

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 : May 23, 2008
		Revised on : February 4, 2020
		ID Number : 1101001-1
Identity of Substance/Mixture	: Reference material: NMIJ RM 1101-a Reference material of thermal expansivity (Single crystal of silicon) Form 1	
Recommended Use of the Chemical and Restriction on Use	: This RM is intended to be used in calibrating push-rod dilatometers and thermomechanical analyzers or as a reference specimen in thermal expansion measurements. Do not use this reference material for other purposes than testing/research.	

2. Hazards Identification

GHS Classification	: Not classified Flammable Solid (in powder form)
GHS label element	: -
Signal Word	: -
Other Hazards Statement	: Toxic if inhaled or swallowed. If in eyes or on mucous membranes, it causes a stimulatory effect. May cause such symptoms as discomfort, nausea and headache through prolonged exposure.
Precautionary Statement	: [Precaution] Use appropriate personal protective equipment. Avoid release to the environment. When dust is generated, seal the source, and wear respiratory protection equipment. [First Aid Measure] If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If on skin: Wash with plenty of soap and water. Then Remove/Take off all contaminated clothing and adhered materials. If skin irritation or rash occurs: Get medical advice/attention.

Immediately get medical advice/attention if you feel unwell.

[Storage]

Seal the case and stored at a clean, dry and well-ventilated place at normal room temperature.

[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.

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

3. Composition/Information on Ingredients

Single substance/Mixture	: Single
Chemical name	: Silicon single crystal
Chemical Formula or	: Si
Structural Formula	
Amount	: 100 %
Reference Number in	: Act on the Evaluation of Chemical Substances and Regulation
Gazetted List in Japan	of Their Manufacture, etc. :-
	Industrial Safety and Health Act :-
CAS No.	: 7440-21-3

4. First-aid Measures

If in Eyes	: Rinse cautiously with clean water for over 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/attention immediately.
If on skin	: Remove contaminated clothes, shoes, and garment. Rinse away thoroughly with plenty of clean water. If developing some symptoms, seek medical advice as needed.
If Inhaled	: Remove victim to fresh air and keep at rest and warm. Get medical advice/attention.
If Ingested	: Rinse mouth thoroughly with water. Drink a lot of water then it induces vomiting. Immediately call a physician.
Protecting Personnel in emergency measures	: Wear protective equipment such as rubber gloves, eye protective goggles.

5. Fire-fighting Measures

Extinguishing Media	: Use powder or sand. Do not use water and water-based fire-extinguishing agent.
Fire-Specific Hazards	: This CRM is nonflammable. But powdered material is flammable, there is a possibility of dust explosion. For powdered material may react with water liberating flammable

- or explosive gases.
- Specific Fire-Fighting Method : Eliminate ignition sources at the origin of a fire and put out fire by using appropriate extinguishing media. It is necessary to perform the appropriate action not to spill substances which have adverse influences, into the environment by water cannon, etc. for firefighting.
- Protection of Fire-Fighters : Carry out fire-fighting from the windward in order to avoid breathing hazardous gas. Use personal protective equipment such as fire protection clothing, heat-resistant clothing, protective clothing, breathing apparatus, circulating oxygen respirator, rubber gloves, and rubber boots.

6. Accidental Release Measures

- Personal Precaution : Remove ignition source in the vicinity immediately. Prepare fire-fighting equipment for the possibility of fires.
- 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 powder in empty containers and close the containers tightly. For recovery of scattered powder, do not use electric vacuum cleaner etc. which may be fire sources. Collect powders using waste clothes or wiping clothes, and collect in empty containers
- 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 : Do not handle with bare hands.
- Local and General Ventilation : When dust is generated, seal the source, and provide local exhaust ventilation or central ventilation.
- Precautions for Safe Handling : Since powder of this reference material is flammable, chips generated in cutting need to be handled appropriately. Since powder of this reference material, when reacting with water, may release flammable or explosive gases, it needs to be handled appropriately. 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.
Keep container tightly closed after using this reference material.

