

APPENDIX D

Liquid Alum Spill control and response measures detailed in Section 6 (Accidental Release Measures) in the Liquid Alum MSDS

CHARACTERISTICS

Liquid aluminum sulfate (liquid alum) is a clear, light green to light yellow aqueous solution. Iron-free and food-grade liquid alums are clear and colorless.

PROPERTIES

(Approximate 48.5% dry aluminum sulfate)	$\text{Al}_2(\text{SO}_4)_3 \cdot 14\text{H}_2\text{O}$, in water
Product weight	11.1-11.2 lb/US gallon
Molecular weight of dry alum ($14\text{H}_2\text{O}$ product)	594
pH of 1% Solution ($14\text{H}_2\text{O}$ product)	3.5 (approx.)
Specific gravity	1.333-1.337
Freezing point	-15°C (5°F)
Boiling point	101°C (214°F) (approx.)

Note: Crystals may begin to appear at temperatures higher than the freezing point. A storage temperature of 45°F or higher is recommended.

SPECIFICATIONS

Grade	Commercial	Low Iron	Iron-Free	Food Grade
Total soluble Al_2O_3 3%	8.0-8.4	8.0-8.2	8.0-8.2	8.0-8.2
Free Al_2O_3	0.01-0.2	0.01-0.2	0.01-0.15	0.01-0.15
Total soluble iron (as Fe_2O_3)%	--	< 0.02*	0.005 max	0.005 max
Water insolubles, %	0.02 max	0.02 max	0.005 max	0.005 max

CONTAINERS

- Bulk tank trucks
- 275 gallon totes
- 55 gallon drums

Aluminum Sulfate, Liquid

TECHNICAL DATA SHEET

SHIPPING LOCATIONS

■ U.S.:

Ashdown, AR
Pine Bluff, AR
Pittsburg, CA
Denver, CO
Jacksonville, FL
Port St. Joe, FL
Tampa, FL
Augusta, GA
Cedar Springs, GA
East Point (Atlanta), GA
Macon, GA
Savannah, GA
East St. Louis, IL
Marrero, (New Orleans), LA

Kalamazoo, MI
River Rouge (Detroit), MI
Newark, NJ
Cleveland, OH
Middletown, OH
Johnsonburg, PA
Catambos, SC
Springfield, TN
Covington, VA
Hopewell, VA
Tacoma, WA
Vancouver, WA
Menasha, WI
Wisconsin Rapids, WI

■ Canada:

Barnet, British Columbia
Dalhousie, New Brunswick
Nellie Lake, Ontario
Thorold, Ontario
Thunder Bay, Ontario
Valleyfield, Quebec

Notes: (1) Iron-free grade also available (2) Food grade also available (3) Low-iron grade also available

PRODUCT SAFETY INFORMATION

Liquid alum may cause irritation when it comes in contact with skin, eyes or mucous membranes. Avoid contact.

Anyone responsible for the procurement, use or disposal of this product should familiarize himself and those handling the product with the appropriate Safety and handling precautions involved. Such information is outlined in our Material Safety Data Sheet, which may be obtained by contacting Customer Service.

In the event of an emergency with this product, call the 24-hour General Chemical emergency number: (800) 631-8050.

General Chemical complies with the standards for American Water Works Association Standard ANSI/AWWA B403-93 for Aluminum Sulfate.

Underwriter Laboratories, Inc.[®] (UL) certifies that General Chemicals Water Chemicals Group is in compliance with ISO 9002.

NSF certifies that plants listed comply with the requirements of ANSLNSF Standard 60 - Drinking Water Treatment Chemicals-Health Effects.

GENERAL CHEMICAL CORPORATION

**General Manager
Water Chemicals
90 East Halsey Road
Parsippany, NJ 07054**

IN CANADA:

**Call Customer Service at
(800) 668-0433 (English)
(800) 363-8413 (French)**



**CUSTOMER SERVICE
(800) 631-8050
TECHNICAL SERVICE
(800) 255-7589
(315) 478-2323**

**WEBSITE
www.genchemcorp.com**

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Material Safety Data Sheet - MSDS

Liquid Alum



Section 1. Chemical Product and Company Identification

Trade name	: Liquid Aluminum Sulphate	Headquarters	: Marsulex Inc. 111 Gordon Baker Road Suite 300 North York, ON M2H 3R1 (416) 496-9655 www.marsulex.com
Material uses	: Alum is used as a coagulating agent in municipal and industrial water and wastewater treatment and as an additive in papermaking.		
Validation date	: 2005-07-15.		
In case of emergency	: Canada : CANUTEC 1-613-996-6666 US : CHEMTREC: 1-800-424-9300		

Section 2. Composition, Information on Ingredients

Name	CAS #	% by weight
Aluminum Sulfate Hydrate	16828-12-9	45-55

This material is classified hazardous under OSHA regulations in the United States and the WHMIS Controlled Product Regulation in Canada.

