## SECTION 1: Identification

### 1.1. Identification

<table>
<thead>
<tr>
<th>Product name</th>
<th>GERMANIUM TETRACHLORIDE 99.999%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product code</td>
<td>GEG5601</td>
</tr>
<tr>
<td>Product form</td>
<td>Substance</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Formula</td>
<td>Cl₄Ge</td>
</tr>
<tr>
<td>Synonyms</td>
<td>TETRACHLOROGERMANIUM</td>
</tr>
<tr>
<td>Chemical family</td>
<td>GERMANIUM CHLORIDE</td>
</tr>
</tbody>
</table>

### 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

**GHS-US classification**
- Skin corrosion/irritation Category 1A: H314 Causes severe skin burns and eye damage
- Serious eye damage/eye irritation Category 1: H318 Causes serious eye damage
- Specific target organ toxicity (single exposure) Category 3: H335 May cause respiratory irritation

Full text of H statements: see section 16

### 2.2. GHS Label elements, including precautionary statements

**GHS US labeling**
- Hazard pictograms (GHS US): ![Warning](image)

<table>
<thead>
<tr>
<th>Signal word (GHS US)</th>
<th>Danger</th>
</tr>
</thead>
</table>
| Hazard statements (GHS US) | H314 - Causes severe skin burns and eye damage  
H318 - Causes serious eye damage  
H335 - May cause respiratory irritation |

<table>
<thead>
<tr>
<th>Precautionary statements (GHS US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P280 - Wear protective gloves/protection/face protection.</td>
</tr>
<tr>
<td>P260 - Do not breathe vapors.</td>
</tr>
<tr>
<td>P264 - Wash hands thoroughly after handling.</td>
</tr>
<tr>
<td>P271 - Use only outdoors or in a well-ventilated area.</td>
</tr>
<tr>
<td>P301+P330+P331 - If swallowed: rinse mouth. Do NOT induce vomiting</td>
</tr>
<tr>
<td>P303+P361+P353 - If on skin (or hair): take off immediately all contaminated clothing. rinse skin with water/shower</td>
</tr>
<tr>
<td>P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing</td>
</tr>
<tr>
<td>P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing</td>
</tr>
<tr>
<td>P310 - Immediately call a doctor</td>
</tr>
<tr>
<td>P363 - Wash contaminated clothing before reuse.</td>
</tr>
<tr>
<td>P403+P233 - Store in a well-ventilated place. Keep container tightly closed.</td>
</tr>
<tr>
<td>P405 - Store locked up.</td>
</tr>
<tr>
<td>P501 - Dispose of contents/container to licensed waste disposal facility.</td>
</tr>
</tbody>
</table>

### 2.3. Hazards not otherwise classified (HNOC)

Other hazards not contributing to the classification: Hydrogen chloride may be formed by reaction with water and moisture in air. The US OSHA PEL (TWA) for hydrogen chloride is 5 ppm.
GERMANIUM TETRACHLORIDE 99.999%  
Safety Data Sheet  

2.4. Unknown acute toxicity (GHS US)  
Not applicable  

SECTION 3: Composition/Information on ingredients  

3.1. Substances  
Substance type: Mono-constituent  
Name: GERMANIUM TETRACHLORIDE 99.999%  
CAS-No.: 10038-98-9  

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>GHS-US classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germanium tetrachloride</td>
<td>(CAS-No.) 10038-98-9</td>
<td>99 - 100</td>
<td>Skin Corr. 1A, H314</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eye Dam. 1, H318</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STOT SE 3, H335</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. Get medical advice/attention if you feel unwell.  
First-aid measures after skin contact: Wash with plenty of soap and 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 if you feel unwell.  

4.2. Most important symptoms and effects (acute and delayed)  
Symptoms/effects: Causes severe skin burns and eye damage.  
Symptoms/effects after inhalation: May cause respiratory irritation. May be harmful if inhaled.  
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. Immediate medical attention and special treatment, if necessary  
Note to physician: Chlorogermanes react with water to form hydrochloric acid, consequently treatment for acid burns may be considered.  

SECTION 5: Fire-fighting measures  

5.1. Suitable (and unsuitable) extinguishing media  
Suitable extinguishing media: None.  
Unsuitable extinguishing media: Water.  

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

5.3. Special protective equipment and precautions for fire-fighters  
Firefighting instructions: Note, since germanium tetrachloride 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 all eye and skin contact and do not breathe vapor and mist.  

SECTION 6: Accidental release measures  

6.1. Personal precautions, protective equipment and emergency procedures  

6.1.1. For non-emergency personnel  
Emergency procedures: Evacuate unnecessary personnel.  

6.1.2. For emergency responders  
Protective equipment: Equip cleanup crew with proper protection.  
Emergency procedures: Stop release.  

6.2. Environmental precautions  
Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.
GERMANIUM TETRACHLORIDE 99.999%
Safety Data Sheet

6.3. Methods and material for containment and cleaning up
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 all eye and skin contact and do not breathe vapor and mist. Provide good ventilation in process area to prevent accumulation of vapors. Avoid contact with water.

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.
Storage area: Store in a well-ventilated place. Store away from heat.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
GERMANIUM TETRACHLORIDE 99.999% (10038-98-9)
AIHA WEEL Ceiling (ppm) 0.5 ppm

8.2. Appropriate engineering controls
Appropriate engineering controls: Handle in an enclosing hood with exhaust ventilation.

