# SAFETY DATA SHEET

Updated on 26/09/2024

## 1. Material Identification

**Product Name** : Aluminum Sulfate
**Catalog Number** : io-1687
**CAS Number** : 10043-01-3
**Identified uses** : Laboratory chemicals, manufacture of chemical compounds
**Company** : Ionz

**>> R&D Use only**

## 2. Hazards Identification

### GHS Classification:

Flammable liquid ( category 2 )
Acute toxicity, oral (Category 3)
Acute toxicity, dermal (Category 3)
Acute toxicity, inhalation (Category 3)
Specific target organ toxicity, single exposure (Category 1)

**Note**

>> Pictograms displayed are for 95.4% (1034 of 1084) of reports that indicate hazard statements. This chemical does not meet GHS hazard criteria for 4.6% (50 of 1084) of reports.

**Pictogram(s)**

**GHS Hazard Statements**

>> H290 (43.1%): May be corrosive to metals [Warning Corrosive to Metals]

>> H318 (91.2%): Causes serious eye damage [Danger Serious eye damage/eye irritation]

**Precautionary Statement Codes**

>> P234, P264+P265, P280, P305+P354+P338, P317, P390, and P406

### Health Hazards:

>> Inhalation of dust irritates nose and mouth. Ingestion of large doses causes gastric irritation, nausea, vomiting, and purging. Dust irritates eyes and skin. (USCG, 1999)

>> Special Hazards of Combustion Products: Produces sulfuric acid upon decomposition. (USCG, 1999)

>> Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.

## 3. Composition/Information On Ingredients

**Chemical name** : Aluminum Sulfate
**CAS Number** : 10043-01-3
**Molecular Formula** : Al2O12S3
**Molecular Weight** : 342.2000 g/mol

## 4. First Aid Measures

### First Aid:

>> INHALATION: rinse nose and mouth with water.

>> INGESTION: give large amounts of water.

>> EYES: flush with water for at least 15 min.

>> SKIN: flush with water, wash with soap and water. (USCG, 1999)

**First Aid Measures**

**Inhalation First Aid**

>> Fresh air, rest. Refer for medical attention.

**Skin First Aid**

>> Rinse skin with plenty of water or shower.

**Eye First Aid**

>> Rinse with plenty of water for several minutes (remove contact lenses if easily possible). Refer immediately for medical attention.

**Ingestion First Aid**

>> Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Refer for medical attention .

## 5. Fire Fighting Measures

>> Excerpt from ERG Guide 154 [Substances - Toxic and/or Corrosive (Non-Combustible)]:

>> SMALL FIRE: Dry chemical, CO2 or water spray.

>> LARGE FIRE: Dry chemical, CO2, alcohol-resistant foam or water spray. If it can be done safely, move undamaged containers away from the area around the fire. Dike runoff from fire control for later disposal.

>> FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks in direct contact with flames. (ERG, 2024)

>> In case of fire in the surroundings, use appropriate extinguishing media.

## 6. Accidental Release Measures

### Isolation and Evacuation:

Isolation and evacuation measures to take when a large amount of this chemical is accidentally released in an emergency.

>> Excerpt from ERG Guide 154 [Substances - Toxic and/or Corrosive (Non-Combustible)]:

>> IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

>> SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.

>> FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

### Spillage Disposal:

Methods for containment and safety measures to protect workers dealing with a spillage of this chemical.

>> Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered plastic containers. If appropriate, moisten first to prevent dusting. Store and dispose of according to local regulations.

## 7. Handling And Storage

### Safe Storage:

>> Separated from bases and strong oxidants. Dry. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.

### Storage Conditions:

>> Ambient /Octadecohydrate/

## 8. Exposure Control/ Personal Protection

>> 8 hr Time Weighted Avg (TWA): 10 mg/cu m (Respirable fraction). /Aluminum metal and insoluble compounds/

### Inhalation Risk:

>> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

### Effects of Short Term Exposure:

>> The substance is severely irritating to the eyes, respiratory tract and gastrointestinal tract. The substance is mildly irritating to the skin.

### Effects of Long Term Exposure:

>> The substance may have effects on the central nervous system. This may result in impaired functions.

