

**MATERIAL SAFETY DATA SHEET
FOR
THORN SMITH LABORATORIES
STUDENT REFERENCE STANDARDS AND REAGENT CHEMICALS**

Arsenious Acid
Catalog Number 81-1010

Manufacturer: Auric Enterprises, Inc.
d/b/a Thorn Smith Laboratories
Address: 7755 Narrow Gauge Road
Beulah, MI 49617
Phone Number: 231-882-4672
MSDS Number: TSL-105
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SECTION 1 - MATERIAL IDENTIFICATION AND INFORMATION

COMPONENTS - Chemical Name & Common Names
(Hazardous Components 1% or greater; Carcinogens 0.1% or greater)

Arsenic Trioxide, Solid

Common Synonyms: Arsenious Oxide, Arsenous Acid

Chemical Family: Metal Oxide

Formula: As_2O_3

Formula Weight: 197.84

CAS No.: 1327-53-3

Exposure Limits:

10 UG (AS)/M³ OSHA TWA

200 UG (AS)/M³ ACGIH TWA

2 UG (AS)/M³ NIOSH Recommended 15 minute ceiling

Measurement Method: Particulate filter; acid; atomic absorption spectrometry; (NIOSH Vol. III #7900)

Subject to SARA Section 313 Annual toxic chemical release reporting.

Subject to California Proposition 65 Cancer and/or Reproductive Toxicity
Warning and Release Requirements

Hazards Identification:

May be fatal if inhaled, swallowed, or absorbed through the skin.

Cancer Hazard. Can cause cancer.

Vapor irritating

Use with adequate ventilation or respiratory protection.

SECTION 2 - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: 869° F (465° C)

Specific Gravity: (H₂O=1): 3.87

Vapor Pressure (mm Hg and Temperature): N/A

Melting Point: 275° C

Vapor Density (Air-1): N/A

Evaporation Rate (-1): N/A

Solubility in Water: Slight

Solvent Solubility: Soluble in acids, alcohol, alkalis, dilute hydrochloric acid, carbonate solution; insoluble in chloroform and ether.

Appearance and Odor: White, odorless, tasteless crystalline powder.

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

Flash Point and Method Used: Non-combustible

Auto-Ignition Temperature: N/A

Negligible fire hazard when exposed to heat or flame

Extinguisher Media: Dry chemical, carbon dioxide, water spray or regular foam. For larger fires, use water spray, fog, or regular foam.

Special Fire Fighting Procedures: Fire fighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in the positive pressure mode. Move container from fire area if you can do it without risk. Use agents suitable for type of fire, use flooding amounts of water as a fog. Avoid breathing poisonous vapors, keep upwind.

SECTION 4 - REACTIVITY HAZARD DATA

STABILITY: Stable Unstable

Incompatibility (Materials to Avoid):

Acids: Vigorous reaction

Aluminum: Corrosive in the presence of moisture

Chlorine Trifluoride: Violent reaction with possible ignition

Copper: Corrosive in the presence of moisture

Fluorine: Violent reaction

Hydrogen Fluoride: Reacts with incandescence

Iron Solutions: Corrodes

Mercury: Vigorous reaction

Metals: Corrosive in the presence of moisture

Oxygen Difluoride: Vigorous reaction

Rubidium Carbide: Ignites

Sodium Chloriate: Forms spontaneously flammable mixture

Sodium Nitrate + Iron (II) Sulfate: Spontaneous ignition

Zinc: Explodes when heated

Hazardous Decomposition Products: Thermal decomposition may release toxic oxides of arsenic and sodium and highly toxic arsine gas.

HAZARDOUS POLYMERIZATION: Has not been reported to occur under normal temperatures and pressures.

