

Safety Data Sheet



1. Identification of the Substance/Mixture and the Supplier

Supplier : National Institute of Advanced Industrial Science and Technology (AIST)
 Address : 1-3-1 Kasumigaseki, Chiyoda, Tokyo, Japan
 Office in Charge : Reference Materials Office, Center for Quality Management of Metrology, National Metrology Institute of Japan
 Person in Charge : Certified Reference Material Staff
 Telephone No. : +81-29-861-4059 Fax No. : +81-29-861-4009
 Emergency Contact : Same as above

Prepared on : February 10, 2014

Revised on : August 31, 2022

ID Number : 5606001

Identity of Substance/Mixture : Certified reference material: NMIJ CRM 5606-a
 Single-Crystal Silicon for Positron Defect Measurements
 Recommended Use of the Chemical and Restriction on Use : This reference material can be used for quality control of positron annihilation lifetime measurements of metals featuring position lifetime of about less than 500 ps, semiconductors and other similar samples, and for validation of the measurement methods/results. Do not use this reference material for other purposes than testing/research.
 This CRM is a reference material (specified in the Japanese Industrial Standard (JIS) Q 0030).

2. Hazards Identification

GHS Classification : Not classifiable
 GHS Label Element: Not classifiable
 Signal Word : -
 Hazards Statement : Combustible solid (if in powder form)
 Other Hazards Statement : Harmful if swallowed.
 Cause irritation if in contact with eyes and mucous membrane.
 May cause such symptoms as discomfort, nausea and headache through prolonged exposure.
 Precautionary Statement : [Precaution]
 Easy to be broken. Broken surface may cause incised wound and broken fractions may be scattered. Sharp broken surface may cause damage to human body. Use jigs or appropriate personal protective equipment.
 [Action]
 If scattered fractions are on skin: Rinse away immediately.
 In case of incised wound, treat the wound by arresting hemorrhage, disinfecting, etc. Get medical advice/attention promptly.
 If in eyes: Rinse immediately with clean water for at least 15 minutes. Keep eyelids open during rinsing so as to let water spread over the entire eyes. Do not rub or tightly close eyes to protect them from damage by sharp edge.
 If swallowed: Rinse mouth. Get medical advice/attention.
 [Storage]

Take precautions against fall and shock as this reference material is easy to be broken.

Do not subject to such processing as deforming/grinding/cutting. Protect from direct sunlight. Store in a clean environment at temperature of 15 °C to 35 °C.

Keep away from radiation sources.

[Disposal]

Dispose of this reference material in accordance with applicable legislation and local government ordinance.

Entrust disposal of this reference material to a professional waste disposal company licensed by prefectural governor.

Take note of the handling and storage precautions when disposing of this reference material.

The other hazards than the above do not result in classification or are not classifiable.

3. Composition/Information on Ingredients

Substance/Mixture	:	Substance
Chemical Identity	:	Silicon
Content	:	99.99 % or more
Chemical Formula or Structural Formula	:	Si
Molecular Weight	:	28.09
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : - Industrial Safety and Health Act : -
CAS Number	:	7440-21-3 (Silicon)
TSCA	:	Applicable
EINECS	:	231-130-8 (Silicon)
Hazardous Ingredient	:	-

4. First-aid Measures

If in eyes	:	Rinse immediately with clean water for at least 15 minutes. Get medical advice/attention.
If on skin	:	Remove/Take off contaminated clothing. Rinse skin with clean water for at least 15 minutes. Get medical advice/attention.
If inhaled	:	Remove victim to fresh air and keep him/her warm and at rest. Get medical advice/attention promptly.
If swallowed	:	Give plenty of water and induce vomiting. Get medical advice/attention.
Expected Acute and Delayed Symptom	:	-
Most Critical Characteristic and Symptom	:	-
Protection of First-Aid Responder	:	-

5. Fire-fighting Measures

Extinguishing Media	:	Use special dry chemical extinguisher and dry sand. Do not use water or phosphate extinguishing media.
---------------------	---	--

- Fire-Specific Hazards : Combustible if in powder form. May cause dust explosion. If in powder form, it reacts with water to release combustible or explosive gases. Incombustible if in block form.
- Specific Fire-Fighting Method : Eliminate ignition sources at the origin of a fire and put out fire by using appropriate extinguishing media. Carry out fire-fighting from the windward as much as possible. Take appropriate precautions to avoid release of substances which have negative effects on environment due to use of extinguishing media etc.
- Protection of Fire-Fighters : Carry out fire-fighting from the windward in order to avoid breathing hazardous gas. Use personal protective equipment such as fireproof clothing, heat-resistant clothing, protective clothing, compressed air open-circuit self-contained breathing apparatus, compressed oxygen closed-circuit self-contained breathing apparatus, rubber gloves and rubber boots.

6. Accidental Release Measures

- Personal Precaution : Remove potential ignition sources from the vicinity promptly. Get fire-fighting kit ready to be prepared for ignition.
- Personal Protective Equipment and Emergency Procedures : Ventilate the affected areas thoroughly, if it is in an indoor environment, until the clean-up operation is completed. Use appropriate personal protective equipment during the operation to avoid skin contact of splash etc. and inhalation of dust and gas.
- Environmental Precautions : Take precautions to prevent spillage from draining into rivers etc. to adversely impact the environment. Make it sure to appropriately treat contaminated wastewater in order to prevent untreated wastewater from being released into the surrounding environment.
- Recovery and Neutralization : Collect scattered fractions in containers which can be tightly closed. Do not use electric vacuum cleaner or other sparking tools to collect powder. Use wiping cloth, rag, etc. to wipe out powder.
- Prevention of Secondary Disaster : Mark the restricted area with rope etc. to keep out unauthorized people. Carry out the clean-up operation from the windward and make people on the leeward side evacuate.

