SECTION 1: Identification

1.1. Identification

Product name: GERMANIUM DIOXIDE, 99.99%
Product code: GEG5300
Product form: Substance
Physical state: Solid
Formula: GeO2
Synonyms: GERMANIA
Chemical family: METAL OXIDE

1.2. Recommended use and restrictions on use

Recommended use: Chemical intermediate

1.3. Supplier

GELEST, INC.
11 East Steel Road
Morrisville, PA 19067
USA
T 215-547-1015 - F 215-547-2484 - (M-F): 8:00 AM - 5:30 PM EST
info@gelest.com - www.gelest.com

1.4. Emergency telephone number

Emergency number: CHEMTREC: 1-800-424-9300 (USA); +1 703-527-3887 (International)

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

Acute toxicity (oral) Category 4 H302 Harmful if swallowed

2.2. GHS Label elements, including precautionary statements

Signal word (GHS US): Warning
Hazard statements (GHS US): H302 - Harmful if swallowed
Precautionary statements (GHS US): P264 - Wash hands thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P303 - Rinse mouth.
P301+P312 - If swallowed: Call a doctor if you feel unwell
P501 - Dispose of contents/container to licensed waste disposal facility.

SECTION 3: Composition/Information on ingredients

3.1. Substances

Substance type: Mono-constituent
Name: GERMANIUM DIOXIDE, 99.99%
CAS-No.: 1310-53-8

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>GHS-US classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germanium oxide</td>
<td>(CAS-No.) 1310-53-8</td>
<td>98-100</td>
<td>Acute Tox. 4 (Oral), H302</td>
</tr>
</tbody>
</table>

Full text of hazard classes and H-statements: see section 16

3.2. Mixtures

Not applicable
SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general: Remove contaminated clothing and shoes. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). If possible show this sheet; if not available show packaging or label.

First-aid measures after inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If you feel unwell, seek medical advice.

First-aid measures after skin contact: Wash with plenty of soap and water. Get medical advice/attention.

First-aid measures after eye contact: Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/attention.

First-aid measures after ingestion: Never give anything by mouth to an unconscious person. Get medical advice/attention.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after inhalation: May cause irritation to the respiratory tract. Inhalation of large amounts is expected to cause necrosis of tracheal epithelium, bronchitis and interstitial pneumonia.

Symptoms/effects after skin contact: Reported to be non-irritating.

Symptoms/effects after eye contact: May cause irritation or conjunctivitis by dissolving to form germanic acid, a weak acid.

Symptoms/effects after ingestion: Harmful if swallowed. Swallowing a small quantity of this material will result in serious health hazard.

Chronic symptoms: Inhalation- Animal studies indicate morphological changes of the respiratory tract such as thickening of the alveolar partitions and hyperplasia of the lymphastic vessels around the bronchi and blood vessels. Ingestion- Rats fed 100ppm for 14 weeks showed stimulated growth. Those fed 1000ppm showed depressed growth and suffered 50% mortality. Kidney damage has been reported in humans and animals.

4.3. Immediate medical attention and special treatment, if necessary

No additional information available

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: None known.

Unsuitable extinguishing media: None known.

5.2. Specific hazards arising from the chemical

Fire hazard: Irritating fumes and organic acid vapors may develop when material is exposed to elevated temperatures or open flame.

Explosion hazard: None known.

5.3. Special protective equipment and precautions for fire-fighters

Protection during firefighting: Do not attempt to take action without suitable protective equipment. Avoid contact with skin and eyes. Do not breathe dust.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Protective equipment: Wear protective equipment as described in Section 8.

Emergency procedures: Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment: Do not attempt to take action without suitable protective equipment. Equip cleanup crew with proper protection. For further information refer to section 8: “Exposure controls/personal protection”.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

For containment: Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams.

Methods for cleaning up: Sweep or shovel spills into appropriate container for disposal.

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling: Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Provide local exhaust or general room ventilation to minimize exposure to dust.
### Hygiene measures
- Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing before reuse.

