Section 1 - Product and Company Information

Product Name: ARSENIC(III) OXIDE, 99.99% METALS BASIS
Product Number: 255483
Brand: ALDRICH
Company: Sigma-Aldrich Canada, Ltd
Address: 2149 Winston Park Drive
          Oakville ON L6H 6J8 CA
Technical Phone: 9058299500
Fax: 9058299292
Emergency Phone: 800-424-9300

Section 2 - Composition/Information on Ingredient

Substance Name: ARSENIC TRIOXIDE
CAS #: 1327-53-3
SARA 313: Yes

Formula: As2O3
Synonyms: Acide arsenieux (French) * Anhydride arsenieux (French) * Arsenic blanc (French) * Arsenic oxide * Arsenic(III) oxide * Arsenic sesquioxide * Arsenic trioxide (ACGIH) * Arsenicum album * Arsenigen saure (German) * Arsenious acid * Arsenious oxide * Arsenious trioxide * Arsenite * Arsenolite * Arsenous acid * Arsenous acid anhydride * Arsenous anhydride * Arsenous oxide * Arsenous oxide anhydride * Arsentrioxide * Arsodent * Claudelite * Claudetite * Crude arsenic * Diarsenic trioxide * RCRA waste number P012 * White arsenic

RTECS Number: CG3325000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Highly Toxic (USA) Very Toxic (EU). Dangerous for the environment. May cause cancer. Also very toxic if swallowed. Causes burns. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Sensitizer. Target organ(s): G.I. System. Heart. Danger: Contains inorganic arsenic. Cancer Hazard. Harmful if inhaled or swallowed. Use only with adequate ventilation or respiratory protection.

HMIS RATING
HEALTH: 3*
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING
HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 0
Section 4 - First Aid Measures

**ORAL EXPOSURE**
If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

**INHALATION EXPOSURE**
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

**DERMAL EXPOSURE**
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

**EYE EXPOSURE**
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

**FLASH POINT**
N/A

**AUTOIGNITION TEMP**
N/A

**FLAMMABILITY**
N/A

**EXTINGUISHING MEDIA**
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

**FIREFIGHTING**
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

**PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL**
Evacuate area.

**PROCEDURE(S) OF PERSONAL PRECAUTION(S)**
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

**METHODS FOR CLEANING UP**
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

**HANDLING**
User Exposure: Do not breathe dust. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Use only in a chemical fume hood.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS
Country  Source            Type      Value
New Zealand OEL Remarks: check ACGIH TLV
USA NIOSH Ceiling co0.002 MG(AS)/M3/15M

Section 9 - Physical/Chemical Properties

Appearance
Physical State: Solid
Color: White
Form: Powder

Property                        Value                                At Temperature or Pressure
Molecular Weight               197.84 AMU
pH                             N/A
BP/BP Range                    457.2 ‘C
MP/MP Range                    312.3 ‘C
Freezing Point                 N/A
Vapor Pressure                 0.000001 mmHg 66 ‘C
Vapor Density                  6.83 g/l
Saturated Vapor Conc.          N/A
SG/Density                     3.738 g/cm3
Bulk Density                   N/A
Odor Threshold                 N/A
Volatile%                      N/A
VOC Content                    N/A
Water Content                  N/A
Solvent Content                N/A
Evaporation Rate               N/A
Viscosity                      N/A
Surface Tension                N/A
Partition Coefficient          N/A
Decomposition Temp.            N/A
Flash Point                    N/A
Explosion Limits               N/A
Section 10 - Stability and Reactivity

STABILITY
Conditions of Instability: May decompose on exposure to moist air or water.
Conditions to Avoid: Heat.
Materials to Avoid: Oxidizing agents, Metals.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Arsenic oxides.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

cancer hazard

ROUTE OF EXPOSURE
Skin Contact: Causes burns.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes burns.
Inhalation: May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion: May be fatal if swallowed.

SENSITIZATION
Respiratory: May cause allergic respiratory reaction.

TARGET ORGAN(S) OR SYSTEM(S)
Peripheral nervous system.

SIGNS AND SYMPTOMS OF EXPOSURE
Dry mouth, a metallic taste, drowsiness, loss of appetite, excessive salivation, nausea, vomiting and a foul, garlic-like breath. Prolonged exposure to arsenic compounds can cause exfoliation and pigmentation of skin, herpes, inflammation of nerves, and nasal septum ulceration. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

CONDITIONS AGGRAVATED BY EXPOSURE
Exposure to arsenic compounds can cause burning and dryness of the oral and nasal cavities, muscle spasms, irritation of the gastrointestinal tract, nausea, vomiting and diarrhea which can
progress to shock and death.

TOXICITY DATA

Oral
Man
114 mg/kg
LDLO
Remarks: Behavioral: Muscle weakness. Lungs, Thorax, or
Respiration: Acute pulmonary edema. Kidney, Ureter, Bladder: Urine
volume decreased.

Oral
Man
29 mg/kg
LDLO
Gastrointestinal: Hypermotility, diarrhea.

Oral
Man
286 mg/kg
LDLO
Remarks: Other changes Cardiac: Arrhythmias (including changes in
conduction). Liver: Liver function tests impaired.

Oral
Human
1.429 mg/kg
LDLO

Oral
Man
2857 mg/kg
LDLO
Kidney, Ureter, Bladder: Renal function tests depressed.

