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

1.1. Product identifier

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product form</td>
<td>Substance</td>
</tr>
<tr>
<td>Physical state</td>
<td>Solid</td>
</tr>
<tr>
<td>Substance name</td>
<td>GERMANIUM TETRABROMIDE</td>
</tr>
<tr>
<td>Product code</td>
<td>GEG5500</td>
</tr>
<tr>
<td>Formula</td>
<td>Br4Ge</td>
</tr>
<tr>
<td>Synonyms</td>
<td>TETRABROMOGERMANIUM; GERMANIUM(IV) BROMIDE</td>
</tr>
<tr>
<td>Chemical family</td>
<td>GERMANIUM BROMIDE</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]

<table>
<thead>
<tr>
<th>Classification</th>
<th>Category</th>
<th>H Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin corrosion/irritation</td>
<td>Category 1B</td>
<td>H314</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>Category 1</td>
<td>H318</td>
</tr>
</tbody>
</table>

Adverse physicochemical, human health and environmental effects

No additional information available

2.2. Label elements

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

<table>
<thead>
<tr>
<th>Hazard pictograms (CLP)</th>
<th>:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal word (CLP)</td>
<td>Danger</td>
</tr>
<tr>
<td>Hazard statements (CLP)</td>
<td>H314 - Causes severe skin burns and eye damage.</td>
</tr>
</tbody>
</table>
GERMANIUM TETRABROMIDE
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P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 - Immediately call a POISON CENTER or doctor/physician

EUH-statements : EUH014 - Reacts violently with water.

2.3. Other hazards
No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance type : Multi-constituent
Name : GERMANIUM TETRABROMIDE
CAS-No. : 13450-92-5
EC-No. : 236-612-1

<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 tetrabromide</td>
<td>(CAS-No.) 13450-92-5 (EC-No.) 236-612-1</td>
<td>&gt; 95</td>
<td>Skin Corr. 1B, H314 Eye Dam. 1, H318</td>
</tr>
<tr>
<td>Other Germanium bromides</td>
<td></td>
<td>&lt; 5</td>
<td>Not classified</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 immediate 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 immediate 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 : Causes severe skin burns and eye damage.
Symptoms/effects after inhalation : May cause irritation to the respiratory tract. Overexposure may cause: Cough. Headache. Nausea.
Symptoms/effects after skin contact : Causes (severe) skin burns.
Symptoms/effects after eye contact : Causes serious eye damage.
Symptoms/effects after ingestion : May be harmful if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed
Note to physician: Bromogermanes reacts with water to form hydrobromic acid, consequently treatment for acid burns may be considered.

SECTION 5: Firefighting measures

5.1. Extinguishing media
Suitable extinguishing media : None.
Unsuitable extinguishing media : Water.

5.2. Special hazards arising from the substance or mixture
Fire hazard : Irritating fumes and acid vapors may develop when material is exposed to elevated temperatures or open flame.

5.3. Advice for firefighters
Firefighting instructions : Exercise caution when fighting any chemical fire. (Note, since germanium tetrabromide is not flammable, precautions refer to mixtures with flammable materials.).
Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection. Avoid contact with skin and eyes. Do not breathe dust.

Print date: 10/04/2019
EN (English) SDS ID: GEG5500
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: Clean up any spills as soon as possible, using an absorbent material to collect it. Sweep or shovel spills into appropriate container for disposal.

6.4. Reference to other sections
See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Precautions for safe handling: Avoid contact with skin and eyes. 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. Avoid contact with water.
Incompatible materials: Water.
Storage area: Store in a well-ventilated place. Store away from heat.

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

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
No additional information available

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

Personal protective equipment:
Avoid all unnecessary exposure. 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 or face shield. 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
Physical state: Solid
GERMANIUM TETRABROMIDE
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**Appearance**: Low-melting solid.