7. Handling and Storage

- Handling
- Engineering Precautions : Strict ban on fire. Keep away from hot surfaces/sparks. Avoid contact with strong oxidizers.
- Local and General Ventilation : Use local ventilation system in indoor handling area.
- Precautions for Safe Handling : Appropriately dispose of chips generated in processing as this reference material in powder form is combustible. Take appropriate precautions as this reference material in powder form may react with water to release combustible or explosive gases. Make a place handling this reference material a restricted area to keep out unauthorized people. Use appropriate personal protective equipment to avoid inhalation and contact with eyes, skin and clothing.

Wash hands, face etc. thoroughly and gargle after handling this reference material.

Avoid rough handling such as turning over, dropping, giving a shock to or dragging containers.

Prevent spill, overflow and scattering, and avoid vapor generation.

Keep container tightly closed after use.

Restrict drinking, eating and smoking to a designated area.

Do not bring gloves and other contaminated personal protective equipment into staff room.

Avoid sudden temperature change (thermal shock) which generates cracks on a test sample.

Reduce thermal and mechanical stresses on a test sample in processing as much as possible so as not to allow cracks, breakage and stains on the sample.

Storage

Appropriate Storage Conditions : Protect from direct sunlight. Store in a clean environment at temperature of 15 °C to 35 °C.

Keep away from radiation sources.

Safe Container Packaging Material : Plastic

8. Exposure Controls/Personal Protection

Threshold Limit Value

Not specified

Permissible Concentration

- ACGIH TLV-TWA (2000) : 10 mg/m³
- Value recommended by Japan Society for Occupational Health (1998) : 2 mg/m³ (Respirable fraction)
8 mg/m³ (Total dust)
- OSHA PEL TWA : 8H TWA: 15 mg/m³ (Total dust)
8H TWA: 5 mg/m³ (Respirable fraction)

Engineering Controls

Ventilation/Exhaust : Local ventilation system or General ventilation system

Safety Control/ Gas Detection : Measuring equipment, Detecting tube

Storage Precaution : Keep container tightly closed.
Keep away from moisture
This reference material reacts with water to release combustible or explosive gases.

Personal Protective Equipment (PPE)

Respiratory System : Gas mask for organic gases, Compressed air open-circuit self-contained breathing apparatus

Hands : Protective gloves

Eyes : Safety goggle

Skin and Body : Protective clothing, Face protection

Hygiene Controls

Handle this reference material in accordance with industrial health and safety standards.

9. Physical and Chemical Properties

- Appearance, etc. : Solid (15 mm x 15 mm, 1 mm in thickness)
- Color : Dark gray
- Odor : No data
- pH : No data
- Melting point : 1410 °C
- Boiling point : 2355 °C
- Flashing point : No data
- Explosive range : No data available
May cause dust explosion, however, if in powder form
- Vapor pressure : 4.77 Pa (1414 °C)
- Relative vapor density(Air=1) : No data
- Specific gravity or bulk specific gravity : 2.33 g/cm³ (25 °C)
- Solubility : No data
- *n*-Octanol/water partition coefficient (Log Po/w) : No data
- Auto-ignition temperature : No data

10. Stability and Reactivity

◇Stability

- Stable under normal conditions

◇Reactivity

- Reacts with oxygen at 400 °C or more and with nitrogen at 1000 °C or more to produce silicon (di)oxide and silicon nitride, respectively.
- Reacts with water at high temperature to release explosive hydrogen gas.
- Flaming ignition if in contact with oxidizers.
- Soluble in aqua regia, nitric acid containing hydrogen fluoride and sodium hydroxide.

◇Conditions to Avoid

- Violently reacts with oxidizer, Alkali carbonate, Calcium, Cesium carbide, Chlorine, Fluorine, Metal fluorides, etc.
- Sensitive to moisture.

◇Hazardous Decomposition Products

- Hydrogen

11. Toxicological Information

Acute Toxicity	Rat Oral administration LD50: 3,160 mg/kg (IUCLID:2000) Not classified under JIS classification criteria (falling under Hazard Category 5 of UN classification criteria)
Serious Eye Damage/ Eye Irritation	Eye irritation Rabbit 3 mg Mild (RTECS)

12. Ecological Information

Persistence and Degradability

- No data available

Bioaccumulative Potential

- No data available

Ecotoxicity

- No data available

13. Disposal Considerations

Residual Waste	:	Dispose in accordance with applicable regional, national and local laws and regulations.
Contaminated Container and Package	:	Dispose in accordance with applicable regional, national and local laws and regulations.

14. Transport Information

UN Number	:	1346
UN Classification	:	Class 4.1
Shipping Name	:	Silicon
Packing Group	:	PG III
ICAO/IATA	:	—
Marine Pollutant	:	Not applicable
Precautions	:	Transport this reference material carefully while keeping it away from direct sunlight and fire and preventing accidental release due to falling, overturning, etc.

15. Regulatory Information

◇Fire Service Act

Article 2: Dangerous Goods, Class 2: Metal Powder (Except for those in which what passes through a wire sieve with aperture of 150 μm accounts for less than 50 %)

◇Civil Aeronautics Act

Enforcement Order: Article 194, Dangerous Goods Publication Appendix 4: Combustible Solids (H-Rating 3)

◇Ship Safety Law

Dangerous Goods 1 Rule Article 3: Dangerous Goods Rating 4.1: Combustible Substances (Container Rating 3)

16. Other Information

Others

The information in this document is not intended to be exhaustive and is based on currently available information and data. The measures given in this document are applicable only to normal handling conditions. When handling this reference material under special conditions etc., it is recommended to take safety measures appropriate to each specific application and context of use. This document is intended to provide information and not intended to guarantee anything in handling this reference material.