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: December 18, 2015
Revised on: March 31, 2017
ID Number: 5804002

Identity of Substance/Mixture: Certified reference material: NMIJ CRM 5804-b
Recommended Use: Isotropic Graphite for Thermal Diffusivity Measurement

Recommended Use: This certified reference material (CRM) is intended for use in the calibration or confirming the validity of instruments for thermal diffusivity measurements. 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: Not classified

Other Hazards: Flammable Solid (Powder form)
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]
A low risk in normal handling. Use appropriate personal protective 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: Rinse with water then get medical advice/attention.

[Storage]
Keep away from strong oxidizers.
This CRM should be stored in an environment with a temperature of
23 °C ± 5 °C and a relative humidity of 50% or less.

[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

<table>
<thead>
<tr>
<th>Substance or mixture</th>
<th>Single</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical name</td>
<td>Graphite</td>
</tr>
<tr>
<td>Synonym</td>
<td>Black lead</td>
</tr>
<tr>
<td>Substance or mixture</td>
<td>99.99%</td>
</tr>
<tr>
<td>Chemical or structural formula</td>
<td>C</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>288.26</td>
</tr>
<tr>
<td>Reference Number in Gazette List in Japan</td>
<td>Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -</td>
</tr>
<tr>
<td></td>
<td>Industrial Safety and Health Act : -</td>
</tr>
<tr>
<td>CAS No.</td>
<td>7782-42-5 (Graphite)</td>
</tr>
<tr>
<td>TSCA</td>
<td>Graphite</td>
</tr>
<tr>
<td>EINECS</td>
<td>231-955-3 (Graphite)</td>
</tr>
<tr>
<td>Hazardous substance</td>
<td>-</td>
</tr>
</tbody>
</table>

4. First-aid Measures

If in Eyes : Wash eyes with plenty of clean water for several minutes. Seek medical attention, if necessary.
If on skin : Rinse with plenty of clean water. Seek medical attention, if necessary.
If Inhaled : Remove victim to fresh air and keep at rest and warm. Get medical advice/attention.
If Ingested : Rinse mouth thoroughly with water and keep at rest. Seek medical attention, if necessary.
Expected Acute and Delayed Symptom : -
Most Critical Characteristic and Symptom Protection of First-Aid Responder : Use personal protective equipment.

5. Fire-fighting Measures

Extinguishing Media : Water spray, Dry chemical extinguishing agent, Foam extinguishing agent, Carbon dioxide (CO₂)
### 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 prevent substances affecting the environment from leaking out when spraying water etc. to extinguish fire. Transfer the movable container to a safe place promptly. If impossible to transfer, use water spray to cool the periphery.

### 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.

### Fire-Specific Hazards
Ignition temperature is 500 to 600 °C or more in the air. And it can cause a spontaneous ignition when it is in a large amount. It may cause a dust explosion when the powder is suspended above a certain amount in the air. Combustion product gas is generated. (CO, CO2)

### 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 such as self-contained breathing apparatus, rubber boots and heavy rubber gloves 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 the contaminated items in an empty container that can be sealed. If it is possible, use with wet waste clothes, wet wiping clothes to collect spillage. Then rinse away the remains with plenty of water.

#### 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 and sparks. Do not allow contact
with strong oxidizer.

**Local and General Ventilation**
In the case of handling in indoor workplaces, use local exhaust ventilation when dust when dust is generated.

**Precautions for Safe Handling**
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 using this reference material. Wash hands, face etc. thoroughly and gargle after handling this reference material.
Restrict drinking, eating and smoking to a designated area. Use appropriate personal protective equipment to avoid inhalation and contact with eyes, skin and clothing.
Do not bring gloves and other contaminated personal protective equipment into staff room.
Make a place handling this reference material a restricted area to keep out unauthorized people.

**Storage**
**Appropriate Storage Conditions**
Avoid direct sunlight and store in clean and well ventilated place such as a desiccator at normal room temperature. This RM should be kept as closed state at room temperature (23 °C ± 5 °C), at relative humidity (50% or less).

