1 Identification of the substance/mixture and of the company/undertaking

Product identifier
Product name: Silicon(IV) oxide
Stock number: 10856
CAS Number: 14808-60-7
EC number: 238-878-4

Relevant identified uses of the substance or mixture and uses advised against.
Sector of Use SU24  Scientific research and development

Details of the supplier of the safety data sheet
Manufacturer/Supplier:
Alfa Aesar, A Johnson Matthey Company
Johnson Matthey Catalog Company, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com

Information Department: Health, Safety and Environmental Department
Emergency telephone number:
During normal hours the Health, Safety and Environmental Department at (800) 343-0660. After normal hours call Carechem 24 at (866) 928-0789.

2 Hazards identification
Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008

GHS08 Health hazard
Carc. 1B  H350  May cause cancer.
STOT RE 2  H373  May cause damage to organs through prolonged or repeated exposure.

Classification according to Directive 67/548/EEC or Directive 1999/45/EC
T; Toxic
R49: May cause cancer by inhalation.
Xn; Harmful
R48/20: Harmful: danger of serious damage to health by prolonged exposure through inhalation.

Information concerning particular hazards for human and environment: Not applicable

Label elements
Labelling according to Regulation (EC) No 1272/2008
The substance is classified and labelled according to the CLP regulation.
Hazard pictograms

GHS08

Signal word Danger
Hazard statements
H350 May cause cancer.
H373 May cause damage to organs through prolonged or repeated exposure.

Precautionary statements
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P281 Use personal protective equipment as required.
P308+P313 IF exposed or concerned: Get medical advice/attention.
P314 Get medical advice/attention if you feel unwell.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

(Contd. on page 2)
Safety Data Sheet
According to OSHA and ANSI

Product name: Silicon(IV) oxide

Hazard description:
WHMIS classification
D2A - Very toxic material causing other toxic effects

Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)

| HEALTH | 1 | Health (acute effects) = 1 |
| FIRE | 0 | Flammability = 0 |
| REACTIVITY | 0 | Reactivity = 0 |

Other hazards
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

3 Composition/information on ingredients

Chemical characterization: Substances
CAS# Description:
14808-60-7 Silicon(IV) oxide
Identification number(s):
EC number: 238-878-4

4 First aid measures

Description of first aid measures
After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.
After swallowing
Seek medical treatment.
Information for doctor
Most important symptoms and effects, both acute and delayed
No further relevant information available.
Indication of any immediate medical attention and special treatment needed
No further relevant information available.

5 Firefighting measures

Extinguishing media
Suitable extinguishing agents
Product is not flammable. Use fire fighting measures that suit the surrounding fire.
Special hazards arising from the substance or mixture
If this product is involved in a fire, the following can be released:
Silicon oxide
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Environmental precautions:
Do not allow material to be released to the environment without proper governmental permits.
Methods and material for containment and cleaning up:
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
Product name: Silicon(IV) oxide

Reference to other sections
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

Handling
Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Open and handle container with care.

Information about protection against explosions and fires: The product is not flammable

Conditions for safe storage, including any incompatibilities

Storage
Requirements to be met by storerooms and receptacles: No special requirements.
Information about storage in one common storage facility: No information known.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.

Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters

Components with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>14808-60-7</th>
<th>Silicon(IV) oxide (100.0%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>see Quartz listing</td>
</tr>
<tr>
<td>REL (USA)</td>
<td>0.05* mg/m³</td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>0.025* mg/m³</td>
</tr>
<tr>
<td>EL (Canada)</td>
<td>0.025 mg/m³</td>
</tr>
<tr>
<td>EV (Canada)</td>
<td>0.10* mg/m³</td>
</tr>
</tbody>
</table>

Additional information: No data

Exposure controls
Personal protective equipment
General protective and hygienic measures
The usual precautory measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Maintain an ergonomically appropriate working environment.

Breathing equipment: Use suitable respirator when high concentrations are present.

Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.
The selection of suitable gloves not only depends on the material, but also on quality.
Quality will vary from manufacturer to manufacturer.

Eye protection: Safety glasses
Body protection: Protective work clothing.

