

Safety Data Sheet (SDS)

Antimony Metal

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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| Substance name: | Antimony Metal |
| Company name: | NIHON SEIKO CO.,LTD. |
| Address | 3-2 SHIMOMIYABI-CHO SHINJUKU-KU TOKYO 162-0822 JAPAN |
| Charge section | NIHON SEIKO CO.,LTD. SALES SECTION |
| Phone number | +81-3-3235-0031 |
| Fax number | +81-3-3235-0034 |
| E-mail address | mail@nihonseiko.co.jp |
| Emergency telephone number | NIHON SEIKO CO.,LTD. NAKASE REFINERY QUALITY ASSURANCE SECTION +81-79-667-2121 |
| Recommended use and restriction on use: | Industrial materials: Raw materials for semiconductor, Storage battery, alloys, etc. |

2. HAZARDS IDENTIFICATION

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| GHS classification : | | |
| Physical hazards | | :Out of category (Not classified) |
| Health hazards | Acute Toxicity (Oral) | :Not classified |
| | Acute Toxicity (Dermal) | :Not classified |
| | Acute Toxicity (Inhalation: dust/mist) | :Not classified |
| | Acute Toxicity (Inhalation: fume/vapors) | :Out of category |
| | Skin corrosion/irritation | :Not classified |
| | Serious eye danger/eye irritation | :Not classified |
| | Respiratory sensitization | :Not classified |
| | Skin sensitization | :Not classified |
| | Germ cell mutagenicity | :Not classified |
| | Carcinogenicity | :Not classified |
| | Reproductive toxicity | :Not classified |
| | Specific target organ toxicity (STOT, single exposure) | :Not classified |
| | Specific target organ toxicity (STOT, repeated exposure) | :Not classified |
| | Aspiration hazard | :Classification not possible |
| Environmental hazards | Hazardous to the aquatic environment (Acute) | :Classification not possible |
| | Hazardous to the aquatic environment (Chronic) | :Classification not possible |
| | Hazardous to the ozone layer | :Not classified |

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| <p>GHS label: Hazard pictogram Signal word Hazard statements Precautionary statements</p> <p>Other hazard not applicable to GHS classification hazard: The summary of important signs and assumed emergency:</p> | <p>Not applicable. Not applicable. Not applicable. 【Prevention】 Not applicable. 【Response】 Not applicable. 【Storage】 Not applicable. 【Disposal】 Not applicable.</p> <p>No information.</p> <p>No information.</p> |
| 3.COMPOSITION / INFORMATION ON INGREDIENTS | |
| <p>Substance/Mixture: General product description: Other name: Chemical property (Chemical formula etc): CAS number: Component and its content: EINECS number: Impurity and stabilizing additive that contribute to GHS Classification:</p> | <p>Substance Antimony Antimony Metal</p> <p>Sb 7440-36-0</p> <p>It has indicated to the last page for every grade. 231-146-5</p> <p>It has indicated to the last page for every grade.</p> |
| 4.FIRST AID MEASURES | |
| <p>Following inhalation: Following skin contact: Following eye contact: After ingestion: Most important symptoms and effects ,both acute and delayed: Protection of person who do first aid: Special precaution statement for doctor:</p> | <p>Move affected person to fresh air. If you feel sick, seek medical attention. Wash with water and remove clothes if necessary. Flush eyes thoroughly with water, also under eyelids. Rinse mouth with water. If you feel sick, seek medical attention.</p> <p>Acute or delayed effects are not anticipated for antimony.</p> <p>No information.</p> <p>No information.</p> |
| 5.Fire-fighting measure | |
| <p>Extinguishing media: Unsuitable extinguishing media: Special hazards arising from the Substance or mixture: Specific fire-fighting: Protection for fire-fighter:</p> | <p>Use fire-fighting measures that suit the environment. The product is not combustible and does not support the combustion. No information.</p> <p>Antimony trioxide dust. Move the product to safe place promptly when it is a fire in the surrounding. If it is non-transferable, sprinkle the container and the circle with water and cool down. Wear suitable protective equipment in fire-fighting.</p> |

