

Material Safety Data Sheet

Material Name: Aluminum Sulfate

ID: C1-166

*** Section 3 - Hazards Identification (Continued) ***

Potential Health Effects: Inhalation

Dusts of this Aluminum Sulfate form sulfuric acid when in contact with moisture in air or tissues. Inhalation of dust or mist is irritating to respiratory tract and mouth. Symptoms of irritation may include coughing, congestion and sore throat. Inhalation of high airborne concentrations may cause constriction of the airways and can result in potentially fatal pulmonary edema (accumulation of fluid in lungs). Chronic inhalation may cause permanent lung damage and reduction of lung function, due to potential for the formation of sulfuric acid, which is corrosive.

HMIS Ratings: Health Hazard: 2* Fire Hazard: 0 Physical Hazard: 1

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: 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: Ingestion

DO NOT INDUCE VOMITING, unless directed by medical personnel. 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.

First Aid: Notes to Physician

Treatment is largely symptomatic. If contamination of eyes has occurred, administer anesthetic drops to facilitate eye irrigation. Be observant for pulmonary edema after inhalation exposure.

*** Section 5 - Fire Fighting Measures ***

Flash Point: Not combustible

Upper Flammable Limit (UFL): Not applicable

Auto Ignition: Not applicable

Rate of Burning: Not applicable

General Fire Hazards

Product will not ignite, but may burn. Caution: Sufficient heat may produce toxic gases. Product will decompose at its melting point [770°C (1418°F)]. In contact with water and metals, flammable hydrogen gas can be generated which can result in a fire hazard. Sealed containers can rupture violently in the heat of a fire.

Hazardous Combustion Products

When heated above 650-770°C (1200-1418°F) Aluminum Sulfate forms sulfur dioxide, sulfur trioxide, aluminum oxide and sulfuric acid.

Extinguishing Media

Dry chemical, foam, carbon dioxide. Do not use water; corrosive sulfuric acid will form.

Fire Fighting Equipment/Instructions

Firefighters should wear full protective clothing. Move container from fire area, if this is without risk. Fight fire from a safe distance. Cool containers with fine water spray, taking care to avoid wetting product.

NFPA Ratings: Health: 2 Fire: 0 Reactivity: 1 Other:

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

Method Used: Not applicable

Lower Flammable Limit (LFL): Not applicable

Flammability Classification: Not applicable

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*** 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. Solutions of the compound can be neutralized with lime or similar compound. 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. Floors should be sealed to prevent absorption of this material. 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. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Do not store this material in open or unlabeled containers. Limit quantity of material stored. Store in suitable containers that are corrosion-resistant. Keep containers closed-material is hygroscopic.

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

Exposure Guidelines

A: General Product Information

Follow the applicable exposure limits.

B: Component Exposure Limits

Aluminum Sulfate (10043-01-3)

ACGIH: as Al; 2 mg/m³ TWA (related to Aluminum, soluble salts)

OSHA: as Al; 2 mg/m³ TWA (Listed under 'Aluminum') (related to Aluminum, soluble salts) [1989 Vacated 1989 PEL]

NIOSH: total: 2 mg/m³ TWA (related to Aluminum, soluble salts and alkyls); respirable dust: 5 mg/m³ TWA; pyro powders and welding fumes: 5 mg/m³ TWA

Engineering Controls

Control airborne dusts and use mechanical ventilation. Local exhaust methods are suggested, where possible, in enclosed or confined spaces. Use a corrosion-resistant ventilation system. Supply ample air replacement. Treatment of exhaust gases may be required to prevent environmental contamination.

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 chemical safety goggles. If necessary, refer to U.S. OSHA 29 CFR 1910.133.

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*** Section 8 - Exposure Controls / Personal Protection (Continued) ***

Personal Protective Equipment: Skin

Where contact is likely, wear chemical resistant gloves, rubber boots, and coveralls. Butyl rubber, natural rubber, polyethylene, polyvinyl chloride or neoprene gloves are recommended. Polyvinyl alcohol and very thin rubber, nitrile, or PVC gloves are NOT recommended. Gloves should be tested to determine 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. Currently, there are no NIOSH respiratory guidelines for this material. NIOSH guidelines for sulfuric acid may be appropriate, depending on use of Aluminum Sulfate. 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. Use good hygiene practices when handling this material including changing and laundering work clothing after use. Discard contaminated shoes and leather goods.

