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

1.1. Product identifier

<table>
<thead>
<tr>
<th>Product form</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
</tr>
<tr>
<td>Substance name</td>
<td>GERMANIUM DIOXIDE, 99.99%</td>
</tr>
<tr>
<td>Product code</td>
<td>GEG5300</td>
</tr>
<tr>
<td>Formula</td>
<td>GeO2</td>
</tr>
<tr>
<td>Synonyms</td>
<td>GERMANIA</td>
</tr>
<tr>
<td>Chemical family</td>
<td>METAL OXIDE</td>
</tr>
</tbody>
</table>

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1. Relevant identified uses

Use of the substance/mixture: Chemical intermediate

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

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

GELEST INC.
Fritz-Klatte-Strasse 8
65933 Frankfurt
Germany
T +49 (0) 69 3535106-500 - F +49 (0) 69 3535106-501 - (M-F): 8:00 AM - 4:00 PM
info@gelestde.com - www.gelestde.com

1.4. Emergency telephone number

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

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Acute toxicity (oral), Category 4

H302

Full text of H statements: see section 16

Adverse physicochemical, human health and environmental effects

No additional information available

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP): GHS07

Signal word (CLP): Warning

Hazard statements (CLP): H302 - Harmful if swallowed.
P264 - Wash hands thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P330 - Rinse mouth.
P301+P312 - IF SWALLOWED: Call a doctor if you feel unwell.
2.3. Other hazards
No additional information available

SECTION 3: Composition/information on ingredients
3.1. Substances
Substance type: Mono-constituent
Name: GERMANIUM DIOXIDE, 99.99%
CAS-No.: 1310-53-8
EC-No.: 215-180-8

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>Classification according to Regulation (EC) No. 1272/2008 [CLP]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germanium oxide</td>
<td>(CAS-No.) 1310-53-8</td>
<td>98%</td>
<td>Acute Tox. 4 (Oral), H302</td>
</tr>
<tr>
<td></td>
<td>(EC-No.) 215-180-8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Full text of 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 person to fresh air and keep comfortable for breathing. If you feel unwell, seek medical advice.

First-aid measures after skin contact: Wash with plenty of 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, both 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. Indication of any immediate medical attention and special treatment needed
No additional information available

SECTION 5: Firefighting measures
5.1. Extinguishing media
Suitable extinguishing media: None known.
Unsuitable extinguishing media: None known.

5.2. Special hazards arising from the substance or mixture
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. Advice for firefighters
Protection during firefighting: Do not attempt to take action without suitable protective equipment. Avoid contact with skin and eyes. Do not breathe dust.

P501 - Dispose of contents/container to licensed waste disposal facility.
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.

7.2. Conditions for safe storage, including any incompatibilities
Storage conditions: Keep container tightly closed.
Incompatible materials: Compatible with most materials. Dissolves in strong acid or base.

7.3. Specific end use(s)
No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Country</th>
<th>Exposure Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria</td>
<td>OEL TWA (mg/m³)</td>
<td>2 mg/m³</td>
</tr>
<tr>
<td>Latvia</td>
<td>OEL TWA (mg/m³)</td>
<td>2 mg/m³</td>
</tr>
<tr>
<td>USA OSHA</td>
<td>OSHA PEL (TWA) (mg/m³)</td>
<td>15 mg/m³ nuisance dust</td>
</tr>
<tr>
<td>Lithuania</td>
<td>IPRV (mg/m³)</td>
<td>2 mg/m³</td>
</tr>
<tr>
<td>Romania</td>
<td>OEL STEL (mg/m³)</td>
<td>5 mg/m³</td>
</tr>
</tbody>
</table>

8.2. Exposure controls
Appropriate engineering controls:
Provide local exhaust or general room ventilation.

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

9.1. 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>Colour</td>
<td>White</td>
</tr>
<tr>
<td>Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>Odour 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 (butylacetate=1)</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>Vapour pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative vapour density at 20 °C</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative density</td>
<td>4.703</td>
</tr>
<tr>
<td>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>
<tr>
<td>Viscosity, dynamic</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive limits</td>
<td>No data available</td>
</tr>
</tbody>
</table>

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

Acute toxicity: Harmful if swallowed.

