packed in an intermediate packaging with cushioning material to prevent movement in the inner receptacles and packed in a strong outer box with a gross mass not to exceed 29kg. The completed package must meet a drop test. The requirements are found in 2.7.6.1. The package must not be opened or otherwise altered until it is no longer in commerce. For air transportation no shipping paper is required. The package must be legibly marked with the following marking:



**NOTE:** The "" must be replaced by the primary hazard class, or when assigned, the division of each of the hazardous materials contained in the package. The "" must be replaced by the name of the shipper or consignee if not shown elsewhere on the package. The symbol shall be not less than 100 mm x 100 mm and must be durable and clearly visible.

### International Maritime Organization (I.M.O.) Classification

Ammonium Chloride is not regulated under I.M.O.

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**\*\*\* Section 15 - Regulatory Information \*\*\***

**US Federal Regulations**

**A: General Product Information**

None.

**B: Component Analysis**

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

**Ammonium Chloride (12125-02-9)**

CERCLA: Final RQ = 5000 lb (2270 kg)

SARA 302 (EHS TPQ) There are no specific Threshold Planning Quantities for Ammonium Chloride. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

**C: Sara 311/312 Tier II Hazard Ratings:**

Component	CAS #	Fire Hazard	Reactivity Hazard	Pressure Hazard	Immediate Health Hazard	Chronic Health Hazard
Ammonium Chloride	12125-02-9	No	No	No	Yes	No

**State Regulations**

**A: General Product Information**

Other state regulations may apply.

**B: Component Analysis - State**

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS #	CA	FL	MA	MN	NJ	PA
Ammonium Chloride	12125-02-9	Yes	Yes	Yes	Yes	Yes	Yes

**Other Regulations**

**A: General Product Information**

Not determined

**B: Component Analysis - Inventory**

Component	CAS #	TSCA	DSL	EINECS
Ammonium Chloride	12125-02-9	Yes	Yes	Yes

**C: Component Analysis - WHMIS IDL**

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Ammonium Chloride	12125-02-9	1% item 88 (471)

**ANSI Labeling (Z129.1):**

**WARNING!** MAY BE HARMFUL IF INHALED OR INGESTED. MAY CAUSE EYE, SKIN AND RESPIRATORY IRRITATION. Do not taste or swallow. Do not get on skin or in eyes. Avoid breathing dusts or particulates. Keep from contact with clothing. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, faceshields, suitable body protection, and NIOSH -approved respiratory protection, as appropriate. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO<sub>2</sub>, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with inert material. Place residue in suitable container. Consult Material Safety Data Sheet for additional information.

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**\*\*\* Section 16 - Other Information \*\*\***

**Other Information**

Chem One Ltd. ("Chem One") shall not be responsible for the use of any information, product, method, or apparatus herein presented ("Information"), and you must make your own determination as to its suitability and completeness for your own use, for the protection of the environment, and for health and safety purposes. You assume the entire risk of relying on this Information. In no event shall Chem One be responsible for damages of any nature whatsoever resulting from the use of this product or products, or reliance upon this Information. By providing this Information, Chem One neither can nor intends to control the method or manner by which you use, handle, store, or transport Chem One products. If any materials are mentioned that are not Chem One products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be observed. Chem One makes no representations or warranties, either express or implied of merchantability, fitness for a particular purpose or of any other nature regarding this information, and nothing herein waives any of Chem One's conditions of sale. This information could include technical inaccuracies or typographical errors. Chem One may make improvements and/or changes in the product (s) and/or the program (s) described in this information at any time. If you have any questions, please contact us at Tel. 713-896-9966 or E-mail us at Safety@chemone.com.

**Key/Legend**

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; WHMIS = Workplace Hazardous Materials Information System

**\*\*\* Section 16 - Other Information (continued) \*\*\***

**Contact:** Sue Palmer-Koleman, PhD

**Contact Phone:** (713) 896-9966

**Revision Log**

07/21/00 4:27 PM SEP Changed company name, Sect 1 and 16, from Corporation to Ltd.  
05/14/01 9:31 AM HDF Checked exposure limits; made changes to Section 9; overall review, 311/312 SARA ratings added.  
07/24/01 2:11 PM CLJ Add Shipments by Air information to Section 14, Changed contact to Sue, non-800 Chemtrec Num.  
05/22/03 2:11 PM HDF General review and up-date of entire MSDS. Up-graded Section 10 Reactivity Information. Up-date of HMIS categories. Up-date of Section 8. Up-date of Section 14.  
06/22/05 11:58 SEP Updated IATA Section 14.  
10/17/07 3:29 PM SEP Update IATA Section 14, added RQ info to DOT section.  
01/04/08 1:05 PM HDF Change NFPA 'Reactivity Hazard' to 'Instability Hazard'.  
10/10/08 3:29 PM DLY Changed Chem One Physical Address  
11/23/2010 3:55 Pm SEP Update IATA

This is the end of MSDS # C1-103