Storage

- Appropriate Storage : • Keep out heat sources and store in a dry state and sealed.
Conditions : • This RM should be kept at room temperature (23 °C ± 5 °C), at relative humidity (50% or less).
Safe Container : Polyethylene
Packaging Material

8. Exposure Controls/Personal Protection

Threshold Limit Value

Not assigned

Permissible Concentration

- ACGIH TLV-TWA : 10 mg/m³
- Values recommended by Japan Society for Occupational Health (2000) : 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

Facility engineering

- Keep container tightly closed and avoid exposure to moisture.
- For powdered material may react with water liberating flammable or explosive gases.
- Install facilities to rinse eyes and to wash hands and body in the vicinity of a place handling this reference material and label them.

Personal Protective equipment

- Respiratory protection : Protective dust mask, if necessary
- Hands : Protective gloves
- Eyes : Eye protector (Goggle type as necessary)
- Skin and Body : Protective clothing, face mask

Hygiene measure : Treat in accordance with rules on Industrial hygiene and Industrial safety.

9. Physical and Chemical Properties

- Appearance, etc. : Rectangular block with a base of 4.5 mm × 4.5 mm and a length of 60 mm (Form 1)
- Color : Dark blue-black
- Odor : No data
- pH : No data
- Melting point : 1410 °C
- Boiling point : 2355 °C
- Flashing point : No data
- Explosive range : This CRM is nonflammable. But powdered material is

	flammable, there is a possibility of dust explosion.
Vapor pressure	: 4.77 Pa (1414 °C)
Relative vapor density (Air=1)	: No data
Specific gravity or bulk specific gravity	: No data
Solubility	: No data
<i>n</i> -Octanol/water partition coefficient (Log Po/w)	: No data
Auto-ignition temperature	: No data

10. Stability and Reactivity

◇Stability

- Stable in 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

- This RM reacts with oxidizing substances, alkali carbonates, calcium, cesium carbide, chlorine, fluorine, and fluoride of the metal violently.
- This RM is sensitive to moisture.

◇Hazardous Decomposition Products

- Hydrogen (H₂)

11. Toxicological Information

Note: The information about the toxicity related to this product has been investigated in the forefront of the way but pay enough attention to the handling as those with an unknown toxic.

Acute Toxicity	Oral Rat LD50: 3160 mg/kg
Serious Eye Damage/ Eye Irritation	Eye irritation Rat: 3 mg (mild) (RTECS)

12. Ecological Information

Ecotoxicity	: No data
Persistence and Degradability	: No data
Bioaccumulative Potential	: No data
Mobility in soil	: No data
Influence to the ozone layer	: No data

13. Disposal Considerations

- Dispose in accordance with applicable regional, national and local laws and

regulations.

- Dispose of containers after thoroughly removing their contents.

14. Transport Information

UN Number : 1346 (Name and Description: SILICON POWDER, AMORPHOUS/Class and division: 4.1)
 UN Classification : Not applicable
 Shipping Name : Silicon single crystal
 Packing Group : III
 ICAO/IATA : -
 Marine Pollutant : Not applicable
 Precautions : Transport with care avoiding leakage due to accidents such as drop and fall, as well as fire.

15. Regulatory Information

◇Industrial Safety and Health Act

Not applicable

◇Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.

Not applicable

◇Fire Service Act

Article 2, category 2 metal powders (except powders whose content of powders with powder size less than 150 μm (screen size) is less than 50 %)

◇Civil Aeronautics Act

Ordinance for Enforcement of the Civil Aeronautics Act, Article 194, Dangerous Goods, Flammable Solid (Class H-3)

◇Ship Safety Law

Dangerous Material Rule article 3, Hazardous class 4.1 Flammable substances (container grade 3)

◇TSCA (Toxic Substances Control Act (a United States federal government law))

Assigned (Silicon)

- ◎ **This SDS is originally prepared for the use of the material in Japan, thus the stated laws and regulations are stipulated and carried out in Japan. The use of the material in other countries should be referred to and by application of the relevant laws and regulations of the country in which the material will be used.**

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.