SAFETY DATA SHEET

Date Printed: 04/27/2018
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SECTION 1. IDENTIFICATION

Product Identifier: (5N) 99.999% Arsenic Selenide Sputtering Target

Product Code: AS-SE-05-ST

CAS Number: 1303-36-2

Relevant identified uses of the substance: Scientific research and development

Supplier details:

American Elements 10884 Weyburn Ave. Los Angeles, CA 90024 Tel: +1 310-208-0551 Fax: +1 310-208-0351 Emergency telephone number: Domestic, North America +1 800-424-9300 International +1 703-527-3887

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)

GHS06 Skull and crossbones
Acute Tox. 2 H330 Fatal if inhaled.
Hazards not otherwise classified
No data available

GHS label elements

GHS label elements, including precautionary statements

Hazard pictograms

GHS06
Signal word: Danger
Hazard statements
H330 Fatal if inhaled.
Precautionary statements
P260 Do not breathe dust/fume/gas/mist/vapors/spray.
P284 [In case of inadequate ventilation] wear respiratory protection.
P320 Specific treatment is urgent (see on this label).
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

WHMIS classification
D1A - Very toxic material causing immediate and serious toxic effects
D2A - Very toxic material causing other toxic effects
Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)
HEALTH
FIRE
REACTIVITY
1
1
1
Health (acute effects) = 1
Flammability = 1
Physical Hazard = 1
Other hazards
Results of PBT and vPvB assessment
PBT: N/A
vPvB: N/A

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances
CAS No. / Substance Name:
1303-36-2 Arsenic(III) selenide
Identification number(s):
EC number: 215-119-5
Index number: 033-002-00-5

SECTION 4. FIRST AID MEASURES

Description of first aid measures
General information
Immediately remove any clothing soiled by the product.
Remove breathing apparatus only after contaminated clothing has been completely removed.
In case of irregular breathing or respiratory arrest provide artificial respiration
If inhaled:
Supply patient with fresh air. If not breathing, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
In case of skin contact:
Immediately wash with soap and water; rinse thoroughly.
Seek immediate medical advice.
In case of eye contact:
Rinse opened eye for several minutes under running water. Consult a physician.
If swallowed:
Do not induce vomiting; immediately call for medical help.
Information for doctor
Most important symptoms and effects, both acute and delayed
No data available
Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5. FIREFIGHTING MEASURES

Extinguishing media
Suitable extinguishing agents
Product is not flammable. Use fire-fighting measures that suit the surrounding fire.
Special hazards arising from the substance or mixture
If this product is involved in a fire, the following can be released:
Toxic metal compounds
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Environmental precautions:
Do not allow material to be released to the environment without official permits.
Methods and materials for containment and cleanup:
Dispose of contaminated material as waste according to section 13.
Ensure adequate ventilation.
Prevention of secondary hazards:
No special measures required.
Reference to other sections
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7. HANDLING AND STORAGE

Handling
Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Open and handle container with care.
Information about protection against explosions and fires:
The product is not flammable
Conditions for safe storage, including any incompatibilities
Requirements to be met by storerooms and receptacles:
No special requirements.
Information about storage in one common storage facility:
No data available
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well-sealed containers.
Specific end use(s)
SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters
Components with limit values that require monitoring at the workplace:
Selenium and selenium compounds (as Se)

<table>
<thead>
<tr>
<th>Component</th>
<th>mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH TLV</td>
<td>0.2</td>
</tr>
<tr>
<td>Austria MAK</td>
<td>0.1</td>
</tr>
<tr>
<td>Belgium TWA</td>
<td>0.2</td>
</tr>
<tr>
<td>Denmark TWA</td>
<td>0.1</td>
</tr>
<tr>
<td>Finland TWA</td>
<td>0.1; 0.3-STEL</td>
</tr>
<tr>
<td>Germany MAK</td>
<td>0.1</td>
</tr>
<tr>
<td>Hungary 0.1-STEL</td>
<td></td>
</tr>
<tr>
<td>Japan OEL</td>
<td>0.1</td>
</tr>
<tr>
<td>Korea TLV</td>
<td>0.2</td>
</tr>
<tr>
<td>Netherlands MAC-TGG</td>
<td>0.2</td>
</tr>
<tr>
<td>Poland TWA</td>
<td>0.1; 0.3-STEL</td>
</tr>
<tr>
<td>Sweden NGV</td>
<td>0.1</td>
</tr>
<tr>
<td>Switzerland MAK-W</td>
<td>0.1</td>
</tr>
<tr>
<td>United Kingdom TWA</td>
<td>0.1</td>
</tr>
<tr>
<td>USA PEL</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Arsenic, elemental, and inorganic compounds (except arsine), as As