SECTION 5 - HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY:

Inhalation Ingestion Skin Contact Eye Contact

Not Hazardous

CARCINOGEN LISTED IN:

NTP OSHA IARC Monograph Not Listed

TOXICITY:

Arsenic Trioxide, Solid:

29 MG/KG ORAL-MAN LDLO; 1429 UG/KG ORAL-HUMAN LDLO; 286 MG/KG ORAL-MAN LDLO; 2857 MG/KG ORAL-MAN LDLO; 14, 600 UG/KG ORAL-RAT LD50; 31,500 UG/KG ORAL-MOUSE LD50; 20,190 UG/KG ORAL-RABBIT LD50; 10 MG/KG ORAL-DOG LDLO; 30 MG/KG ORAL-CATTLE LDLO; 8 MG/KG SUBCUTANEOUS-RAT LDLO; 9800 UG/KG SUBCUTANEOUS-MOUSE LD50; 10,700 UG/KG INTRAVENOUS-MOUSE LD50; 10,560 UG/KG INTRAVENOUS-RABBIT LDLO; 871 MG/KG INTRAPERITONEAL-RAT LD50; 2 MG/KG INTRADERMAL-DOG LDLO; 2941 UG/KG UNREPORTED-MAN LDLO; 8 MG/KG UNREPORTED-RAT LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS)

HEALTH HAZARDS - Acute:

Inhalation: Inorganic arsenic compounds may cause irritation of the respiratory tract with cough, foamy sputum, pain in the chest, dyspnea and possibly pulmonary edema. There may be cyanosis of the face, giddiness, restlessness, lassitude, headache, extreme general weakness, an initial rise, then fall in temperature, hypotension, pain in the limbs, and leukocytosis, delayed gastrointestinal symptoms may include nausea, vomiting, colic and diarrhea. Acute, severe systemic intoxication by inhalation is unlikely, but if sufficient amounts are absorbed, other effects as described in acute ingestion are possible.

Ingestion: The approximate lethal dose is 120 MG. Large doses of inorganic arsenic compounds may cause systemic poisoning with symptoms usually appearing one-half to four hours after ingestion. Symptoms may include burning and pain in chest, esophagus, stomach and bowel, constriction in the throat, dysphagia, sweetish metallic taste, violent gastroenteritis with vomiting, copious watery or bloody diarrhea containing shreds of mucous, and dehydration with intense thirst and muscular cramps. There may be a garlic odor to the breath, vomit, and feces; vertigo, frontal headache, fever, sweating, restlessness, confusion, delirium and even mania may occur. With less than lethal doses, some

symptoms may develop without prominent gastrointestinal signs. Later symptoms may include cold, clammy skin, cyanosis, rapid, feeble pulse, hypotension, shock, cardiac disturbances, including ventricular fibrillation, and general paralysis. Death within 1-48 hours is usually due to circulatory failure; coma and convulsions may occur terminally. Death delayed 3 to 14 days is usually due to dehydration, electrolyte imbalance and gradual hypotension. Liver and kidney degenerative changes may be present. If the acute phase is survived, delayed sequelae may include: a variety of skin lesions, alopecia, mees lines, edema of the face and eyelids, and conjunctivitis; neuropathy with sensory and motor involvement encephalopathy; liver damage with multiple profile abnormalities, jaundice, and hepatomegaly; renal failure with hematuria, albuminuria, glucosuria, and oliguria or anuria; and anemia and leukopenia, especially neutropenia. Weakness and diarrhea may persist for weeks.

Skin Contact: Arsenic and inorganic arsenic compounds irritate the skin with erythema, itching and burning. Sensitization dermatitis may occur in previously exposed persons. Inorganic arsenic compounds are slightly absorbed through the skin when administered in a lipid vehicle. Poisoning has caused alopecia, bronzing of the skin, and brittle nails. If sufficient absorption occurs severe gastritis or gastroenteritis may occur.

Eye Contact: Arsenical dust may cause irritation characterized by itching, burning, watering of the eyes, photophobia and sometimes hyperemia and chemosis.

HEALTH HAZARDS - Chronic:

Inhalation: Repeated exposure to inorganic arsenic compounds may cause weakness, persistent headache, anorexia, weight loss, fatigue, pallor, malaise, low grade fever, salivation, and gastrointestinal disturbances with nausea, occasional vomiting, a sense of heaviness in the stomach, colic and diarrhea alternating with constipation. Effects on mucous membranes may result in conjunctivitis with a sensation of irritation and lacrimation of catarrhal state of the nose, larynx, and stomatitis. Perforation of the nasal septum may occur. Many forms of skin lesions are possible including pigmentation (melanosis), erythema, eczema, keratosis of palms and soles, localized subcutaneous edema, especially of the eyelids, scaling and desquamation, brittle nails, and white bands on the nails (mees lines), alopecia and vitiligo, peripheral neuritis may develop, initially of the hands and feet, which is usually sensory with paresthesia, hypesthesia, pain, burning, and tenderness. In very severe cases, motor paralysis and muscle atrophy may occur with foot and waist drop. Effects on the liver, kidney, myocardium, and bone marrow may occur but are more common with chronic ingestion. Inorganic arsenic compounds have been shown to be lung and skin carcinogens in humans. The latency time between onset of exposure and the appearance of cancer is usually between 15 and 30 years.

