

Material Safety Data Sheet

Liquid Alum

1. Product and company identification

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

2. Hazards identification

Emergency overview

| | |
|--|---|
| Color | : Clear. |
| Physical state | : Liquid. |
| Odor | : Odorless. |
| Signal word | : DANGER! |
| Hazard statements | : CAUSES EYE AND SKIN BURNS. |
| Precautions | : Risk of cancer depends on duration and level of exposure to the sulfuric acid mist. Avoid exposure - obtain special instructions before use. Do not breathe vapor or mist. Do not get in eyes or on skin or clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling. |
| OSHA/HCS status | : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200). |
| Routes of entry | : Eye contact. Inhalation. Ingestion. |
| <u>Potential acute health effects</u> | |
| 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. |
| Skin | : Corrosive to the 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. |
| Eyes | : Corrosive to eyes. |

Potential chronic health effects

| | |
|------------------------------|---|
| Chronic effects | : No known significant effects or critical hazards. |
| Carcinogenicity | : Can cause cancer. Risk of cancer depends on duration and level of exposure to the sulfuric acid mist. |
| Mutagenicity | : No known significant effects or critical hazards. |
| Teratogenicity | : No known significant effects or critical hazards. |
| Developmental effects | : No known significant effects or critical hazards. |
| Fertility effects | : No known significant effects or critical hazards. |

2. Hazards identification

Over-exposure signs/symptoms

- Inhalation** : No specific data.
- Ingestion** : Adverse symptoms may include the following:
stomach pains
- Skin** : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur
- Eyes** : Adverse symptoms may include the following:
pain
watering
redness
- 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.

See toxicological information (section 11)

3. Composition/information on ingredients

United States

| Name | CAS number | % |
|--------------------------|------------|---------|
| Aluminum Sulfate Hydrate | 16828-12-9 | 45 - 55 |
| Sulfuric acid | 7664-93-9 | 0.1 - 1 |

Canada

| Name | CAS number | % |
|--------------------------|------------|---------|
| Aluminum Sulfate Hydrate | 16828-12-9 | 45 - 55 |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

- Eye contact** : Immediately flush eyes with lukewarm, gently running water for a minimum of 20 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.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

5. Fire-fighting measures

Flammability of the product : No specific fire or explosion hazard.

Extinguishing media

- Suitable** : Use an extinguishing agent suitable for the surrounding fire.
- Not suitable** : None known.
- Hazardous thermal decomposition products** : Forms aluminum oxide, sulfur dioxide and/or sulfur trioxide at temperatures reported above 650°C (1200°F).
- Special protective equipment for fire-fighters** : 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.
- Special remarks on fire hazards** : Non-flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and heat.
- Special remarks on explosion hazards** : 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.

6. Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- Small spill** : 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** : 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.

7. Handling and storage

- Handling** : Do not breathe dust or mist. Do not ingest. Do not get in eyes or on skin or 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).

8. Exposure controls/personal protection

United States

| Ingredient | Exposure limits |
|--------------------------|---|
| Aluminum Sulfate Hydrate | ACGIH TLV (United States). TWA: 2 mg/m ³ 8 hour(s). Form: as Aluminium (soluble salts) OSHA PEL (United States). TWA: 2 mg/m ³ 8 hour(s). Form: as Aluminium (soluble salts) |

8. Exposure controls/personal protection

Canada

| Occupational exposure limits | | TWA (8 hours) | | | STEL (15 mins) | | | Ceiling | | | |
|------------------------------|-----------|---------------|-------------------|-------|----------------|-------------------|-------|---------|-------------------|-------|-----------|
| Ingredient | List name | ppm | mg/m ³ | Other | ppm | mg/m ³ | Other | ppm | mg/m ³ | Other | Notations |
| Aluminum Sulfate Hydrate | US ACGIH | - | 2 | - | - | - | - | - | - | - | [a] |

Form: [a]as Aluminium (soluble salts)

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : Personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash station and safety shower is proximal to the work-station on location.

Personal protection

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 : Use gloves appropriate for work or task being performed. Recommended: neoprene, PVC, vinyl or rubber.

Eyes : Safety eyewear should be used when there is a likelihood of exposure. Recommended: Chemical splash goggles or face shield.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended: Rubber apron and/on long sleeves.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9. Physical and chemical properties

| | |
|-----------------------------------|---|
| Physical state | : Liquid. |
| Color | : Clear. |
| Odor | : Odorless. |
| Molecular formula | : Al ₂ (SO ₄) ₃ 14 H ₂ O |
| pH | : 1.9 to 2.3 |
| Boiling/condensation point | : 101°C (213.8°F) |
| Melting/freezing point | : -16°C (3.2°F) |
| Relative density | : 1.335 |
| Solubility | : Completely miscible in water. |

10. Stability and reactivity

- Chemical stability** : The product is stable.
- Conditions to avoid** : No specific data.
- Materials to avoid** : 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.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

11. Toxicological information

Acute toxicity

| Product/ingredient name | Result | Species | Dose | Exposure |
|--------------------------|-----------|---------|-------------|----------|
| Aluminum Sulfate Hydrate | LD50 Oral | Rat | >9000 mg/kg | - |
| Sulfuric acid | LD50 Oral | Rat | 2140 mg/kg | - |

- Chronic toxicity** : No specific data.