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| <p>6.Accidental release measures Personal precautions, protective equipment and emergency procedures:</p> <p>Environmental precautions:</p> <p>Methods and material for containment and cleaning up:</p> <p>Prevention of second disaster:</p> | <p>Avoid formation of dust. Ensure adequate ventilation. Keep unprotected persons away. Although the substance has no acute toxicity, it is advised to avoid contact with skin, eyes, and clothing – wear suitable protective equipment. Avoid inhalation of dust.</p> <p>It is advised that in the event of an accidental release the product should be prevented from reaching the sewage system or any water course and penetrating the soil. Dispose of spilled material in accordance with the relevant regulations.</p> <p>In any case avoid dust formation. Sweep all spilled material or use an appropriate industrial vacuum cleaner. Collect spilled material in suitable containers or closed plastic bags for recovery or disposal.</p> <p>For more information on exposure controls/personal protection or disposal considerations, check section 8 and 13 of this safety data sheet.</p> |
| <p>7.Handling and storage Handling: Technological countermeasure (local ventilation/ General Ventilation etc) Safety precaution</p> <p>Avoid contact Hygiene measure</p> <p>Storage: Safety storage condition</p> <p>Safety packaging material</p> | <p>Provide a local dust collection system in the places where dust can be generated. Provide dust protective mask in the handling position.</p> <p>Do not handle until all safety precautions have been read and understood. Work by wearing suitable protective equipment. Check section 10. Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices). No eating, drinking and smoking at the workplace. Wash hands after use. Remove contaminated clothing and protective equipment before entering eating areas. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.</p> <p>Store in well ventilated dry area with low humidity and sealed state.</p> <p>Establish whether the container conforms test standard on a voluntary basis.</p> |

8.EXPOSURE CONTROLS / PERSONAL PROTECTION

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| Engineering controls: | Prevent formation of dust where possible. Ensure appropriate ventilation/exhaustion at machinery and places where dust can be generated. Any deposit of dust which cannot be avoided must be regularly removed using preferably appropriate industrial vacuum cleaners or central vacuum systems. Waste air is to be released into the atmosphere only when it has passed through suitable dust separators. Waste water generated during the production process or cleaning operations should be collected and should preferably be treated in an on-site waste water treatment plant which ensures efficient removal of antimony. |
| Exposure control limits Effect of over exposure: ACGIH(2012) | 0.5mg/m ³ TLV-TWA (Antimony and compounds, as Sb) |
| Personal protective equipment: Respiratory protection Hand protection Eye protection Skin and body protection Special precaution statement | Dust protective mask(As appropriate) Protective gloves Protective glasses Protective high boots and cloth Avoid environmental discharge. |