<table>
<thead>
<tr>
<th>Component</th>
<th>mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH TLV</td>
<td>0.01; Confirmed human carcinogen</td>
</tr>
<tr>
<td>Belgium TWA</td>
<td>0.2</td>
</tr>
<tr>
<td>Denmark TWA</td>
<td>0.05</td>
</tr>
<tr>
<td>Finland TWA Carcinogen</td>
<td></td>
</tr>
<tr>
<td>France VME</td>
<td>0.2</td>
</tr>
<tr>
<td>Hungary 0.5-STEL; Carcinogen</td>
<td></td>
</tr>
<tr>
<td>Korea TWA 0.01; Confirmed human carcinogen</td>
<td></td>
</tr>
<tr>
<td>Norway 0.02</td>
<td></td>
</tr>
<tr>
<td>Poland TWA 0.01</td>
<td></td>
</tr>
<tr>
<td>Sweden NGV 0.03; Carcinogen</td>
<td></td>
</tr>
<tr>
<td>Switzerland TWA 0.1; Carcinogen</td>
<td></td>
</tr>
<tr>
<td>United Kingdom TWA 0.1; Carcinogen</td>
<td></td>
</tr>
<tr>
<td>USA PEL 0.01</td>
<td></td>
</tr>
</tbody>
</table>

AS 1303-36-2 Arsenic(III) selenide (100.0%)

<table>
<thead>
<tr>
<th>Component</th>
<th>Long-term value</th>
<th>mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>0.2</td>
<td>as Se</td>
</tr>
<tr>
<td>REL (USA)</td>
<td>0.2</td>
<td>as Se</td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>0.2</td>
<td>as Se</td>
</tr>
</tbody>
</table>

EL (Canada) Long-term value: 0.1 mg/m³ as Se

Ingredients with biological limit values:
1303-36-2 Arsenic(III) selenide (100.0%)

<table>
<thead>
<tr>
<th>Component</th>
<th>µg As/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEI (USA)</td>
<td>35</td>
</tr>
</tbody>
</table>

Medium: urine
Time: end of workweek
Parameter: Inorganic arsenic plus methylated metabolites
Additional information: No data

Exposure controls
Personal protective equipment
Follow typical protective and hygienic practices for handling chemicals. Keep away from foodstuffs, beverages and feed. Remove all soiled and contaminated clothing immediately. Wash hands before breaks and at the end of work. Store protective clothing separately. Maintain an ergonomically appropriate working environment.

Breathing equipment:
Refer to 29CFR1910.1018 for regulations on respiratory protection required during exposure to inorganic arsenic. Use self-contained respiratory protective device in emergency situations.
Protection of hands: Impervious gloves
Inspect gloves prior to use. Suitability of gloves should be determined both by material and quality, the latter of which may vary by manufacturer.
Eye protection: Safety glasses
Body protection: Protective work clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties
Appearance:
Form: Solid in various forms
Color: Brown
Odor: Odorless
Odor threshold: No data available.

pH: N/A
Melting point/Melting range: 360 °C (680 °F)
Boiling point/Boiling range: No data available
Sublimation temperature / start: No data available
Flash point: N/A
Flammability (solid, gas): No data available.
Ignition temperature: No data available
Decomposition temperature: No data available
Autoignition: No data available.
Danger of explosion: Product does not present an explosion hazard.

Explosion limits:
Lower: No data available
Upper: No data available
Vapor pressure: N/A

Density at 20 °C (68 °F): 4.75 g/cm³ (39.639 lbs/gal)
Relative density: No data available.
Vapor density: N/A
Evaporation rate: N/A
Solubility in Water (H₂O): Insoluble
Partition coefficient (n-octanol/water): No data available.
Viscosity:
Dynamic: N/A
Kinematic: N/A
Other information
No data available
SECTION 10. STABILITY AND REACTIVITY

Reactivity
No data available
Chemical stability
Stable under recommended storage conditions.
Thermal decomposition / conditions to be avoided:
Decomposition will not occur if used and stored according to specifications.
Possibility of hazardous reactions
No dangerous reactions known
Conditions to avoid
No data available
Incompatible materials:
Oxidizing agents
No data available
Hazardous decomposition products:
Toxic metal oxide fume

SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects
Acute toxicity:
Fatal if inhaled.
Fatal if swallowed.
LD/LC50 values that are relevant for classification:
Oral LD50 >5000 mg/kg (rat)
Skin irritation or corrosion:
Irritant to skin and mucous membranes.
Eye irritation or corrosion:
Irritating effect.
Sensitization:
No sensitizing effects known.
Germ cell mutagenicity:
No effects known.
Carcinogenicity:
EPA-A: human carcinogen: sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer.
IARC-1: Carcinogenic to humans: sufficient evidence of carcinogenicity.
ACGIH A1: Confirmed human carcinogen: Agent is carcinogenic to humans based on epidemiologic studies of, or convincing clinical evidence in, exposed humans.
Carcinogen as defined by OSHA.
NTP-K: Known to be carcinogenic: sufficient evidence from human studies.
Reproductive toxicity: No effects known.
Specific target organ system toxicity - repeated exposure: No effects known.
Specific target organ system toxicity - single exposure: No effects known.
Aspiration hazard: No effects known.
Subacute to chronic toxicity:
Acute arsenic poisoning from ingestion results in marked irritation of the stomach and intestines with nausea, vomiting and diarrhea. In severe cases, the vomitus and stools are bloody and the patient goes into collapse and shock with weak, rapid pulse, cold sweats, coma and death. Chronic arsenic poisoning may cause disturbances of the digestive system such as loss of appetite,
SECTION 12. ECOLOGICAL INFORMATION

Toxicity
Aquatic toxicity:
No data available
Persistence and degradability
No data available
Bioaccumulative potential
No data available
Mobility in soil
No data available
Ecotoxicological effects:
Remark:
Very toxic for aquatic organisms
Additional ecological information:
Do not allow material to be released to the environment without official permits.
Do not allow product to reach groundwater, water courses, or sewage systems, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.
May cause long lasting harmful effects to aquatic life.
Avoid transfer into the environment.
Very toxic for aquatic organisms
Results of PBT and vPvB assessment
PBT: N/A
vPvB: N/A
Other adverse effects
No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods
Recommendation
Consult official regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation:
Disposal must be made according to official regulations.

SECTION 14. TRANSPORT INFORMATION

UN-Number
DOT, IMDG, IATA
UN3077
UN proper shipping name
DOT
Environmentally hazardous substances, solid, n.o.s. (Arsenic(III) selenide)
IMDG, IATA
ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Arsenic(III)selenide)
Transport hazard class(es)
DOT, IMDG
Class
9 Miscellaneous dangerous substances and articles.
Label
9
Class
9 (M7) Miscellaneous dangerous substances and articles
Label
9
IATA
Class
9 Miscellaneous dangerous substances and articles.
Label
9
Packing group
DOT, IMDG, IATA
III
Environmental hazards:
Special marking (ADR):
Symbol (fish and tree)
Special marking (IATA):
Symbol (fish and tree)
Special precautions for user
Warning: Miscellaneous dangerous substances and articles
Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
N/A
Transport/Additional information:
DOT
Marine Pollutant (DOT):
No
UN "Model Regulation":
UN3077, Environmentally hazardous substances, solid, n.o.s. (Arsenic(III) selenide), 9, III

SECTION 15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture
GHS GHS label elements, including precautionary statements
Hazard pictograms
GHS06
Signal word: Danger
Hazard statements
H330 Fatal if inhaled.
Precautionary statements
P260 Do not breathe dust/fume/gas/mist/vapors/spray.
P284 [In case of inadequate ventilation] wear respiratory protection.
P320 Specific treatment is urgent (see on this label).
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
All components of this product are listed on the Canadian Domestic Substances List (DSL).
SARA Section 313 (specific toxic chemical listings)
1303-36-2 Arsenic(III) selenide
California Proposition 65
Prop 65 - Chemicals known to cause cancer
1303-36-2 Arsenic(III) selenide
Prop 65 - Developmental toxicity
Substance is not listed.
Prop 65 - Developmental toxicity, female
Substance is not listed.
Prop 65 - Developmental toxicity, male
Substance is not listed.

Information about limitation of use:
For use only by technically qualified individuals.
This product contains arsenic and is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.
This product contains selenium and is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

Other regulations, limitations and prohibitive regulations
Refer to 29CFR1910.1018 for regulations concerning inorganic arsenic.
Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.
Substance is not listed.
The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
Substance is not listed.
Annex XIV of the REACH Regulations (requiring Authorisation for use)
Substance is not listed.

Chemical safety assessment:
A Chemical Safety Assessment has not been carried out.

16. OTHER INFORMATION

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH). The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. American Elements shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. COPYRIGHT 1997-2016 AMERICAN ELEMENTS. LICENSED GRANTED TO MAKE UNLIMITED PAPER COPIES FOR INTERNAL USE ONLY.