See Section 8 for Exposure Limits.
See Section 11 for Toxicological Data.

Section 3. Hazards Identification

Physical state and Appearance	: Liquid.
Emergency overview	: CAUTION! CAUSES EYE AND SKIN IRRITATION. Do not get in eyes, on skin or on clothing. Avoid breathing vapor or mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.
Routes of entry	: Dermal contact. Eye contact. Inhalation. Ingestion.
Potential acute health effects	: Eyes : Irritating to eyes. Skin : Irritating to skin. Aluminum is very poorly absorbed through the skin and toxic effects would not be expected following short-term skin contact. Prolonged and repeated exposure to dilute solutions may cause irritation, redness, pain and drying and cracking of the skin. Inhalation : Mists and vapors cause varying degrees of irritation of the nose, throat and respiratory tract. Ingestion : May cause irritation of the lining of the stomach. Ingestion is not a typical route of occupational exposure.
Potential chronic health effects	: Carcinogenic effects : Not classified or listed by IARC, NTP, OSHA, EU and ACGIH. Mutagenic effects : Not available. Teratogens effects : Not available.
Medical conditions aggravated by over-exposure	: Skin irritation may be aggravated in individuals with existing skin lesions. Breathing of vapors or sprays (mists) may aggravate acute or chronic asthma and chronic pulmonary disease such as emphysema and bronchitis.
Over-exposure signs/symptoms	: Not available.

See Section 11 for Toxicological Data.

Section 4. First Aid Measures

- Eye contact** : Immediately flush eyes with lukewarm, gently running water for a minimum of 5 minutes or until the chemical is removed. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport.
- Skin contact** : Flush skin with lukewarm running water for a minimum of 5 minutes or until the chemical is removed. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing and obtain medical attention. Do not transport victim unless the recommended flushing period is completed or flushing can be continued during transport.
- Inhalation** : Move victim to fresh air. If irritation persists, obtain medical attention immediately. Give artificial respiration ONLY if breathing has stopped. Give Cardiopulmonary Resuscitation (CPR) if there is no breathing AND no pulse. Obtain medical attention IMMEDIATELY.
- Ingestion** : If irritation or discomfort occur, obtain medical advice immediately.
- Notes to physician** : Not available.

Section 5. Fire Fighting Measures

- Flammability of the product** : Non-flammable.
- Auto-ignition temperature** : Not applicable.
- Flash points** : Not applicable.
- Flammable limits** : Not applicable.
- Products of combustion** : Forms aluminum oxide, sulfur dioxide and/or sulfur trioxide at temperatures reported above 650°C (1200°F).
- Fire hazards in the presence of various substances** : Not applicable.
- Explosion hazards in the presence of various substances** : Liquid alum may react with some metals, to give flammable, potentially explosive hydrogen gas. Hydrogen gas can accumulate to explosive concentrations inside confined spaces. Follow appropriate NFPA codes.
- Fire-fighting media and instructions** : Use appropriate extinguisher for surrounding material.
- Protective clothing (fire)** : Wear a NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing if vapors or mists are present. For fighting fires in close proximity to spill or vapors, use acid-resistant personal protective equipment. Evacuate residents who are downwind of fire. Prevent unauthorized entry to fire area. Dike area to contain runoff and prevent contamination of water sources. Neutralize runoff with lime, soda ash or other suitable neutralizing agents (see Deactivating Chemicals, Section 6). Cool containers that are exposed to flame with streams of water until fire is out.

Section 6. Accidental Release Measures

- Small spill and leak** : Cover with dry earth, sand or other non-combustible material. Use clean tools to collect material and place it into loosely covered plastic containers for later disposal.
- Large spill and leak** : Prevent liquid from entering sewers or waterways. Dike with inert material (sand, earth, etc.). Stop or reduce leak if safe to do so. Consider in situ neutralization and disposal. Ensure adequate decontamination of tools and equipment following clean up. Comply with Federal, Provincial/State and local regulations on reporting releases.
- Deactivating Chemicals:** Lime, limestone, soda ash, sodium bicarbonate, dilute sodium hydroxide or dilute aqua ammonia.

Section 7. Handling and Storage

- Handling** : Do not breathe dust or mist. Do not ingest. Do not get in eyes, on skin or on clothing. Aluminum sulfate in solution is acidic. Use corrosion-resistant transfer equipment. Use only with adequate ventilation. Wash thoroughly after handling.
- Storage** : Liquid alum may be received and stored in corrosion-resistant tanks. Keep container tightly closed. Keep container in a cool, well-ventilated area. Store at temperatures below 40°C (104°F) and above 0°C (32°F).

Section 8. Exposure Controls, Personal Protection

Engineering controls : Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of the material below occupational exposure limits.

Personal protection

Eyes : Face shield.