**Exposure Prevention**

>> PREVENT DISPERSION OF DUST!

**Inhalation Prevention**

>> Avoid inhalation of dust. Use local exhaust or breathing protection.

**Skin Prevention**

>> Protective gloves.

**Eye Prevention**

>> Wear safety goggles.

**Ingestion Prevention**

>> Do not eat, drink, or smoke during work.

## 9. Physical And Chemical Properties

**Molecular Weight:**

>> 342.2

**Exact Mass:**

>> 341.818266

**Physical Description:**

>> Anhydrous aluminum sulfate is a white crystalline solid. Aluminum sulfate is also obtained as an 18-hydrate Al2(SO4)3.18H2O. Both forms are soluble in water, noncombustible, and nontoxic. The primary hazard is the threat to the environment. Immediate steps should be taken to limit its spread to the environment. It is used in paper making, in firefighting foams, and in sewage treatment and water purification.

>> ODOURLESS WHITE HYGROSCOPIC LUSTROUS CRYSTALS OR POWDER.

**Color/Form:**

>> White, lustrous crystals, pieces, granules, or powder

**Odor:**

>> ODORLESS

**Taste:**

The sensation of flavor perceived in the mouth and throat on contact with a substance.

>> HAS SWEET, MILDLY ASTRINGENT TASTE

**Boiling Point:**

>> 214 °F at 760 mmHg (USCG, 1999)

**Melting Point:**

>> 3.9 °F (USCG, 1999)

**Solubility:**

>> Solubility in water: good

**Density:**

>> 2.71 at 68 °F 1.7 at 20 °C (USCG, 1999) - Denser than water; will sink

>> 2.71 g/cm³

**Vapor Pressure:**

>> Esentially zero.

**Stability/Shelf Life:**

>> Stable in air.

**Decomposition:**

>> When heated to decomposition it emits toxic fumes of /sulfur oxides/.

>> 770 °C

**Corrosivity:**

The ability of a chemical to damage or destroy other substances when it comes into contact.

>> Aluminum sulfate solution is corrosive to aluminum.

**pH:**

pH is an expression of hydrogen ion concentration in water. Specifically, pH is the negative logarithm of hydrogen ion (H+) concentration (mol/L) in an aqueous solution. The term is used to indicate basicity or acidity of a solution on a scale of 0 to 14, with pH 7 being neutral.

>> 2,9 or above (5 % solution)

**Refractive Index:**

>> Index of refraction: 1.47

## 10. Stability And Reactivity

>> Dissolves in water with evolution of some heat. Creates acidic solutions.

>> Water-Reactive

## 11. Toxicological Information

**Toxicity Summary:**

>> The main target organs of aluminum are the central nervous system and bone. Aluminum binds with dietary phosphorus and impairs gastrointestinal absorption of phosphorus. The decreased phosphate body burden results in osteomalacia (softening of the bones due to defective bone mineralization) and rickets. Aluminum's neurotoxicity is believed to involve several mechanisms. Changes in cytoskeletal protein functions as a results of altered phosphorylation, proteolysis, transport, and synthesis are believed to be one cause. Aluminum may induce neurobehavioral effects by affecting permeability of the blood-brain barrier, cholinergic activity, signal transduction pathways, lipid peroxidation, and impair neuronal glutamate nitric oxide-cyclic GMP pathway, as well as interfere with metabolism of essential trace elements because of similar coordination chemistries and consequent competitive interactions. It has been suggested that aluminum's interaction with estrogen receptors increases the expression of estrogen-related genes and thereby contributes to the progression of breast cancer (A235), but studies have not been able to establish a clear link between aluminum and increased risk of breast cancer (A15468). Certain aluminum salts induce immune responses by activating inflammasomes. (L739, A235, A236)

**Evidence for Carcinogenicity:**

Evidence that this chemical does or may cause cancer. The information here is collected from various sources by the Hazardous Substances Data Bank (HSDB).

>> A4: Not classifiable as a human carcinogen. /Aluminum metal and insoluble compounds/

**Carcinogen Classification:**

This section provides the International Agency for Research on Cancer (IARC) Carcinogenic Classification and related monograph links. In the IARC Carcinogenic classification, chemicals are categorized into four groups: Group 1 (carcinogenic to humans), Group 2A (probably carcinogenic to humans), Group 2B (possibly carcinogenic to humans), and Group 3 (not classifiable as to its carcinogenicity to humans).