Oral
Rat
14.6 mg/kg
LD50

Intraperitoneal
Rat
871 MG/KG
LD50

Oral
Mouse
31.5 mg/kg
LD50

Subcutaneous
Mouse
9800 UG/KG
LD50

Intravenous
Mouse
10700 UG/KG
LD50
Oral Rabbit 20.19 mg/kg LD50

CHRONIC EXPOSURE - CARCINOGEN

Result: This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Species: Rat
Route of Application: Intratracheal
Dose: 16 MG/KG
Exposure Time: 15W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.

Species: Hamster
Route of Application: Intratracheal
Dose: 45 MG/KG
Exposure Time: 15W
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.

Species: Rat
Route of Application: Intratracheal
Dose: 75 MG/KG
Exposure Time: 15W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.

Species: Hamster
Route of Application: Intratracheal
Dose: 40 MG/KG
Exposure Time: 15W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.

Species: Hamster
Route of Application: Intratracheal
Dose: 55450 UG/KG
Exposure Time: 15W
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.

Species: Rat
Route of Application: Intratracheal
Dose: 167 MG/KG
Exposure Time: 15W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.

Species: Hamster
Route of Application: Intratracheal
Dose: 39608 UG/KG
Exposure Time: 24W  
Frequency: I  
Result: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration: Tumors.  
Species: Hamster  
Route of Application: Intratracheal  
Dose: 55456 UG/KG  
Exposure Time: 24W  
Frequency: I  
Result: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration: Tumors.  
Species: Hamster  
Route of Application: Intratracheal  
Dose: 30 MG/KG  
Exposure Time: 15W  
Frequency: I  
Result: Tumorigenic: Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration: Tumors.  

OSHA CARCINOGEN LIST  
cancer hazard  

IARC CARCINOGEN LIST  
Rating: Group 1  

CHRONIC EXPOSURE - TERATOGEN  
Species: Mouse  
Dose: 8250 UG/KG  
Route of Application: Oral  
Exposure Time: (7-17D PREG)  
Result: Effects on Newborn: Behavioral. Specific Developmental Abnormalities: Immune and reticuloendothelial system.  
Species: Mouse  
Dose: 1650 UG/KG  
Route of Application: Oral  
Exposure Time: (7-17D PREG)  
Result: Specific Developmental Abnormalities: Central nervous system.  
Species: Mouse  
Dose: 28500 UG/M3/4H  
Route of Application: Inhalation  
Exposure Time: (9-12D PREG)  
Result: Specific Developmental Abnormalities: Musculoskeletal system. Effects on Embryo or Fetus: Cytological changes (including somatic cell genetic material).  
Species: Mouse  
Dose: 260 UG/M3/4H  
Route of Application: Inhalation  
Exposure Time: (9-12D PREG)  
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).  

CHRONIC EXPOSURE - MUTAGEN
Species: Human
Dose: 1 UMOL/L
Cell Type: lung
Mutation test: Unscheduled DNA synthesis

Species: Human
Dose: 500 UMOL/L
Cell Type: HeLa cell
Mutation test: DNA inhibition

Species: Human
Dose: 1200 NMOL/L
Cell Type: leukocyte
Mutation test: Cytogenetic analysis

Species: Human
Dose: 2 UG/CM3
Cell Type: lymphocyte
Mutation test: Sister chromatid exchange

Species: Mouse
Route: Intraperitoneal
Dose: 1 MG/KG
Mutation test: Micronucleus test

Species: Mouse
Route: Oral
Dose: 20 ML/KG
Mutation test: DNA inhibition

Species: Mouse
Route: Oral
Dose: 3696 MG/KG
Mutation test: Cytogenetic analysis

Species: Mouse
Dose: 28500 UG/M3
Cell Type: Other cell types
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 250 NMOL/L
Cell Type: lung
Mutation test: Micronucleus test

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Woman
Dose: 600 MG/KG
Route of Application: Oral
Exposure Time: (30W PREG)
Result: Effects on Newborn: Other neonatal measures or effects. Effects on Newborn: Apgar score (human only).

Species: Rat
Dose: 30 MG/KG
Route of Application: Oral
Exposure Time: (9D PREG)
Result: Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Maternal Effects: Other effects. Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Species: Rat
Dose: 10 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (9D PREG)
Result: Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Eye, ear.

Species: Rat
Dose: 20800 UG/KG
Route of Application: Intratracheal
Exposure Time: (8W MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Mouse
Dose: 224 MG/KG
Route of Application: Oral
Exposure Time: (MULTIGENERATIONS)
Result: Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth).

Species: Mouse
Dose: 3636 MG/KG
Route of Application: Oral
Exposure Time: (1-18D PREG)
Result: Effects on Fertility: Abortion.

Section 12 - Ecological Information
No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Arsenic trioxide
UN#: 1561
Class: 6.1
Packing Group: Packing Group II
Hazard Label: Toxic substances.
PIH: Not PIH

IATA
Proper Shipping Name: Arsenic trioxide
IATA UN Number: 1561
Hazard Class: 6.1
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: T+-N
Indication of Danger: Very toxic. Dangerous for the environment.
Risk Statements: May cause cancer. Also very toxic if swallowed. Causes burns. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Statements: Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. This material and its container must be disposed of as hazardous waste. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Highly Toxic (USA) Very Toxic (EU).
Dangerous for the environment.
Risk Statements: May cause cancer. Also very toxic if swallowed. Causes burns. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: Avoid exposure - obtain special instructions before use. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: Yes
NOTES: This product is subject to SARA section 313 reporting requirements - arsenic compounds.
TSCA INVENTORY ITEM: Yes

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65
California Prop - 65: This product is or contains chemical(s) known to the state of California to cause cancer. California Proposition 65: This product is or contains chemical(s) known to the state of California to cause cancer.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not