**Molecular mass**: 392.23 g/mol

**Colour**: Clear to pink-orange.

**Odour**: Acrid. Hydrogen bromide.

**Odour threshold**: No data available

**Refractive index**: 1.6269

**pH**: No data available

**Relative evaporation rate (butylacetate=1)**: No data available

**Melting point**: 26.1 °C

**Freezing point**: No data available

**Boiling point**: 186.5 °C

**Flash point**: Not flammable

**Auto-ignition temperature**: No data available

**Decomposition temperature**: No data available

**Flammability (solid, gas)**: No data available

**Vapour pressure**: 58.4 mm Hg @ 93.7°C

**Relative vapour density at 20 °C**: > 1

**Relative density**: 3.132

**Solubility**: Reacts with water. Organic solvent: Soluble: ethanol, toluene, ether

**Log Pow**: No data available

**Log Kow**: No data available

**Viscosity, kinematic**: No data available

**Viscosity, dynamic**: No data available

**Explosive properties**: No data available

**Oxidising properties**: No data available

**Explosive 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**

Reacts with water and moisture in air, liberating hydrogen bromide.

**10.4. Conditions to avoid**

No additional information available

**10.5. Incompatible materials**

Water:

**10.6. Hazardous decomposition products**

Acid vapors. Hydrogen bromide.

**SECTION 11: Toxicological information**

**11.1. Information on toxicological effects**

**Acute toxicity**: Not classified

**Skin corrosion/irritation**: Causes severe skin burns and eye damage.

**Serious eye damage/irritation**: Causes serious eye damage.

**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
GERMANIUM TETRABROMIDE
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Aspiration hazard: Not classified
Potential adverse human health effects and symptoms: Inhalation of large amounts is expected to cause necrosis of tracheal epithelium, bronchitis and interstitial pneumonia.
Symptoms/effects after inhalation: May cause irritation to the respiratory tract. Overexposure may cause: Cough. Headache. Nausea.
Symptoms/effects after skin contact: Causes (severe) skin burns.
Symptoms/effects after eye contact: Causes serious eye damage.
Symptoms/effects after ingestion: May be harmful if swallowed.
Reason for classification: Expert judgment

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): 1759
UN-No. (IMDG): 1759
UN-No. (IATA): 1759
UN-No. (ADN): 1759
UN-No. (RID): 1759

14.2. UN proper shipping name
Proper Shipping Name (ADR): CORROSIVE SOLID, N.O.S.
Proper Shipping Name (IMDG): CORROSIVE SOLID, N.O.S.
Proper Shipping Name (IATA): Corrosive solid, n.o.s.
Proper Shipping Name (ADN): CORROSIVE SOLID, N.O.S.
Proper Shipping Name (RID): CORROSIVE SOLID, N.O.S.
Transport document description (ADR): UN 1759 CORROSIVE SOLID, N.O.S. (GERMANIUM TETRABROMIDE), 8, II, (E)
Transport document description (IMDG): UN 1759 CORROSIVE SOLID, N.O.S. (GERMANIUM TETRABROMIDE), 8, II
Transport document description (IATA): UN 1759 Corrosive solid, n.o.s. (GERMANIUM TETRABROMIDE), 8, II
Transport document description (ADN): UN 1759 CORROSIVE SOLID, N.O.S. (GERMANIUM TETRABROMIDE), 8, II
Transport document description (RID): UN 1759 CORROSIVE SOLID, N.O.S. (GERMANIUM TETRABROMIDE), 8, II

14.3. Transport hazard class(es)
ADR
Transport hazard class(es) (ADR): 8
**GERMANIUM TETRABROMIDE**

Safety Data Sheet

<table>
<thead>
<tr>
<th>Danger labels (ADR)</th>
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<td>IMDG</td>
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<td>Transport hazard class(es) (IMDG)</td>
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<td>Danger labels (IMDG)</td>
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<td>IATA</td>
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<td>ADN</td>
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<td>8</td>
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<tr>
<td>Danger labels (RID)</td>
<td>8</td>
</tr>
</tbody>
</table>

**14.4. Packing group**

| Packing group (ADR) | II |
| Packing group (IMDG) | II |
| Packing group (IATA) | II |
| Packing group (ADN) | II |
| Packing group (RID) | II |