>> Not listed by IARC. IARC classified aluminum production as carcinogenic to humans (Group 1), but did not implicate aluminum itself as a human carcinogen. (L135) A link between use of aluminum-containing antiperspirants and increased risk of breast cancer has been proposed (A235), but studies have not been able to establish a clear link (A15468).

**Health Effects:**

>> Aluminum targets the nervous system and causes decreased nervous system performance and is associated with altered function of the blood-brain barrier. The accumulation of aluminum in the body may cause bone or brain diseases. High levels of aluminum have been linked to Alzheimer's disease. A small percentage of people are allergic to aluminium and experience contact dermatitis, digestive disorders, vomiting or other symptoms upon contact or ingestion of products containing aluminium. (L739, L740)

**Exposure Routes:**

>> The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

>> Oral (L739) ; inhalation (L739)

**Inhalation Exposure**

>> Cough. Sore throat.

**Skin Exposure**

>> Redness.

**Eye Exposure**

>> Redness. Burns.

**Ingestion Exposure**

>> Burning sensation in the throat and chest. Abdominal pain. Nausea. Vomiting. Diarrhoea.

>> Inhalating aluminum dust causes coughing and abnormal chest X-rays. A small percentage of people are allergic to aluminium and experience contact dermatitis, digestive disorders, vomiting or other symptoms upon contact or ingestion of products containing aluminium. (L739, L740)

**Toxicity Data:**

>> LD50: 980 mg/kg (Oral, Mouse) (A236) LD50: 40 mg/kg (Intraperitoneal, Mouse) (A553)

**Minimum Risk Level:**

The minimal risk level (MRL) is an estimate of the amount of a chemical a person can eat, drink, or breathe each day without a detectable risk to health

>> Intermediate Oral: 1.0 mg/kg/day (L134) Chronic Oral: 1.0 mg/kg/day (L134)

**Treatment:**

Treatment when exposed to toxin

>> EYES: irrigate opened eyes for several minutes under running water. INGESTION: do not induce vomiting. Rinse mouth with water (never give anything by mouth to an unconscious person). Seek immediate medical advice. SKIN: should be treated immediately by rinsing the affected parts in cold running water for at least 15 minutes, followed by thorough washing with soap and water. If necessary, the person should shower and change contaminated clothing and shoes, and then must seek medical attention. INHALATION: supply fresh air. If required provide artificial respiration.

**Interactions:**

>> ... Aluminum was added to the freshwater tanks as aluminum sulfate and the pH of the tank was adjusted slowly as necessary to avoid localization of the acid. The tanks were then allowed to equilibrate and 20 fish /golden shiners/ were placed in each tank. At pH 4.5 and 5.0 + 100 ppm aluminum, all fish died within a few hr. With total aluminum concn of 10 ppm and 100 ppm and pH 4.5 and 5.0, it appeared that the aluminum and the acid had a synergistic effect. Visual inspection of the fish showed that the aluminum interacted with the gills, which may have caused suffocation. It is possible that some chemical forms of aluminum are more toxic than others. Suspended clay (aluminum silicate) does not appear to be toxic, but in acid solution, aluminum ion is released, which may be toxic. ...

**Antidote and Emergency Treatment:**

>> /Exposure to aluminum sulfate/: Call for medical aid. Dust: Irritating to eyes, nose and throat. If inhaled will cause difficult breathing. If in eyes, hold eyelids open and flush with plenty of water. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. Solid: Irritating to skin and eyes. If swallowed with cause nausea or vomiting. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. If in eyes, hold eyelids open and flush with plenty of water. If swallowed and victim is conscious, have victim drink water or milk. If swallowed and victim is unconscius or having convulsions, do nothing except keep victim warm.