Ingestion: Reproductive effects have been reported in animals. Repeated ingestion of small amounts of inorganic arsenic compounds may cause effects as described in chronic inhalation. Other reported symptoms may include metallic taste, thirst, garlic odor to the breath and sweat, anxiety, hot flashes, ataxia, mental confusion, edema of the ankles and lower eyelids, nose bleeds and bleeding gums. Liver effects may include jaundice, hepatomegaly, cirrhosis, ascites, non-cirrhotic portal hypertension, and fatty infiltration and central necrosis. The kidneys may be severely damaged and there may be oliguria, proteinuria, hematuria, and casts. Hematologic effects may include anemia, leukopenia, especially neutropenia,

thrombocytopenia without severe bleeding, disturbed erythropoiesis, and disturbed or depressed myelopoiesis. Aplastic anemia with subsequent fatal myelogenous leukemia has been reported. Reported cardiovascular effects include severe cardiac peripheral edema and left-sided heart failure and gangrene of the extremities due to peripheral vascular changes. An increased incidence of chromosomal aberrations has been observed in persons treated with arsenical compounds. Cancer in humans is associated with chronic ingestion of arsenic.

Skin Contact: Occupational exposure to airborne arsenic may cause burning and itching with two types of dermatitis due to local irritation or sensitization, and eczematous type with erythema and follicular swelling and pustules. The dermatitis is usually localized on the most heavily exposed areas such as the face, back of neck, forearms wrists and hands. Chronic dermal lesions may follow this type of initial reaction, but usually only after many years of exposure, hyperkeratosis, warts and melanosis of the skin are conspicuous signs. These chronic skin lesions, particularly the hyperkeratosis, may develop into precancerous and cancerous lesions.

Eye contact: Repeated or prolonged contact may cause discomfort, edema of the lids, and corneal injury and opacity.

EMERGENCY FIRST AID PROCEDURES - Seek medical assistance for further treatment, observation and support if necessary.

Inhalation: Remove from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Maintain airway and blood pressure and administer oxygen if available. Keep affected person warm and at rest. Treat symptomatically and supportively. Administration of oxygen should be performed by qualified medical personnel. Get medical attention immediately.

Skin Contact: Remove contaminated clothing and shoes immediately, wash affected area with soap or mild detergent and large amounts of water until no evidence of chemical remains (approximately 15 to 50 minutes). Get medical attention immediately.

Eye Contact: Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower eyelids, until no evidence of chemical remains (approximately 15 to 20 minutes), get medical attention immediately.

Ingestion: Remove by gastric lavage or emesis. Follow with a saline cathartic. Maintain blood pressure, airway, and give oxygen if respiration is depressed. Do not perform gastric lavage or emesis if victim is unconscious. Get medical attention immediately. (Dreisbach, Handbook of Poisoning, 12th Edition). Administration of oxygen should be performed by qualified medical personnel.

ANTIDOTE: The following antidote has been recommended, however, the decision as to whether the severity of poisoning requires administration of any antidote and actual dose required should be made by qualified medical personnel.

Arsenic Poisoning: Give Dimercaprol, 3 MG/KG (OR 0.3 ML/KG) every 4 hours for 2 days and then 2 MG/KG every 2 hours for a total of 10 days. Dimercaprol is available as a 10% solution in oil for intramuscular administration. Next, give penicillamine, up to 100 MG/KG/DAY (maximum 1 G/Day) divided into 4 doses for no longer than 1 week. If a longer administration period is warranted, dosage should not exceed 40 MG/KG/DAY. Give the drug orally half an hour before meals. Discontinue antidote when urine arsenic level falls below 50 UG/24 hr. (Dreisbach, Handbook of Poisoning, 12th Edition). Antidote should be administered by qualified medical personnel.

