Safety Data Sheet

Material Name: Aluminum Sulfate

ID: C1-166

* * * Section 1 - Identification * * *

Part Number: NSF Standard Ground or Iron Free
Chemical Name: Aluminum Sulfate, 14.3-Hydrate
Product Use: For Commercial Use

RESTRICTIONS on USE

NOT TO BE USED AS A PESTICIDE. THIS PRODUCT IS NOT TO BE USED IN VIOLATION OF ANY PATENTS. CHEM ONE LTD. DISCLAIMS ANY AND ALL WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR APPLICATION. IN NO EVENT SHALL CHEM ONE LTD. OR ITS SUPPLIERS BE LIABLE FOR ANY DAMAGES WHATSOEVER INCLUDING DIRECT, INDIRECT, INCIDENTAL, CONSEQUENTIAL, LOSS OF BUSINESS PROFITS OR SPECIAL DAMAGES, EVEN IF CHEM ONE LTD. OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SOME STATES DO NOT ALLOW THE EXCLUSION OF LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES SO THE FOREGOING LIMITATION MAY NOT APPLY.

Supplier Information
Chem One Ltd
14140 Westfair East Drive
Houston, Texas 77041-1104

Phone: (713) 896-9966
Fax (713) 896-7540
Emergency # (800) 424-9300 or +1 (703) 527-3887

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 – Hazard(s) Identification * * *

GHS HAZARD

Hazard Classes	Hazard Categories
Serious eye damage	Category 1
Corrosive to metals	Category 1

Signal Word: Danger

Pictograms:

Hazard Statements

PHYSICAL HAZARDS:	H290: May be corrosive to metals
HEALTH HAZARDS:	H318: Causes serious eye damage
ENVIRONMENTAL HAZARDS:	None

PRECAUTIONARY STATEMENTS:

P102: Keep out of reach of children
P202: Do not handle until all safety precautions have been read and understood
P234: Keep only in original container.
P280: Wear eye protection/face protection.

RESPONSE STATEMENTS:

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/doctor (USA National POISON CENTER 800-222-1222)
P390: Absorb spillage to prevent material-damage.

STORAGE STATEMENTS:

P406: Store in a corrosive resistant container with a resistant inner liner.

DISPOSAL STATEMENTS:

P501: Dispose of content and/or container in accordance with local, regional, national or international regulations

Hazards not otherwise classified (HNOC): No data available

* * * Section 3 – Composition/information on Ingredients * * *

CAS #	Component	Percent
10043-01-3	Aluminum Sulfate*	> 98%

*Aluminum Sulfate, 14.3 Hydrate is the hydrated form. However, the CAS # 10043-01-3 is for the anhydrous form. Hydrated aluminum sulfate, A12(SO4)3*18H2O, is efflorescent and therefore may have approximately 14 molecules of water. The hydrate form may be indicated as "xH2O" and assigned CAS # 17927-65-0.

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Aluminum, soluble salts, Aluminum (7429-90-5).

Synonyms: Sulfuric acid, aluminum salt (3:2); Sulfuric acid, aluminum salt (3:2); Aluminum sulfate; Aluminum sulphate; Aluminum (III) sulfate; Aluminum alum; Aluminum trisulfate; Cake alum; Dialuminum sulfate; Alum; Aluminum sesquisulfate.

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

Emergency Overview

Aluminum Sulfate is an odorless, lustrous white to grayish-white crystalline, granular or powdered solid. This material can cause severe irritation and inflammation, or burns to the eyes and skin. Contact with high concentration or prolonged contact may cause permanent damage. Inhalation of high airborne concentrations may cause constriction of the airways. Dusts can form corrosive sulfuric acid when in contact with moisture in air or tissues. Concentrated solutions are corrosive to the eyes, skin and gastrointestinal tract. When heated to decomposition, Aluminum Sulfate may emit toxic and corrosive fumes of sulfur dioxide and/or sulfur trioxide.

Description of first aid measures:

In case of eye contact: Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor.

In case of skin contact: 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.

In case of 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.

If inhaled: 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.

Symptoms and potential health effects:

Eyes: Causes serious eye damage. Signs/symptoms may include cloudy appearance of the cornea, chemical burns, severe pain, tearing, ulcerations, significantly impaired vision or complete loss of vision.

Skin: Aluminum Sulfate dusts can irritate the skin. Concentrated solutions are corrosive and may cause burns and permanent scarring. Prolonged exposure can cause numbing of the fingers. Prolonged contact can result in dermatitis (dry, red, itchy skin).

Ingestion: May cause burns to the mouth, throat and stomach. Symptoms may include vomiting, nausea, bleeding stomach, and abdominal pain. Ingestion of small amounts of aluminum sulfate may cause a sensation of dryness in the mucous membranes of the mouth and throat. Adverse effects on muscle and kidneys, and gum necrosis have been reported after ingestion of large amounts of aluminum compounds. Repeated ingestion over prolonged period can result in phosphate deficiency, which can cause softening and bending of bones. The approximate fatal dose in humans by ingestion is 30 grams.

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.

Notes to Physician and Special Treatment:

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 * * *

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 Instability: 1 Other:

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

* * * Section 6 - Accidental Release Measures * * *

Personal precautions

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. Remove soiled clothing and launder before reuse. Avoid all skin contact with the spilled material. Avoid inhalation of dusts. Wear adequate personal protective equipment. Have emergency equipment readily available.