**Safe Container/ Packaging Material**
Polyethylene

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### 8. Exposure Controls/Personal Protection

**Threshold Limit Value**
No data

**Permissible Concentration (Graphite)**
- ACGIH TLV-TWA : 2 mg/m³
- Values recommended by Japan Society for Occupational Health : Not assigned
- OSHA PEL TWA : Not assigned

**Facility engineering**
**Ventilation/Exhaust**
Use local ventilation system or general ventilation system when dust is generated.

**Safety Control/Gas Detection**
Measuring equipment, Detecting tube

**Storage Precaution**
Ventilate along floor surface. Seal. Keep away from flammable substances, reducing agents and strong oxidizers.

**Personal Protective equipment**
**Respiratory System**
Dust mask

**Hands**
Protective gloves

**Eyes**
Eye protector (Goggle type as necessary)

**Skin and Body**
Protective clothing, Protective face mask
Hygiene Controls
Handle this reference material in accordance with industrial health and safety standards.

9. Physical and Chemical Properties

- **Appearance, etc.**
  - This CRM was in the form of disks with a diameter of 10 mm and thicknesses of 1.4 mm, 2.0 mm, 2.8 mm, and 4.0 mm; further, the CRM was stored in a plastic case.

- **Color**
  - Black

- **Odor**
  - No data

- **pH**
  - No data

- **Melting point**
  - 3338 °C

- **Boiling point**
  - 3700 °C ~ 4300 °C

- **Flashing point**
  - No data. Flammable in a certain condition

- **Explosive range**
  - No data. Powdered material is flammable; there is a possibility of dust explosion.

- **Vapor pressure**
  - 0.001 Pa (2000 °C)

- **Relative vapor density (Air=1)**

- **Specific gravity or bulk specific gravity**
  - 1.7 to 1.9

- **Solubility**
  - Insoluble in water

- **n-Octanol/water partition coefficient (Log Po/w)**
  - No data

- **Auto-ignition temperature**
  - No data. Ignition temperature is 500 to 600 °C or more in the air. And it can cause a spontaneous ignition when it is in a large amount. It may cause a dust explosion when the powder is suspended above a certain amount in the air. Flammable in a certain condition

- **Electric conductivity**
  - Electric conductive

10. Stability and Reactivity

◇ Stability
  - Stable in normal conditions

◇ Reactivity
  - Reacts with fluorine at room temperature.

◇ Conditions to Avoid
  - Contact with strong oxidizing substances

◇ Hazardous Decomposition Products
  - Carbon monoxide (CO)

11. Toxicological Information

Other
※ For the toxicity information, due to no information as a mixture, it is originated from the information about raw materials.

The present product is stable under the normal condition, and there is no hazard such as eluting any harmful additive agent ingredients; however, in case of special handling such as its use under higher temperature, sufficient measures for safety should be taken.

### 12. Ecological Information

**Persistence and Degradability**
- No data available

**Bioaccumulative Potential**
- No data available

**Ecotoxicity**
- No data available

### 13. Disposal Considerations

<table>
<thead>
<tr>
<th>Residual Waste</th>
<th>Landfill disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dispose in accordance with applicable regional, national and local laws and regulations.</td>
</tr>
<tr>
<td></td>
<td>When the above-mentioned treatments are not possible, entrust disposal of residual waste to a professional waste disposal company licensed by prefectural governor.</td>
</tr>
</tbody>
</table>

| Contaminated Container and Package | Dispose of containers after thoroughly removing their contents. |

### 14. Transport Information

**UN Number**
- Not applicable

**UN Classification**
- —

**Shipping Name**
- —

**Packing Group**
- —

**ICAO/IATA**
- —

**Marine Pollutant**
- Not applicable

**Precautions**
- Check before transport if containers are free from leakage.
- Load in a way to avoid overturning, falling and being broken, and take all necessary measures to prevent collapsing

### 15. Regulatory Information

- No applicable legislations

### 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.