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

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATE CLP (oral)</td>
<td>1250 mg/kg bodyweight</td>
</tr>
<tr>
<td>Germanium oxide (1310-53-8)</td>
<td></td>
</tr>
<tr>
<td>LD50 oral rat</td>
<td>1250 mg/kg</td>
</tr>
<tr>
<td>LD50 intraperitoneal rat</td>
<td>750 mg/kg</td>
</tr>
</tbody>
</table>
GERMANIUM DIOXIDE, 99.99%
Safety Data Sheet

<table>
<thead>
<tr>
<th>Germanium oxide (1310-53-8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 inhalation rat (mg/l)</td>
</tr>
<tr>
<td>ATE CLP (oral)</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation : Not classified
Serious eye damage/irritation : Not classified
Respiratory or skin sensitisation : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified
Reproductive toxicity : Not classified
STOT-single exposure : Not classified
STOT-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 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.

SECTION 12: Ecological information

12.1. Toxicity
Acute aquatic toxicity : Not classified
Chronic aquatic toxicity : Not classified

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. Results of PBT and vPvB assessment
No additional information available

12.6. Other adverse effects
Other adverse effects : This substance may be hazardous to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment 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
In accordance with ADR / RID / IMDG / IATA / ADN

14.1. UN number
UN-No. (ADR) : Not applicable
UN-No. (IMDG) : Not applicable
UN-No. (IATA) : Not applicable
UN-No. (ADN) : Not applicable
UN-No. (RID) : Not applicable
GERMANIUM DIOXIDE, 99.99%
Safety Data Sheet

14.2. UN proper shipping name

<table>
<thead>
<tr>
<th>Proper Shipping Name (ADR)</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper Shipping Name (IMDG)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Proper Shipping Name (IATA)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Proper Shipping Name (ADN)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Proper Shipping Name (RID)</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

14.3. Transport hazard class(es)

ADR

<table>
<thead>
<tr>
<th>Transport hazard class(es) (ADR)</th>
<th>Not applicable</th>
</tr>
</thead>
</table>

IMDG

<table>
<thead>
<tr>
<th>Transport hazard class(es) (IMDG)</th>
<th>Not applicable</th>
</tr>
</thead>
</table>

IATA

<table>
<thead>
<tr>
<th>Transport hazard class(es) (IATA)</th>
<th>Not applicable</th>
</tr>
</thead>
</table>

ADN

<table>
<thead>
<tr>
<th>Transport hazard class(es) (ADN)</th>
<th>Not applicable</th>
</tr>
</thead>
</table>

RID

<table>
<thead>
<tr>
<th>Transport hazard class(es) (RID)</th>
<th>Not applicable</th>
</tr>
</thead>
</table>

14.4. Packing group

<table>
<thead>
<tr>
<th>Packing group (ADR)</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packing group (IMDG)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Packing group (IATA)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Packing group (ADN)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Packing group (RID)</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

14.5. Environmental hazards

| Dangerous for the environment | No |
| Marine pollutant | No |
| Other information | No supplementary information available |

14.6. Special precautions for user

- Overland transport
  No data available
- Transport by sea
  No data available
- Air transport
  No data available
- Inland waterway transport
  No data available
- Rail transport
  No data available

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Not applicable

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

15.1.1. EU-Regulations

No REACH Annex XVII restrictions
GERMANIUM DIOXIDE, 99.99% is not on the REACH Candidate List
GERMANIUM DIOXIDE, 99.99% is not on the REACH Annex XIV List
GERMANIUM DIOXIDE, 99.99%  
Safety Data Sheet


% Volatiles : 0 %

15.1.2. National regulations

Germany
Reference to AwSV : Water hazard class (WGK) 1, Slightly hazardous to water (Classification according to VwVwS, Annex 3; ID No. 5610)
12th Ordinance Implementing the Federal Immission Control Act - 12.BImSchV : Is not subject of the 12. BImSchV (Hazardous Incident Ordinance)

Netherlands
SZW-lijst van kankerverwekkende stoffen : The substance is not listed
SZW-lijst van mutagene stoffen : The substance is not listed
NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Borstvoeding : The substance is not listed
NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Vruchtbaarheid : The substance is not listed
NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Ontwikkeling : The substance is not listed

15.2. Chemical safety assessment
No additional information available

SECTION 16: Other information

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

Other information : Prepared by safety and environmental affairs.

Full text of H- and EUH-statements:
Acute Tox. 4 (Oral) : Acute toxicity (oral), Category 4
H302 : Harmful if swallowed.

SDS EU (REACH Annex II) - Custom

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