Methods and materials for containment and clean-up

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). 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

Environmental precautions

Prevent spill rinsate from contamination of storm drains, sewers, soil or groundwater.

* * * 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

Component	CAS #	Value	Type/Regulation
Aluminum, soluble salts	7429-90-5	2 mg/m^3	ACGIH – TWA (as Al)
		2 mg/m^3	OSHA – TWA (1989 Vacated PEL)
		2 mg/m^3	NIOSH – TWA (total dust)
		5 mg/m^3	NIOSH – TWA (respirable dust)
		5 mg/m^3	NIOSH – TWA (pyro powders and fumes)

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.

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.

Protective Clothing Pictograms:

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

Physical Properties:

Physical State:	Lustrous solid
Appearance:	White to grayish-white
Odor:	Odorless
Odor Threshold:	Not determined
pH:	3.0 – 4.0 (5% solution @ 25 °C)
Melting Point/Range:	Not applicable
Boiling Point/Range:	> 1600 °C (> 2912 °F) (anhydrous form)
Flash Point:	Not applicable
Evaporation Rate:	Not applicable
Flammability:	Not flammable
Flammability/Explosive Limits:	Not applicable
Vapor Pressure:	Nil
Vapor Density:	Not applicable
Specific Gravity:	1.95 @ 4 °C
Solubility in Water:	87.5 g/100 mL @ 20 °C
Partition Coefficient:	Not determined
Autoignition Temperature:	Not determined
Decomposition Temperature:	770 °C (1418 °F)
Viscosity:	Not applicable
Chemical Formula:	$Al_2(SO_4)_3 \bullet 14.3H_2O$
Molecular Weight:	599.75
Softening Point:	Not determined
Particle Size:	149-200 microns
Bulk Density:	0.96 g/cc
Heat of Combustion:	Not determined

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.

* * * 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 hydroscopic and will absorb moisture from the air.

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.

* * * 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

Aluminum Sulfate (10043-01-3)

Route of Exposure	Test Type and Value
Oral:	LD_{50} (Mouse) = 6207 mg/kg TD_{Lo} (Rat, 8 d) = 10138 mg/kg; Kidney, Ureter, Bladder: other changes in urine composition; Nutritional and Gross Metabolic: changes in phosphorus
Inhalation:	Not determined
Dermal:	TD_{Lo} (Mouse, subcutaneous, male) = 27371 µg/kg; 30 days pre-mating: Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count), testes, epididymis, sperm duct
Intraperitoneal:	LD_{50} (Mouse) = 274 mg/kg TD_{Lo} (Mouse, female) = 800 mg/kg; 10-13 days after conception: Reproductive: Effects on Newborn: growth statistics (e.g.%, reduced weight gain); Reproductive: Effects on Newborn: behavioral

Carcinogenicity

A: General Product Information

Information not available.

B: Component Carcinogenicity

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

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 (leukolytes), 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.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

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

Toxicity to fish:	TL_m = 240 ppm (Mosquitofish, 48 h)
	Fatal = 14 ppm (Fundulus, 36 h, freshwater)
	LC_{50} = 250 ppm (Largemouth bass, 96 h)
Toxicity to invertebrates:	Not determined
Toxicity to algae:	Not determined
Toxicity to bacteria:	Not determined

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 Ground * * *

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 49 CFR, IATA and IMDG to assure regulatory compliance.

NOTE: Non-regulated in single packaging less than 5000 lb (2270 kg)

US DOT 49 CFR 100-185 Revised October 24, 2014 Information

UN/NA #: UN 3077
Shipping Name: Environmentally Hazardous Substance, solid, n.o.s (Aluminium sulphate)
Hazard Class: 9
Packing Group: III
Required Label(s): Class 9
Special Provisions: 8,146, 335,B54, B120, IB8, IP3, T1, TP33
Packaging: Bulk 172.240
RQ Quantity: For a single package less than the RQ of 5000lb (2270 kg), the RQ designation should be not be used.

Please refer to the most recent edition of the "International Air Transport Association (IATA)" Regulations

Please refer to the most recent Amendment of the "International Maritime Dangerous Goods (IMDG) Code"

* * * 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

Aluminum Sulfate Hydrate is exempted from listing on the TSCA inventory as a hydrate of an actively listed product (Aluminum Sulfate, CAS # 10043-01-3)

Component	CAS #	TSCA
Aluminum Sulfate Hydrate	17927-65-0	Exempted

* * * Section 16 - Other Information * * *

Other Information

Disclaimer: The information presented in this Safety Data Sheet is based on data believed to be accurate as of the date this Safety Data Sheet was prepared. HOWEVER NO responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above is furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use.

Contact: safety@chemone.com 713-896-9966

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

Revision log

02/25/2015 GHS revision all sections

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06/12/2018 Melanie Koch removed IMDG and IATA specific shipping information and added a refer to latest edition statement. Nothing else was changed during this revision.

06/17/2019 Revised Sections 2, 4, and 9, removed ANSI Labeling.
11/09/2021 Revised Section 15 information. Modified format.
This is the end of SDS # C1-166

Chem One Limited