### Storage conditions
- Keep container tightly closed.

### Incompatible materials
- Compatible with most materials. Dissolves in strong acid or base.

### SECTION 8: Exposure controls/personal protection

#### Control parameters

<table>
<thead>
<tr>
<th>Germanium oxide (1310-53-8)</th>
<th>OSHA</th>
<th>OSHA PEL (TWA) (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA</td>
<td></td>
<td>15 mg/m³ nuisance dust</td>
</tr>
</tbody>
</table>

#### Appropriate engineering controls
- Provide local exhaust or general room ventilation.

#### Individual protection measures/Personal protective equipment

**Personal protective equipment:**
Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

**Hand protection:**
Neoprene or nitrile rubber gloves

**Eye protection:**
Chemical goggles. Contact lenses should not be worn

**Skin and body protection:**
Wear suitable protective clothing

**Respiratory protection:**
Where exposure through inhalation may occur from use, respiratory protection equipment is recommended. NIOSH-certified dust and mist (orange cartridge) respirator.

### SECTION 9: Physical and chemical properties

#### Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Powder.</td>
</tr>
<tr>
<td>Molecular mass</td>
<td>104.59 g/mol</td>
</tr>
<tr>
<td>Color</td>
<td>White.</td>
</tr>
<tr>
<td>Odor</td>
<td>No data available</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>Refractive index</td>
<td>1.99</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point</td>
<td>1086 °C</td>
</tr>
<tr>
<td>Freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling point</td>
<td>No data available</td>
</tr>
<tr>
<td>Flash point</td>
<td>No data available</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Non flammable.</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative vapor density at 20 °C</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative density</td>
<td>4.703</td>
</tr>
<tr>
<td>Specific gravity / density</td>
<td>1.3 - 1.4 g/ml Bulk density</td>
</tr>
<tr>
<td>% Volatiles</td>
<td>0 %</td>
</tr>
<tr>
<td>Solubility</td>
<td>Water: 4.47 g/l @ 25°C; 10.7 g/l @ 100°C</td>
</tr>
<tr>
<td>Log Pow</td>
<td>No data available</td>
</tr>
<tr>
<td>Log Kow</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td>No data available</td>
</tr>
</tbody>
</table>
GERMANIUM DIOXIDE, 99.99%
Safety Data Sheet

Viscosity, dynamic : No data available
Explosive properties : No data available
Oxidizing properties : No data available
Explosion limits : No data available

9.2. Other information
No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity
No additional information available

10.2. Chemical stability
Stable.

10.3. Possibility of hazardous reactions
No additional information available

10.4. Conditions to avoid
None known.

10.5. Incompatible materials
Compatible with most materials. Dissolves in strong acid or base.

10.6. Hazardous decomposition products
Germanium oxides.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

<table>
<thead>
<tr>
<th>Acute toxicity</th>
<th>Not classified</th>
</tr>
</thead>
</table>

**GERMANIUM DIOXIDE, 99.99% (1310-53-8)**

<table>
<thead>
<tr>
<th>ATEx US (oral)</th>
<th>1250 mg/kg body weight</th>
</tr>
</thead>
</table>

**Germanium oxide (1310-53-8)**

<table>
<thead>
<tr>
<th>LD50 oral rat</th>
<th>1250 mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 intraperitoneal rat</td>
<td>750 mg/kg</td>
</tr>
<tr>
<td>LC50 inhalation rat (mg/l)</td>
<td>&gt; 1420 mg/m³ (Exposure time: 4 h)</td>
</tr>
<tr>
<td>ATE US (oral)</td>
<td>1250 mg/kg body weight</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation : Not classified
Serious eye damage/irritation : Not classified
Respiratory or skin sensitization : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified
Reproductive toxicity : Not classified
Specific target organ toxicity – single exposure : Not classified
Specific target organ toxicity – repeated exposure : Not classified
Aspiration hazard : Not classified
Symptoms/effects after inhalation : May cause irritation to the respiratory tract. Inhalation of large amounts is expected to cause necrosis of tracheal epithelium, bronchitis and interstitial pneumonia.
Symptoms/effects after skin contact : Reported to be non-irritating.
Symptoms/effects after eye contact : May cause irritation or conjunctivitis by dissolving to form germanic acid, a weak acid.
Symptoms/effects after ingestion : Harmful if swallowed. Swallowing a small quantity of this material will result in serious health hazard.
Chronic symptoms : Inhalation- Animal studies indicate morphological changes of the respiratory tract such as thickening of the alveolar partitions and hyperplasia of the lymphatic vessels around the bronchi and blood vessels. Ingestion- Rats fed 100ppm for 14 weeks showed stimulated growth. Those fed 1000ppm showed depressed growth and suffered 50% mortality. Kidney damage has been reported in humans and animals.