*** 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:	Lustrous white to grayish-white solid	Odor:	Odorless
Physical State:	Crystalline, granules or powder	pH:	3.0-4.0 (5% aqueous solution at 25 deg C)
Vapor Pressure:	Essentially 0 mm Hg	Vapor Density:	Not applicable
Boiling Point:	> 1600 deg C (2912 deg F) [anhydrous]	Freezing/Melting Point:	Decomp at 770 deg C (1418 deg F)
Solubility (H2O):	87.5 g/100mL at 20 deg C	Specific Gravity:	1.95 at 4 deg C
Refractive Index:	1.47	Particle Size:	149-200 microns
Softening Point:	Not applicable	Evaporation Rate:	Not applicable
Viscosity:	Not applicable	Bulk Density:	0.96 g/cc
Percent Volatile:	Not available	Molecular Weight:	599.75 (342.14, Anhydrous)
		Chemical Formula:	Al ₂ (SO ₄) ₃ •14.3H ₂ O

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

Chemical Stability

Normally stable. In contact with water, sulfuric acid is formed with evolution of some amount of heat. When exposed to air, loss of combined water molecules by a hydrated material, such as this compound, will result in partial decomposition. Aluminum Sulfate is hygroscopic and will absorb moisture from the air.

Chemical Stability: Conditions to Avoid

Avoid contact with moisture, excessive heat and incompatible materials listed below.

Incompatibility

Aluminum Sulfate is incompatible with strong oxidizing agents and strong bases (may react violently), moisture and most common metals in presence of moisture.

Hazardous Decomposition

Thermal decomposition: Sulfur dioxide, sulfur trioxide, and aluminum oxide. In contact with water: sulfuric acid.

Hazardous Polymerization

Will not occur.

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* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Severely irritating or corrosive to the skin, eyes and gastrointestinal tract. Prolonged exposure to the skin may cause numbing effects. Product can cause severe irritation and inflammation of the eyes. Concentrated solutions may cause permanent damage to eyes or skin, or blindness. Dusts of this product form sulfuric acid when in contact with moisture in air or tissues. Inhalation of dust or mist is irritating to respiratory tract and mouth. Symptoms of irritation may include coughing, congestion and sore throat. High concentrations may cause constriction of the airways. Ingestion may cause burns to the mouth, throat and stomach. Symptoms may include vomiting, nausea, bleeding stomach, and abdominal pain. Soluble aluminum compounds can be absorbed from the gut, and excess levels can be deposited in bone. Once absorbed, aluminum is eliminated rapidly by the kidneys, unless renal failure is present. Repeated ingestion of this product can weaken bones by phosphate deficiency. Ingestion of large amounts of Aluminum Sulfate by humans has resulted in death. Lethality by ingestion is probably due to the corrosive action of the sulfuric acid formed by the hydrolysis of the salt. Ingestion of small amounts of aluminum sulfate may cause a sensation of dryness in the mucous membranes of the mouth and throat.

B: Component Analysis - LD50/LC50

Aluminum Sulfate (10043-01-3)

LD₅₀ (Unreported-Rat) 410 mg/kg; LD₅₀ (Oral-Mouse) 6207 mg/kg; LD₅₀ (Intraperitoneal-Mouse) 274 mg/kg; LD₅₀ (Unreported-Mouse) 520 mg/kg; LD₅₀ (Unreported-Guinea Pig) 490 mg/kg

B: Component Analysis - TDLo/LDLo

Aluminum Sulfate (10043-01-3)

TDLo (Oral-Rat) 10138 mg/kg/8 days-continuous: Kidney, Ureter, Bladder: other changes in urine composition; Nutritional and Gross Metabolic: changes in phosphorus; TDLo (Intraperitoneal-Mouse) 800 mg/kg: female 10-13 day(s) after conception: Reproductive: Effects on Newborn: growth statistics (e.g.%, reduced weight gain) Reproductive: Effects on Newborn: behavioral; TDLo (Intratesticular-Rat) 27371 µg/kg: male 1 day(s) pre-mating: Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count), testes, epididymis, sperm duct; TDLo (Subcutaneous-Mouse) 27371 µg/kg: male 30 day(s) pre-mating: Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count), testes, epididymis, sperm duct

Carcinogenicity

A: General Product Information

Information not available.

B: Component Carcinogenicity

This compound is not listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Epidemiology

Information not available.

Neurotoxicity

With extensive exposures, aluminum may accumulate in brain tissue producing neurotoxicity, including encephalopathy and seizures (based on animal data).

Mutagenicity

A solution of Aluminum Sulfate in water produced positive results in cultured human cells (leukocytes), via sister chromatid exchanges, micronuclei and chromosomal aberrations). Negative results have been obtained in bacteria and cultured mammalian cells.

