

# Safety Data Sheet



## 1. Identification of the Substance/Mixture and the Supplier

Supplier : National Institute of Advanced Industrial Science and Technology (AIST)  
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 Office in Charge : Reference Materials Office, Center for Quality Management of Metrology, National Metrology Institute of Japan  
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 Emergency Contact : Same as above

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 ID Number : 5604001

Identity of Substance/Mixture : Certified reference material: NMIJ CRM 5604-a  
 Recommended Use of the Chemical and Restriction on Use : Low Energy Arsenic Implanted Silicon (Level:  $6 \times 10^{14}$  atoms/cm<sup>2</sup>)  
 : This CRM is intended for use in calibrating the response of a secondary ion mass spectrometry (SIMS) or a Rutherford backscattering spectrometry instrument for ion-implanted arsenic with an average implantation depth of ca. 10nm in a silicon matrix. Do not use this reference material for other purposes than testing/research.

## 2. Hazards Identification

GHS Classification: Not classified  
 GHS Label Element: Not classified  
 Signal Word: -  
 Hazards Statement: -  
 Other Hazards Statement: Toxic if inhaled or swallowed.  
 Causes irritation if in eyes or if in contact with mucous membrane.  
 May cause such symptoms as discomfort, nausea and headache through prolonged exposure.  
 Precautionary Statement: [Precaution]  
 Use appropriate personal protective equipment.  
 Wash hands thoroughly after handling.  
 Get the instruction manual before use. Do not handle until all safety precautions have been read and understood.  
 [Action]  
 If on eyes or skin, Rinse eyes and skin with clean water.  
 Immediately get medical advice/attention.  
 [Storage]  
 Keep out from direct sun light and store at clean place at normal

room temperature.

Store in dry air or nitrogen atmosphere.

[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

Substance/Mixture	:	Single substance
Chemical name	:	Silicon
Chemical 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 No.	:	7440-21-3
Hazardous substance	:	-

※This CRM contains elements below;

Arsenic (As) :78.6 ng/cm<sup>2</sup>

### 4. First-aid Measures

If in Eyes	:	Rinse cautiously with clean water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/attention immediately.
If on Skin	:	Remove/Take off contaminated clothing, etc. Rinse thoroughly with clean water. Wash polluted clothing, if reuse them.
If Inhaled	:	Remove victim to fresh air and keep at rest and warm. Get medical advice/attention immediately.
If Ingested	:	Rinse mouth thoroughly with water. Drink a lot of water then it induces vomiting. Immediately call a physician.
Predicted immediate and delayed symptoms	:	If in eyes or on mucous membranes, it causes a stimulatory effect..
Most important symptom/effect	:	
Protecting Personnel in emergency measures	:	

## 5. Fire-fighting Measures

- Extinguishing Media : Use powder or sand. Do not use water and water-based fire-extinguishing agent.
- Fire-Specific Hazards : Powder is flammable, there is a possibility of dust explosion. For powdered CRM, it may react with water and liberate flammable or explosive gases. In the case of bulk this CRM is non-flammable.
- Specific Fire-Fighting Method : Eliminate ignition sources at the origin of a fire and put out fire by using extinguishing media. Remove movable containers promptly to a safe place. In the case of immovable containers, cool their surroundings with sprayed water.
- 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 Use 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

- Since the doped arsenic is likely to elute, do not remove the natural oxide film on the

surface in cleaning or do not perform processing such as dissolving this product.

- Avoid high temperature or heat treatment because doped arsenic in this CRM may diffuse and the CRM may degrade by these treatments.
- Powder is flammable. As the powder may react with water to release the flammable or explosive gas, then take appropriate action.
- Make a place handling this reference material a restricted area to keep out unauthorized people.
- Keep container tightly closed after using this reference material.
- Wash hands, face etc. thoroughly and gargle after handling this reference material.
- Keep out heat sources and store in a dry state and sealed.

**Storage**

Appropriate Storage : • Keep out of sunlight. Store in clean place at normal room temperature.

Conditions : • Store in a dry air or nitrogen atmosphere.

Safe Container : Plastic case

Packaging Material

## 8. Exposure Controls/Personal Protection

**Threshold Limit Value**

- Not specified

**Permissible Concentration**

- ACGIH TLV(s) : TWA 10 mg/m<sup>3</sup>
- Values recommended by Japan Society for Occupational Health : 2 mg/m<sup>3</sup> (respirable fraction)
- OSHA PEL : 8 mg/m<sup>3</sup>(total dust)
- OSHA PEL : 8H TWA 15 mg/m<sup>3</sup>(total dust)
- OSHA PEL : 8H TWA 5 mg/m<sup>3</sup>(respirable fraction)

**Facility engineering**

- In the case of handling in indoor workplaces, use a local exhaust ventilation.
- 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

**Hygiene measure**

Treat in accordance with rules on Industrial hygiene and Industrial safety.

## 9. Physical and Chemical Properties

- Appearance, etc. : Square plate with 0.8 mm thick and 15 mm square
- Color : Dark blue-black
- Odor : No data
- pH : No data
- Melting point : 1410 °C
- Boiling point : 2355 °C

- Flashing point : No data
- Explosive range : No data
- Vapor pressure : No data
- Relative vapor density(Air=1) : No data
- Specific gravity or bulk specific gravity : 2.33 g/cm<sup>3</sup>
- Solubility : Soluble in Aqua regia, nitric acid containing the hydrogen fluoride, sodium hydroxide solution.
- *n*-Octanol/water partition coefficient (Log Po/w) : No data
- Auto-ignition temperature : No data

## 10. Stability and Reactivity

### ◇Stability

- Stable in normal conditions

### ◇Reactivity

- React with oxygen at 400 °C or above, to produce a silicon oxide. React with nitrogen at 1000 °C or above, resulting in a silicon oxide and silicon nitride.
- Reacts with water at high temperatures to release the explosion of the original gas.
- Soluble in Aqua regia, nitric acid containing the hydrogen fluoride, sodium hydroxide solution.

### ◇Conditions to Avoid

- Sunlight, Heat, High humidity

### ◇Hazardous Decomposition Products

- No data

## 11. Toxicological Information

Acute Toxicity	Oral	Rat LD50	3160 mg/kg (RTECS)
	Abdominal cavity	Rat LDLo	500 mg/kg (RTECS)
Serious Eye Damage/ Eye Irritation	Eye Irritation	Rabbit	3 mg (mild) (RTECS)

## 12. Ecological Information

Degradability, concentration

- No-data

Bioaccumulative Potential

- No-data

Ecotoxicity

- No-data

## 13. Disposal Considerations

- Dispose of this reference material in accordance with applicable legislation and local government ordinance.
- When the above-mentioned treatments are not possible, entrust disposal of residual waste

to a professional waste disposal company licensed by prefectural governor.

- Dispose of containers after thoroughly removing their contents.

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#### 14. Transport Information

UN Number	: 1346
UN	: Class 4.1
Classification	
Material name	: Silicon
Container	: PG III
grade	
ICAO/IATA	: —
Marine	: N/A
pollutant	
Precautions	: Avoid direct sunlight and transfer with care not to spill/leak by dropping or falling, etc.

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#### 15. Regulatory Information

◇ 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)

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

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#### 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.

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