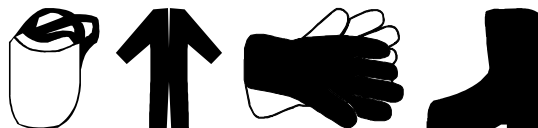
Body : Lab coat or coveralls.

Respiratory : A NIOSH/MSHA approved air-purifying respirator equipped with acid gas/fume, mist cartridges for concentrations up to 20 mg/m³. An air-supplied respirator if concentrations are higher or unknown.

Hands : Gloves: Neoprene, PVC, vinyl or rubber.

Feet : Appropriate industrial footwear.

Protective clothing (pictograms)



Personal protection in case of a large spill : Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be adequate. Consult a specialist before handling this product.

Exposure limits

Product name

Aluminum Sulfate Hydrate

Exposure limits

ACGIH (TLV)

TWA: 2 mg/m³ as Aluminium (soluble salts)

OSHA (PEL) (United States).

TWA: 2 mg/m³ as Aluminium (soluble salts)

[Consult local authorities for acceptable exposure limits.](#)

Section 9. Physical and Chemical Properties

Physical state and Appearance : Liquid.

Color : Clear.

Odor : Odorless.

Molecular formula : Al₂(SO₄)₃ · 14 H₂O

pH : 1.9 to 2.3 [Acidic.]

Boiling/condensation point : 101°C (213.8°F)

Melting/freezing point : -16°C (3.2°F)

Specific gravity : 1.335 (Water = 1)

Vapor pressure : The highest known value is 2.3 kPa (17.5 mm Hg) (at 20°C) (Water).

Vapor density : The highest known value is 0.62 (Air = 1) (Water).

Odor threshold : Not available.

Evaporation rate : Not available.

LogK_{ow} : Not available.

Solubility : Completely miscible in water.

Section 10. Stability and Reactivity

Stability and reactivity : The product is stable.

Incompatibility with various substances : Strong bases such as sodium hydroxide. Reaction may be violent.

Hazardous decomposition products : Sulfuric acid vapors may be released upon heating and sulfur dioxide and sulfur trioxide may be released upon decomposition.

Hazardous polymerization : Will not occur.

Section 11. Toxicological Information

Toxicity data

<u>Ingredient name</u>	<u>Test</u>	<u>Result</u>	<u>Route</u>	<u>Species</u>
Aluminum Sulfate Hydrate	LD50 LD50	>9000 mg/kg >9000 mg/kg	Oral Oral	Rat Mouse

Chronic effects on humans : See Section 3.

Other toxic effects on humans : Irritating to eyes and skin.

Section 12. Ecological Information

Ecotoxicity data

<u>Ingredient name</u>	<u>Species</u>	<u>Period</u>	<u>Result</u>
Aluminum Sulfate Hydrate	Goldfish (LC50)	72 hour/hours	100 mg/l

Products of degradation : These products are carbon oxides and water, sulfur oxides, phosphates. Toxicity is primarily associated with acidic pH. Acidic soil conditions can develop with the material present leading to release of some trace metals.

Toxicity of the products of biodegradation : The products of biodegradation are more toxic than the original product.

Section 13. Disposal Considerations

Waste information : Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Consult your local or regional authorities.

Section 14. Transport Information

Canada (TDG) : RQ CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Aluminum Sulfate), 8, UN3264, PG III.

United States (DOT) : RQ CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Aluminum Sulfate), 8, UN3264, PG III.

ERG : 154

Section 15. Regulatory Information

WHMIS (Canada) : Class E: Corrosive liquid.
Class D-2B: Material causing other toxic effects (Toxic).
CEPA DSL: All components listed.
This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

HCS Classification : Irritating material

U.S. Federal Regulations : TSCA 8(b) inventory: All components listed.
Clean Water Act (CWA) 311: Sulfuric acid

State Regulations : Pennsylvania RTK: Sulfuric acid: (environmental hazard, generic environmental hazard)
Massachusetts RTK: Sulfuric acid
New Jersey: Sulfuric acid
California Prop. 65: No products were found.

Section 16. Other Information

Hazardous Material Information System (U.S.A.)

Health	2
Fire hazard	0
Reactivity	0
Personal protection	C

National Fire Protection Association (U.S.A.)



References : - 29CFR Part1910.1200 OSHA MSDS Requirements. - 49CFR Table List of Hazardous Materials, UN#, Proper Shipping Names, PG. ANSI Z400.1, MSDS Standard, 2004. - Canada Gazette Part II, Vol. 122, No. 2. Registration SOR/88-64, 31 December 1987. Hazardous Products Act "Ingredient Disclosure List" - Canadian Transport of Dangerous Goods, Regulations and Schedules, Clear Language version 2002. - Manufacturer's Material Safety Data Sheet.

Responsible name : **Kemika XXI Inc.**

Date of previous issue : **2004-12-14.**

Version : **2**

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.