Teratogenicity

In 88 women exposed during pregnancy to excessive Aluminum Sulfate levels in drinking water, the outcome of pregnancy, fetal viability and birth weight parameters were normal compared to unexposed controls. The only significant difference found in the infants of exposed mothers was an increase in skeletal malformations of the foot.

Other Toxicological Information

On occasion workers chronically exposed to aluminum-containing dusts or fumes have developed severe pulmonary reactions including fibrosis, emphysema and pneumothorax. A much rarer encephalopathy has also been described. The factors which predispose to lung damage are not well characterized.

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*** Section 12 - Ecological Information ***

Ecotoxicity

Spills into water will result in hydrolysis to sulfuric acid solution with the capability of producing burns.

TLm (mosquito fish) 48 hours = 240 ppm; Fatal (fundulus) 36 hours = 14 ppm (fresh water); LC₅₀ (Largemouth bass) 96 hours = 250 ppm

Environmental Fate

Bioconcentration: No potential for food chain concentration. Aluminum sulfate will slowly be precipitated to Al(OH)₃ due to natural alkalinity. A study was undertaken to assess the possibility of aluminum bioaccumulation (in rainbow trout). Trout tissues, plankton, and water were analyzed for total aluminum concentration. Statistical comparisons of experimental and control tissues revealed few overall significant differences in the level of aluminum between alum-exposed and non-exposed fish, but significant differences existed between tissues within a given treatment and age class

*** 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. However, product should be tested for corrosivity to determine if Waste Number D002 applies.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this compound.

Disposal Instructions

Review federal, provincial, and local government requirements prior to disposal. Disposal by controlled incineration or secure landfill may be acceptable.

*** Section 14 - Transportation Information ***

NOTE: The shipping classification information in this section (Section 14) is 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

Shipping Name: Not Regulated

Hazard Class: Not Classified

UN/NA #: Not Classified

Packing Group: None

Required Label(s): None

International Air Transport Association (IATA)

For Shipments by Air transport: We classify this product as hazardous (Class 9) when shipped by air because 49 CFR 173.140 (a). "For the purposes of this subchapter, miscellaneous hazardous material (Class 9) means a material which presents a hazard during transportation, but which does not meet the definition of any other hazard class. This class includes: (a) Any material which has an anesthetic, noxious, or other similar property which could cause extreme annoyance or discomfort to a flight crew member so as to prevent the correct performance of assigned duties."

UN: UN 3077

Proper Shipping Name: Environmentally hazardous substance, solid, n.o.s. (aluminum sulfate)

Hazard Class: 9

Packing Group: III

Passenger & Cargo Aircraft Packing Instruction: 911

Passenger & Cargo Aircraft Maximum Net Quantity: No Limit

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

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

Special Provisions: A97

ERG Code: 9L

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

Aluminum Sulfate is not regulated under I.M.O.

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*** Section 15 - Regulatory Information ***

US Federal Regulations

A: General Product Information

Aluminum Sulfate is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance.

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):

Aluminum Sulfate (10043-01-3)

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

CERCLA: Final RQ = 5000 pounds (2270 kg)

C: Sara 311/312 Tier II Hazard Ratings:

Component	CAS #	Fire Hazard	Reactivity Hazard	Pressure Hazard	Immediate Health Hazard	Chronic Health Hazard
Aluminum Sulfate	10043-01-3	No	No	No	Yes	Yes

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
Aluminum Sulfate (* related to Aluminum) (** related to Aluminum, soluble salts)	10043-01-3	Yes	Yes*	Yes	Yes**	Yes	Yes

Other Regulations

A: General Product Information

Not determined.

B: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Aluminum Sulfate	10043-01-3	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
Aluminum Sulfate	10043-01-3	1% item 53 (198) (related to Aluminum, soluble salts)

ANSI Labeling (Z129.1):

CAUTION! MAY CAUSE RESPIRATORY SYSTEM, SKIN AND EYE IRRITATION OR BURNS. HARMFUL IF INGESTED OR INHALED. Avoid contact with skin, eyes, or clothing. Do not taste or swallow. Avoid breathing dusts and particulates. 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, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with inert material. Sweep-up, avoiding generation of dusts. 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

Contact: Sue Palmer-Koleman, PhD

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Revision Log

07/11/00 10:30 AM SEP Company name revised, Sect 1 and 16, from Corporation to Ltd.
05/14/01 9:31 AM HDF Checked exposure limits; made changes to Sect 9; overall review, add SARA 311/312 Haz Ratings.
07/24/01 2:09 PM CLJ Add Shipments by Air information to Section 14, Changed contact to Sue, non-800 Chemtrec Num.
08/06/03: 8:09 AM 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 11:45 AM SEP Update IATA Section 14.

This is the end of MSDS # C1-166