SECTION 12: Ecological information

12.1. Toxicity
No additional information available
GERMANIUM DIOXIDE, 99.99%
Safety Data Sheet

### 12.2. Persistence and degradability
No additional information available

### 12.3. Bioaccumulative potential
No additional information available

### 12.4. Mobility in soil
No additional information available

### 12.5. Other adverse effects
- Other adverse effects: This substance may be hazardous to the environment.
- Effect on the ozone layer: No additional information available

### SECTION 13: Disposal considerations

#### 13.1. Disposal methods
- Sewage disposal recommendations: Do not dispose of waste into sewer.
- Product/Packaging disposal recommendations: Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to licensed waste disposal facility.
- Ecology - waste materials: Avoid release to the environment.

### SECTION 14: Transport information

#### 14.1. UN number
Not regulated for transport.

#### 14.2. UN proper shipping name
Not applicable

#### 14.3. Additional information
- Other information: No supplementary information available.

**Transport by sea**
No additional information available

**Air transport**
No additional information available

### SECTION 15: Regulatory information

#### 15.1. US Federal regulations
- **Germanium oxide (1310-53-8)**
  - Listed on the United States TSCA (Toxic Substances Control Act) inventory

#### 15.2. International regulations
**CANADA**
- Germanium oxide (1310-53-8)
  - Listed on the Canadian DSL (Domestic Substances List)

**EU-Regulations**
- **Germanium oxide (1310-53-8)**
  - Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

**National regulations**
- **Germanium oxide (1310-53-8)**
  - Listed on the AIICS (Australian Inventory of Chemical Substances)
  - Listed on IIECS (Inventory of Existing Chemical Substances Produced or Imported in China)
  - Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
  - Listed on the Korean ECL (Existing Chemicals List)
  - Listed on NZIoC (New Zealand Inventory of Chemicals)

#### 15.3. US State regulations
California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

### SECTION 16: Other information
GERMANIUM DIOXIDE, 99.99%
Safety Data Sheet

Full text of H-phrases:

| H302 | Harmful if swallowed |

Abbreviations and acronyms: Abbreviations: ND: Not Determined, No Data; NA: Not Applicable; LD: Lethal Dose; LC: Lethal Concentration; ATE: Acute Toxicity Estimates; H: hour; °: °C unless otherwise stated; mm: millimeters Hg, torr; PEL: permissible exposure level; TWA: time weighted average; TLV: threshold limit value; TG: Test Guideline; NIOSH: National Institute for Occupational Safety and Health; IARC: International Agency for Research on Cancer; NTP: National Toxicology Program; HMIS: Hazardous Material Information System; CAS No.: Chemical Abstract Service Registration Number; EC No.: European Commission Registration Number; EC Index No.: European Commission Index Number; OECD: The Organisation for Economic Co-operation and Development; GHS: The Globally Harmonized System of Classification and Labelling; APF: Assigned Protection Factor.

Hazard Rating

Health: 1 Slight Hazard - Irritation or minor reversible injury possible
Flammability: 0 Minimal Hazard - Materials that will not burn
Physical: 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Prepared by safety and environmental affairs.

Date of issue: 10/15/2015 Version: 1.0

SDS US (GHS HazCom 2012) - Custom

According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

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