SARA/TITLE HAZARD CATEGORIES AND LISTS

Acute: Yes Chronic: Yes Flammability: No Pressure: No
Reactivity: No

Extremely Hazardous Substance: Yes
CERCLA Hazardous Substance: Yes
SARA 313 Toxic Chemicals: Yes
TSCA Inventory: Yes

SECTION 6 - CONTROL AND PROTECTIVE MEASURES

Respiratory Protection (Specify Type): The following respirators are the minimum legal requirements as set forth by the Occupational Safety and Health Administration found in 29 CFR 1910, Subpart Z.

Concentration of inorganic arsenic or condition of use: Unknown or greater or less than 20,000 UG/M³ (20 MG/ME) or firefighting. Required Respirator: Any full facepiece, self-contained breathing apparatus, operated in positive pressure mode.

Concentration of inorganic arsenic or condition of use: Not greater than 20,000 UG/M³ (20 MG/M³). Required Respirator: Supplied-air respirator with full facepiece, hood or helmet or suit and operated in positive pressure mode.

Concentration of inorganic arsenic or condition of use: Not greater than 10,000 UG/M³ (10 MG/M³). Required Respirator: Powered-air purifying respirators in all inlet face coverings with high efficiency filters; or half-mask supplied-air respirator operated in positive pressure mode.

Concentration of inorganic arsenic or condition of use: Not greater than 500 UG/M³. Required Respirator: Full facepiece air-purifying respirator equipped with high efficiency filters; or any full facepiece supplied-air respirator; or any full facepiece self-contained breathing apparatus.

Concentration of inorganic arsenic or condition of use: Not greater than 100 UG/M³. Required Respirator: Half-mask air-purifying respirator equipped with high efficiency filters; or any half-mask supplied-air respirator.

Protective Gloves: Employee must wear appropriate protective gloves to prevent contact with this substance.

Eye Protection: Employee must wear splash-proof or dust-resistant safety goggles to prevent eye contact with this substance.

Ventilation to be used: Provide general dilution ventilation to keep fume and dust levels as low as possible. Ventilation must meet the requirements in 29 CFR 1910.1018 (G).

Local Exhaust Mechanical Exhaust (General)
 Special Other (Specify)

Other protective clothing and equipment: Employee must wear appropriate protective (impervious) clothing and equipment to prevent repeated or prolonged skin contact with this substance.

Hygienic Work Practices: Avoid contact with eyes, skin, and clothing. Avoid breathing dust. Keep container closed when not in use. Use with adequate ventilation. Wash thoroughly after handling.

SECTION 7 - PRECAUTIONS FOR SAFE HANDLING & USE/LEAK PROCEDURES

Soil Spill: Do not handle packages without full protective equipment. Dig a pit, pond, lagoon or holding area to contain liquid or solid material. Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water.

Water spill: Use dredges or lifts to extract immobilized masses of pollution and precipitates. Add suitable agent to neutralize material to pH-7. Add Calcium Hypochlorite to spill. Add Ferric Chloride to spill. Neutralize with agricultural lime, slaked lime, crushed limestone, or Sodium Bicarbonate.

Occupational Spill: Do not touch spilled material. Stop leak if you can do it without risk. For small spills, take up with sand or other absorbent material and place into containers for later disposal. For small dry spills, with a clean shovel place material into clean, dry container and cover. Move containers from spill area. For larger spills, dike far ahead of spill for later disposal. Keep unnecessary people away. Isolate hazard area and deny entry.
Reportable Quantity: 5000 lbs.

Waste Disposal Methods: Observe all federal, state, and local regulations when storing or disposing of this substance. For assistance, contact the district director of the Environmental Protection Agency.

NFPA Rating: Health - 3 Fire - 0 Reactivity - 0

SECTION 8 - TRANSPORTATION DATA & ADDITIONAL INFORMATION

Domestic (D.O.T.)

Proper Shipping Name: Arsenic Trioxide

Hazard Class or Division: 6.1

Labeling Requirement: Poison

Packing Group: II

I.D.#: UN1561

Applicable Exemption #: DOT E 8249

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