9 Physical and chemical properties

Information on basic physical and chemical properties

General Information
Appearance:
Form: Powder or granules
Color: White to pale brown
Odor: Odorless
Safety Data Sheet
According to OSHA and ANSI

Product name: Silicon(IV) oxide

<table>
<thead>
<tr>
<th>Odor threshold:</th>
<th>Not determined.</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH-value:</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

**Change in condition**
- Melting point/Melting range: 1710°C (3110 °F)
- Boiling point/Boiling range: 2230°C (4046 °F)
- Sublimation temperature / start: Not determined
- Flammability (solid, gaseous): Not determined.
- Ignition temperature: Not determined.
- Decomposition temperature: Not determined.
- Auto igniting: Not determined.
- Explosion limits: Not determined.
- Lower: Not determined
- Upper: Not determined
- Vapor pressure: Not applicable.
- Density: Not determined
- Relative density: Not determined.
- Vapor density: Not applicable.
- Evaporation rate: Not applicable.
- Solubility in / Miscibility with Water: Insoluble
- Partition coefficient (n-octanol/water): Not determined.
- Viscosity: dynamic: Not applicable.
- kinematic: Not applicable.
- Other information: No further relevant information available.

10 Stability and reactivity

**Reactivity**
- Thermal decomposition / conditions to be avoided: Decomposition will not occur if used and stored according to specifications.
- Possibility of hazardous reactions: No dangerous reactions known.
- Incompatible materials: No information known.
- Hazardous decomposition products: Silicon oxide.

11 Toxicological information

**Information on toxicological effects**
- Acute toxicity:
- Primary irritant effect:
  - on the skin: May cause irritation
  - on the eye: May cause irritation
- Sensitization: No sensitizing effects known.
- Additional toxicological information:
  - To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
  - AGIHH A2: Suspected human carcinogen: Agent is carcinogenic in experimental animals at dose levels, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) considered relevant to worker exposure. Available epidemiologic studies are conflicting or insufficient to confirm an increased risk of cancer in exposed humans.
  - IARC-1: Carcinogenic to humans: sufficient evidence of carcinogenicity.
  - NTP-K: Known to be carcinogenic: sufficient evidence from human studies.

The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute and/or other multiple dose toxicity data for components in this product.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains reproductive and/or mutation data for components in this product.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for components in this product.

12 Ecological information

**Toxicity**
- Aquatic toxicity: No further relevant information available.
- Persistence and degradability: No further relevant information available.
- Behavior in environmental systems:
- Bioaccumulative potential: No further relevant information available.
- Mobility in soil: No further relevant information available.
Product name: Silicon(IV) oxide

Additional ecological information:
General notes:
Do not allow material to be released to the environment without proper governmental permits.
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.
Other adverse effects No further relevant information available.

13 Disposal considerations
Waste treatment methods
Recommendation Consult state, local or national regulations to ensure proper disposal.
Uncleaned packaging:
Recommendation: Disposal must be made according to official regulations.

14 Transport information

<table>
<thead>
<tr>
<th>UN-Number</th>
<th>DOT, ADR, ADN, IMDG, IATA</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN proper shipping name</td>
<td>DOT, ADR, ADN, IMDG, IATA</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Transport hazard class(es)</td>
<td>DOT, ADR, ADN, IMDG, IATA</td>
<td>Not applicable</td>
</tr>
<tr>
<td>class</td>
<td>DOT, ADR, ADN, IMDG, IATA</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Packing group</td>
<td>DOT, ADR, IMDG, IATA</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Environmental hazards:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine pollutant:</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Special precautions for user</td>
<td></td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code</td>
<td></td>
<td>Not applicable.</td>
</tr>
<tr>
<td>UN &quot;Model Regulation&quot;:</td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

15 Regulatory information
Safety, health and environmental regulations/legislation specific for the substance or mixture
National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
All components of this product are listed on the Canadian Domestic Substances List (DSL).
Information about limitation of use: For use only by technically qualified individuals.
Other regulations, limitations and prohibitive regulations
Substances of very high concern (SVHC) according to REACH, Article 57
Substance is not listed.
REACH - Pre-registered substances Substance is listed.
Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information
Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing MSDS: Health, Safety and Environmental Department.
Contact: Zachariah C. Holt
Global EHS Manager

Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)