8.3. Individual protection measures/Personal protective equipment

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

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties
Physical state: Liquid
Appearance: Clear liquid.
Molecular mass: 214.4 g/mol
Color: No data available
Odor: Acrid. Similar to hydrogen chloride.
Odor threshold: No data available
Refractive index: 1.4644
pH: No data available
Relative evaporation rate (butyl acetate=1): No data available
Melting point: No data available
Freezing point: -49 - -52 °C
Boiling point: 83.1 °C
Flash point: Not flammable
Critical temperature: 548 K
Auto-ignition temperature: No data available
GERMANIUM TETRACHLORIDE 99.999%
Safety Data Sheet

Decomposition temperature: No data available
Flammability (solid, gas): No data available
Vapor pressure: 25 mm Hg @ 0°C; 67 mm Hg @ 20°C
Critical pressure: 36.6 atm
Relative vapor density at 20 °C: > 1
Relative density: 1.879
Solubility: Reacts with water.
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
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
React with water and moisture in air, liberating hydrogen chloride. Reacts violently with bases.

10.4. Conditions to avoid
Heat. Open flame. Sparks.

10.5. Incompatible materials

10.6. Hazardous decomposition products
Acid vapors.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute toxicity: Not classified

<table>
<thead>
<tr>
<th>Germanium tetrachloride (10038-98-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 intravenous mouse</td>
</tr>
<tr>
<td>LC50 inhalation mouse (2 h)</td>
</tr>
<tr>
<td>LC50 inhalation mouse</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation: Causes severe skin burns and eye damage.
Serious eye damage/irritation: Causes serious eye damage.
Respiratory or skin sensitization: Not classified
Germ cell mutagenicity: Not classified
Carcinogenicity: Not classified
Reproductive toxicity: Not classified
Specific target organ toxicity – single exposure: May cause respiratory irritation.
Specific target organ toxicity – repeated exposure: Not classified
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. Persistent changes in the respiratory system have been reported from 4mg/m3. Lasting changes in the respiratory system function have been reported in animals. Other: GENETOX PROGRAM 1986, POSITIVE: B Subtilis rec assay; RTECS# LYS225000.

Symptoms/effects after inhalation: May cause respiratory irritation. May be harmful if inhaled.
Symptoms/effects after skin contact: Causes (severe) skin burns.
Symptoms/effects after eye contact: Causes serious eye damage.
GERMANIUM TETRACHLORIDE 99.999%
Safety Data Sheet

Symptoms/effects after ingestion: May be harmful if swallowed.
Reason for classification: Expert judgment

SECTION 12: Ecological information

12.1. Toxicity
No additional information available

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
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
UN-No./(DOT) : 3390
DOT NA no. : UN3390

14.2. UN proper shipping name
Transport document description : UN3390 Toxic by inhalation liquid, corrosive, n.o.s. (GERMANIUM TETRACHLORIDE), 6.1 (8), I
Proper Shipping Name (DOT) : Toxic by inhalation liquid, corrosive, n.o.s. (GERMANIUM TETRACHLORIDE)
Packing group (DOT) : I - Great Danger
Hazard labels (DOT) : 6.1 - Poison inhalation hazard
: 8 - Corrosive

DOT Packaging Non Bulk (49 CFR 173.xxx) : 227
DOT Packaging Bulk (49 CFR 173.xxx) : 244
DOT Packaging Exceptions (49 CFR 173.xxx) : None
DOT Symbols : G - Identifies PSN requiring a technical name

14.3. Additional information
Emergency Response Guide (ERG) Number : 154
Other information: No supplementary information available.

Transport by sea
DOT Vessel Stowage Location: D - The material must be stowed “on deck only” on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger vessels in which the limiting number of passengers is exceeded.
DOT Vessel Stowage Other: 40 - Stow “clear of living quarters”

Air transport
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27): Forbidden
### SECTION 15: Regulatory information

#### 15.1. US Federal regulations

<table>
<thead>
<tr>
<th>Germanium tetrachloride (10038-98-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
</tr>
</tbody>
</table>

#### 15.2. International regulations

**CANADA**

<table>
<thead>
<tr>
<th>Germanium tetrachloride (10038-98-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed on the Canadian DSL (Domestic Substances List)</td>
</tr>
</tbody>
</table>

**EU-Regulations**

<table>
<thead>
<tr>
<th>Germanium tetrachloride (10038-98-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)</td>
</tr>
</tbody>
</table>

**National regulations**

<table>
<thead>
<tr>
<th>Germanium tetrachloride (10038-98-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed on the AICS (Australian Inventory of Chemical Substances)</td>
</tr>
<tr>
<td>Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)</td>
</tr>
<tr>
<td>Listed on the Japanese ENCS (Existing &amp; New Chemical Substances) inventory</td>
</tr>
<tr>
<td>Listed on the Korean ECL (Existing Chemicals List)</td>
</tr>
<tr>
<td>Listed on NZIoC (New Zealand Inventory of Chemicals)</td>
</tr>
<tr>
<td>Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)</td>
</tr>
</tbody>
</table>

#### 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

**Full text of H-phrases:**

<table>
<thead>
<tr>
<th>H314</th>
<th>Causes severe skin burns and eye damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>H318</td>
<td>Causes serious eye damage</td>
</tr>
<tr>
<td>H335</td>
<td>May cause respiratory irritation</td>
</tr>
</tbody>
</table>

**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**: 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given
- **Flammability**: 0 Minimal Hazard - Materials that will not burn
- **Physical**: 1 Slight Hazard - Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

Prepared by safety and environmental affairs.

**Date of issue**: 03/04/2015  
**Revision date**: 08/31/2015  
**Version**: 2.0

SDS US (GHS HazCom 2012) - Custom

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