9.PHYSICAL AND CHEMICAL PROPERTIES

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| Appearance: Physical state Figure Color Odor: Odor threshold: pH: Melting point: Initial boiling point and boiling range: Flash point: Evaporation rate: Flammability (solid, gas): Upper/lower flammability or explosive limits: Vapor pressure: Vapor density: Relative density: Solubility(ies): Partition coefficient n-octanol/water: Auto-ignition temperature: Decomposition temperature: | Solid Massive, Shot metal Gray Odorless Not applicable as odorless. Not applicable to solids. 630 °C 1380 °C Not applicable as only relevant for liquids or low melting point solids. Not applicable to solids. Non-flammable. This substance does not contain any chemical groups that might lead to spontaneous ignition a short time after coming in contact with air at room temperature (circa 20°C). Furthermore, long-term industrial experience in handling shows that the substance does not ignite in contact with air. Non explosive. Antimony exhibits no chemical groups indicating explosive properties. 1.66mmHg (800 °C) No information. 6.7 18.2 mg/l (20°C -ISO 6341 medium-loading 2g Sb/l-pH 4.6) No information. Not relevant since this would require heat to be developed either by reaction of this substance with oxygen or by exothermic decomposition and which is not lost rapidly enough to the surroundings. Cannot decompose. |
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| Viscosity: Other: | Not applicable to solids. No information. |
| 10.STABILITY AND REACTIVITY | |
| Reactivity: Chemical stability: Possibility of hazardous reactions: | No information. Under normal conditions of use and storage, the product is stable. Reaction with H ⁻ equivalents releases antimony hydride (stibine, SbH ₃). When heated in air, it burns with a blue flame and antimony trioxide is generated. Antimony pentachloride is generated and catch fire if Antimony meets chlorine. If Antimony reacts with bromine and iodine, it reacts violently at ordinary temperatures. Sulfur dioxide is generated if it meets hot sulfuric acid. The mixture of antimony powder and nitrate salt has the quality of explosiveness. Antimony reacts with salt of permanganic acid, become reduced and antimonate is generated. |
| Conditions to avoid: Incompatible materials: | Avoid dust formation and high temperature Reaction with H ⁻ equivalents releases antimony hydride (stibine, SbH ₃). Hot sulfuric acid. Halogen. Nitrate salt. Salt of permanganic acid. Strong acids/bases. Reducing agents. |
| Hazardous decomposition products: Other: | Not applicable. No information. |
| 11.TOXICOLOGICAL INFORMATION | |
| Acute Toxicity (Oral): | Based on read-across from antimony trioxide, antimony does not require a classification. LD ₅₀ rat > 20,000 mg/kg bw (Antimony trioxide) (Fleming, 1938; Gross et al, 1955; Weil et al, 1978) |
| Acute Toxicity (Dermal): | Based on read-across from antimony trioxide, antimony does not require a classification. LD ₅₀ rabbit > 8,300 mg/kg bw (Gross et al, 1955) (Antimony trioxide) |
| Acute Toxicity (Inhalation: dust/mist): | Based on read-across from antimony trioxide, antimony does not require a classification. LC ₅₀ rat > 5,200 mg/m ³ (Leuschner, 2006) (Antimony trioxide) |
| Acute Toxicity (Inhalation: fume/vapors): Skin corrosion/irritation: | Out of category to solids. Causes mild skin irritation. Especially can cause dermatitis on contact with sweat-damp region over again or prolonged contact. Dermatitis that known as "antimony spots" can cause rash after itchiness. |
| Serious eye danger/irritation: | Antimony trioxide is not irritating to eyes.(Leuschner, 2005) Based on read-across from antimony trioxide, antimony does not require a classification. |
| Respiratory or skin sensitization: | Not skin sensitizing (Chevalier, 2005; Moore, G.E, 1994) /no respiratory sensitizer. Based on read-across from antimony trioxide, antimony does not require a classification. Based on read-across from antimony trioxide, antimony does not require a classification. |

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| Germ cell mutagenicity: | Antimony trioxide does not cause systemic mutagenicity in vivo after oral administration. Negative in vivo results on chromosome aberrations and micronuclei were obtained in two different species via oral application – mouse (Elliot et al., 1998) and rat (Whitwell, 2006), (Kirkland et al., 2007). Based on read-across from antimony trioxide, antimony does not require a classification. |
| Carcinogenicity: Japan Society for Occupational Health ACGIH EPA NTP EU IARC | Not classified as carcinogen. Not classified as carcinogen. Not classified as carcinogen. Not classified as carcinogen. Not classified as carcinogen. Not classified as carcinogen. |
| Reproductive toxicity: | Based on the available long-term toxicity studies in rodents (Omura et al, 2002) and the relevant information on the toxicokinetic behavior in rats, it is concluded that antimony trioxide does not present a reproductive toxicity hazard. Based on read-across from antimony trioxide, antimony does not require a classification. |
| STOT single exposure: | Antimony trioxide is not classified as STOT, single exposure. Based on read-across from antimony trioxide, antimony does not require a classification. |
| STOT repeated exposure: | Antimony trioxide is not classified as STOT, repeated exposure. Based on read-across from antimony trioxide, antimony does not require a classification. |
| Aspiration hazard: | Classification not possible, because of a lack of information. |
| Other: | No information. |

12.ECOLOGICAL INFORMATION

Antimony metal and antimony containing compounds will dissolve and generate antimony ions. The environmental section will therefore discuss the fate of antimony in general.

Ecotoxicity: The test result is given below

Acute aquatic toxicity test results:

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| Marine fish [Red seabream, <i>Pargus major</i>] | 96 h LC50 | =6.9 mg Sb/L (Takayanagi, 2001) |
| Freshwater fish [Pimephales promelas] | 96 h LC50 | =14.4 mg Sb/L (Brooke et al, 1986) |
| Invertebrates [Chlorohydra viridissimus] | 96 h LC50 | =1.77 mg Sb/L (TAI, 1990) |
| Algae [Pseudokirchneriella subcapitata] | 72 h ErC50 (growth rate) | >36.6 mg Sb/L (Heijerick et al,2004) |
| Plants [Lemna minor] | 4 d EC50 | > 25.5 mg Sb/L (Brooke et al, 1986) |

Chronic aquatic toxicity test results:

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| Fish [Pimephales promelas] | 28 d NOEC/LOEC (growth; length) | = 1.13/2.31 mg Sb/L (Kimball, 1978) |
| Invertebrates [Daphnia magna] | 21 d NOEC/LOEC (reproduction) | = 1.74/3.13 mg Sb/L (Heijerick et al, 2003) |
| Algae [Pseudokirchneriella subcapitata] | 72 h NOEC/LOEC (growth rate) | = 2.11/4.00 mg Sb/L (Heijerick et al, 2004) |

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| Persistence and degradability: | Antimony cannot be degraded, but may be transformed between different phases, chemical species, and oxidation states. |
| Bioaccumulative potential: | Bioaccumulation of antimony by both aquatic and terrestrial organisms is low. A BCF of 40 has been determined for aquatic organisms and a BSAF of 1 for earthworms. |
| Mobility in soil: | $\log K_p = 2.07$ |
| Hazardous to the ozone layer: | Antimony is not expected to contribute to ozone depletion, ozone formation, global warming or acidification.. |
| Other: | No information. |
| 13.DISPOSAL CONSIDERATIONS | |
| Waste from residues: | Dispose of contents in accordance with local/regional/national/international regulations(to be specified). |
| Contaminated container/packing: | Dispose of container in accordance with local/regional/national/international regulations(to be specified). |
| 14.TRANSPOT INFORMATION | |
| International regulation: | |
| UN code | Not applicable. |
| Proper shipping name | Not applicable. |
| UN Class | Not applicable. |
| Packing group | Not applicable. |
| Marine pollutant | Not applicable. |
| 15.REGULATORY INFORMATION | |
| Worldwide chemical inventories: | |
| ENCS(Japan) | Not listed |
| TSCA(USA) | Listed |
| ECL(Korea) | KE-01834 |
| DSL(Canada) | Listed |
| PICCS(Philippines) | Listed |
| AICS(Australia) | Listed |
| IECSC(China) | Listed |
| NECI(Taiwan) | Listed |
| Other regulatory information: | Follow regulation and law of each country or region. |
| 16. OTHER INFORMATION | |
| Treatment of stated contents: | <p>The contents of this information sheet are based on the data, information available at moments, and may be revised by additional data coming up in future.</p> <p>The precautions mentioned in this sheet are intended for normal use of this material, when use in unusual manner, the proper safety method is required.</p> <p>Read this SDS before use the ingredients.</p> <p>Keep this SDS in your file for your timely reference. The contents of this information sheet are not warranted and the company can accept no liability to any customer or any other person.</p> |
| References: | <p>1.GHS taiou guideline Edit: Japan Chemical Industry Association Issuance: Japanese Standards Association</p> <p>2.Antimony Trioxide SDS form of International Antimony Association (i2a)</p> <p>3.Sodium Antimonate SDS form of International Antimony Association (i2a)</p> |

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| | <p>4. 【Kaiteidai3ban】 Kinkyujioukyusochishishin Issuance: Japanese Standards Association 5.Kyoyonodonokankoku (2014) Japanese Society of Occupational Health 6.National Institute of Technology and Evaluation (NITE)_ Chemical Risk Information Platform (CHRIP)_Antimony_ 7.OECD-SIAM(October 14-16. 2012)SIDS Initial Assessment Profile 8.TRANSPORT OF DANGEROUS GOODS Model Regulations 17th vol I en United Nation 9. Kagakubusshitsu Anzensei Data Book The Chemical Substance Safety Information Workshop 10.Shokubanoanzen site: GHS taiou model label • model MSDS Jouhou: Antimony Ministry of Health, Labour and Welfare (Japan) 11.Muki kagaku zensho.IV-4 MARUZEN CO., LTD. 12.Sangyouigaku vol.33 1991 13.Antimony SDS form of International Antimony Association (i2a)</p> |
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Each Antimony Metal grades of purity and impurity content.

| | METAL-S | METAL-N | METAL-H 3N | METAL-H 4N | METAL-H 4.5N | METAL-H 5N |
|-------|---------|---------|---------------|---------------|-----------------|---------------|
| Sb(%) | 99.8 | 99.7 | 99.9 | 99.99 | 99.995 | 99.999 |
| As(%) | 0.04 | 0.06 | 0.02 | 4ppm | 2ppm | 1ppm |
| Pb(%) | 0.06 | 0.14 | 0.04 | 11ppm | 5ppm | 1ppm |