**Human Toxicity Excerpts:**

>> /HUMAN EXPOSURE STUDIES/ ...The exposures of workers engaged in the synthesis of the simple aluminum sulfate salt /were reported/. ...Exposures were poorly controlled as a result of start-up problems, and atmospheric exposure concentrations ranged form 0-53 mg/cu m as dusts with 25-30% in the respirable range. The employees manifested nocturnal wheezing and breathlessness characteristic of occupational asthma. This reversible airway obstruction persisted despite 2-5 years of nonexposure (mean=41 months) in 11 of the 19 workers initially affected. The similarity of these cases of reversible obstructive airway disease or occupational asthma cases to those seen in aluminum smelters is noteworthy. However, the occupational asthma syndrome is not uncommon, as it has been reported consequent to other irritant metal salt exposures, such as from chromates, platinum, nickel, and vanadium.

**Non-Human Toxicity Excerpts:**

>> /LABORATORY ANIMALS: Acute Exposure/ Moderately irritating to rabbit eyes. /Hydrated aluminum sulfate (Al2(SO4)3, 14.3H2O)/

**Non-Human Toxicity Values:**

>> LD50 Rat oral 1930 mg/kg

## 12. Ecological Information

### ICSC Environmental Data:

>> The substance is toxic to aquatic organisms. It is strongly advised not to let the chemical enter into the environment.

## 13. Disposal Considerations

**Spillage Disposal**

>> Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered plastic containers. If appropriate, moisten first to

prevent dusting. Store and dispose of according to local regulations.

**Disposal Methods**

>> Aluminum compounds are treated under anhydrous conditions to prevent violent reactions, recover solvent, and form Al compounds suitable for landfill by reaction with anhydrous hydrolysis agent, eg calcium hydroxide. /Aluminum compounds/

>> SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational exposure or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal, aquatic, and plant life; and conformance with environmental and public health regulations.

>> Aluminum sulfate: Pretreatment involves hydrolysis, followed by neutralization with sodium hydroxide.

## 14. Transport Information

**DOT**

Aluminum Sulfate

Reportable Quantity of 5000 lb or 2270 kg

**IATA**

Aluminum Sulfate

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## 15. Regulatory Information

### Federal Drinking Water Guidelines:

Federal drinking water guidelines (e.g. maximum containment level (MCL)) for this chemical. In general, these guidelines are recommendations and not legally enforceable.

>> EPA 50-200 ug/l /Aluminum/

### State Drinking Water Standards:

State drinking water standards (e.g. maximum containment level (MCL)) for this chemical. These standards are legally enforceable.

>> (CA) CALIFORNIA 1000 ug/l /Aluminum/

### Clean Water Act Requirements:

The Clean Water Act (CWA) of 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under CWA, the U.S. Environmental Protection Agency (EPA) developed the Toxic Pollutant List (40 CFR Part 401.15) and the Priority Pollutant List (40 CFR Part 423, Appendix A). These lists are to be used by EPA and States to develop the Effluent Guidelines regulations and ensure water quality criteria and standards.

>> 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. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing this substance.

**Regulatory Information**

**The Australian Inventory of Industrial Chemicals**

>> Chemical: Sulfuric acid, aluminium salt (3:2)

**REACH Registered Substance**

>> Status: Active Update: 01-02-2023 https://echa.europa.eu/registration-dossier/-/registered-dossier/16061

>> Status: No longer Valid Update: 23-11-2010 https://echa.europa.eu/registration-dossier/-/registered-dossier/7031

>> Status: No longer Valid Update: 13-05-2013 https://echa.europa.eu/registration-dossier/-/registered-dossier/7828

**New Zealand EPA Inventory of Chemical Status**

>> Aluminium sulphate: Does not have an individual approval but may be used under an appropriate group standard

**New Zealand EPA Inventory of Chemical Status**

>> Sulfuric acid, aluminum salt (3:2), hydrate: Does not have an individual approval but may be used as a component in a product covered by a group standard. It is not approved for use as a chemical in its own right.

## 16. Other Information

**Other Safety Information**

**Chemical Assessment**

>> IMAP assessments - Aluminium sulfates (single and double salts): Human health tier II assessment

>> Evaluation - Use of aluminium in antiperspirants

"The information provided is believed to be accurate but is not comprehensive and should be used as a reference. It reflects our current knowledge and is intended for safety guidance related to the product. This document does not constitute a warranty of the product's properties. Ionz is not responsible for any damages resulting from handling or contact with the product incorrectly."