**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
  Classification code (ADR) : C10
  Special provisions (ADR) : 274
  Limited quantities (ADR) : 1kg
  Excepted quantities (ADR) : E2
  Packing instructions (ADR) : P002, IBC08
  Special packing provisions (ADR) : B3
  Mixed packing provisions (ADR) : MP10
  Portable tank and bulk container instructions (ADR) : T3
  Portable tank and bulk container special provisions (ADR) : TP33
  Tank code (ADR) : SGAN, L4BN
  Vehicle for tank carriage : AT
  Transport category (ADR) : 2
  Special provisions for carriage - Packages (ADR) : V11
  Hazard identification number (Kemler No.) : 80
  Orange plates : 80
  Tunnel restriction code (ADR) : E
  EAC code : 2X

- Transport by sea
  Special provisions (IMDG) : 274
  Limited quantities (IMDG) : 1 kg
  Excepted quantities (IMDG) : E2
  Packing instructions (IMDG) : P002
  IBC packing instructions (IMDG) : IBC08
  IBC special provisions (IMDG) : B2, B4
  Tank instructions (IMDG) : T3
  Tank special provisions (IMDG) : TP33
  EmS-No. (Fire) : F-A
  EmS-No. (Spillage) : S-B
  Stowage category (IMDG) : A
  Properties and observations (IMDG) : Causes burns to skin, eyes and mucous membranes.

- Air transport
  PCA Exected quantities (IATA) : E2
  PCA Limited quantities (IATA) : Y844
  PCA limited quantity max net quantity (IATA) : 5kg
  PCA packing instructions (IATA) : 859
  PCA max net quantity (IATA) : 15kg
  CAO packing instructions (IATA) : 863
  CAO max net quantity (IATA) : 50kg
  Special provisions (IATA) : A3
  ERG code (IATA) : 8L

- Inland waterway transport
  Classification code (ADN) : C10
  Special provisions (ADN) : 274
  Limited quantities (ADN) : 1 kg
  Excepted quantities (ADN) : E2
  Equipment required (ADN) : PP, EP
  Number of blue cones/lights (ADN) : 0
GERMANIUM TETRABROMIDE
Safety Data Sheet

- Rail transport
Classification code (RID) : C10
Special provisions (RID) : 274
Limited quantities (RID) : 1kg
Excepted quantities (RID) : E2
Packing instructions (RID) : P002, IBC08
Special packing provisions (RID) : B4
Mixed packing provisions (RID) : MP10
Portable tank and bulk container instructions (RID) : T3
Portable tank and bulk container special provisions (RID) : TP33
Tank codes for RID tanks (RID) : SGAN, L4BN
Transport category (RID) : 2
Special provisions for carriage – Packages (RID) : W11
Colis express (express parcels) (RID) : CE10
Hazard identification number (RID) : 80

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 TETRABROMIDE is not on the REACH Candidate List
GERMANIUM TETRABROMIDE is not on the REACH Annex XIV List
GERMANIUM TETRABROMIDE is not subject to REGULATION (EU) No 649/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 concerning the export and import of hazardous chemicals.

15.1.2. National regulations

Germany
12th Ordinance Implementing the Federal Immission Control Act - 12.BImSchV : Is not subject of the 12. BlmSchV (Hazardous Incident Ordinance)

Netherlands
SZW-liist van kankerverwekkende stoffen : The substance is not listed
SZW-liist 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

Denmark
Danish National Regulations : Young people below the age of 18 years are not allowed to use the product

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:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Dam. 1</td>
<td>Serious eye damage/eye irritation, Category 1</td>
</tr>
<tr>
<td>Skin Corr. 1B</td>
<td>Skin corrosion/irritation, Category 1B</td>
</tr>
<tr>
<td>H314</td>
<td>Causes severe skin burns and eye damage.</td>
</tr>
<tr>
<td>H318</td>
<td>Causes serious eye damage.</td>
</tr>
<tr>
<td>EUH014</td>
<td>Reacts violently with water.</td>
</tr>
</tbody>
</table>

### SDS EU (REACH Annex II) - Custom

The information contained in this document has been gathered from reference materials and/or Gelest, Inc. test data and is to the best knowledge and belief of Gelest, Inc. accurate and reliable. Such information is offered solely for your consideration, investigation and verification. It is not suggested or guaranteed that the hazard precautions or procedures described are the only ones which exist. Gelest, Inc. makes no warranties, express or implied, with respect to the use of such information and assumes no responsibility therefore. Information on this safety data sheet is not intended to constitute a basis for product specifications.

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