12. Ecological information

- Environmental effects** : Not established

Aquatic ecotoxicity

| Product/ingredient name | Result | Species | Exposure |
|--------------------------|------------------------------------|---|----------|
| Aluminum Sulfate Hydrate | Acute LC50 100 mg/l | Fish | 96 hours |
| Sulfuric acid | Acute LC50 42500 ug/L Marine water | Crustaceans - Pandalus montagui - Adult | 48 hours |
| | Acute LC50 42000 ug/L Fresh water | Fish - Gambusia affinis - Adult | 96 hours |

- Toxicity of the products of biodegradation** : The products of biodegradation are more toxic than the original product.
- Products of degradation** : Decomposition products may include the following materials: carbon oxides (CO, CO₂) and water, sulfur oxides (SO₂, SO₃ etc.), phosphates. Toxicity is primarily associated with acidic pH. Acidic soil conditions can develop with the material present leading to release of some trace metals.





13. Disposal considerations

- Waste disposal** : The generation of waste should be avoided or minimized wherever possible. This material and its container must be disposed of in a safe way. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Empty containers or liners may retain some product residues. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

| Regulatory information | UN number | Proper shipping name | Classes | PG* | Label | Additional information |
|---------------------------|-----------|--|---------|-----|---|------------------------|
| DOT Classification | UN3264 | CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Aluminum Sulfate Hydrate) | 8 | III |  | - |
| TDG Classification | UN3264 | CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. | 8 | III |  | - |
| IMDG Class | UN3264 | CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Aluminum Sulfate Hydrate) | 8 | III |  | - |
| IATA-DGR Class | UN3264 | CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Aluminum Sulfate Hydrate) | 8 | III |  | - |

PG* : Packing group

AERG : 154

Exemption to the above classification may apply.

15 . Regulatory information

United States

HCS Classification

: Corrosive material

U.S. Federal regulations

: **United States inventory (TSCA 8b):** All components are listed or exempted.**SARA 302/304/311/312 extremely hazardous substances:** No products were found.**SARA 302/304 emergency planning and notification:** No products were found.**SARA 302/304/311/312 hazardous chemicals:** No products were found.**SARA 311/312 MSDS distribution - chemical inventory - hazard identification:** No products were found.**Clean Water Act (CWA) 307:** No products were found.**Clean Water Act (CWA) 311:** Sulfuric acid**Clean Air Act (CAA) 112 accidental release prevention:** No products were found.**Clean Air Act (CAA) 112 regulated flammable substances:** No products were found.**Clean Air Act (CAA) 112 regulated toxic substances:** No products were found.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

: Not listed

Clean Air Act Section 602 Class I Substances

: Not listed

Clean Air Act Section 602 Class II Substances

: Not listed

DEA List I Chemicals (Precursor Chemicals)

: Not listed

DEA List II Chemicals (Essential Chemicals)

: Not listed

15 . Regulatory information

State regulations

- : **Connecticut Carcinogen Reporting:** None of the components are listed.
- : **Connecticut Hazardous Material Survey:** None of the components are listed.
- : **Florida substances:** None of the components are listed.
- : **Illinois Chemical Safety Act:** None of the components are listed.
- : **Illinois Toxic Substances Disclosure to Employee Act:** None of the components are listed.
- : **Louisiana Reporting:** None of the components are listed.
- : **Louisiana Spill:** None of the components are listed.
- : **Massachusetts Spill:** None of the components are listed.
- : **Massachusetts Substances:** None of the components are listed.
- : **Michigan Critical Material:** None of the components are listed.
- : **Minnesota Hazardous Substances:** None of the components are listed.
- : **New Jersey Hazardous Substances:** None of the components are listed.
- : **New Jersey Spill:** None of the components are listed.
- : **New Jersey Toxic Catastrophe Prevention Act:** None of the components are listed.
- : **New York Acutely Hazardous Substances:** None of the components are listed.
- : **New York Toxic Chemical Release Reporting:** None of the components are listed.
- : **Pennsylvania RTK Hazardous Substances:** None of the components are listed.
- : **Rhode Island Hazardous Substances:** None of the components are listed.

California Prop. 65

No products were found.

Canada

WHMIS (Canada)

: Class E: Corrosive material

Canadian lists

- : **CEPA Toxic substances:** None of the components are listed.
- : **Canadian ARET:** None of the components are listed.
- : **Canadian NPRI:** None of the components are listed.
- : **Alberta Designated Substances:** None of the components are listed.
- : **Ontario Designated Substances:** None of the components are listed.
- : **Quebec Designated Substances:** None of the components are listed.

Canada inventory

: All components are listed or exempted.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

International lists

- : **Australia inventory (AICS):** All components are listed or exempted.
- : **China inventory (IECSC):** All components are listed or exempted.
- : **Japan inventory:** All components are listed or exempted.
- : **Korea inventory:** All components are listed or exempted.
- : **New Zealand Inventory of Chemicals (NZIoC):** All components are listed or exempted.
- : **Philippines inventory (PICCS):** All components are listed or exempted.

Chemical Weapons Convention List Schedule I Chemicals

: Not listed

Chemical Weapons Convention List Schedule II Chemicals

: Not listed

Chemical Weapons Convention List Schedule III Chemicals

: Not listed

16 . Other information

United States

Label requirements : CAUSES EYE AND SKIN BURNS.

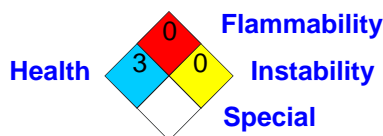
Hazardous Material Information System (U.S.A.) :

| | |
|------------------|---|
| Health | 3 |
| Flammability | 0 |
| Physical hazards | 0 |
| | |

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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



Canada

WHMIS (Canada) :



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 2005. - Manufacturer's Material Safety Data Sheet.

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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.