# Material Safety Data Sheet


**OSHA Hazard Communication Rule**

**Date of Last Revision:** 04-29-96

### Chemical Identity

<table>
<thead>
<tr>
<th>Label Identity</th>
<th>Chemical Name/Synonyms</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Germanium</td>
<td>Ge</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Family</th>
<th>CAS Registry Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal</td>
<td>7440-56-4, Listed in the TSCA Inventory</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hazardous Ingredients</th>
</tr>
</thead>
<tbody>
<tr>
<td>%: 100</td>
</tr>
<tr>
<td>TLV: 10mg/m³</td>
</tr>
<tr>
<td>OSHA/PEL: 15mg/m³ (as nuisance particles)</td>
</tr>
</tbody>
</table>

### Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Color, Form, Odor</th>
<th>Gray-white metalloid, crystalline and brittle stable at room temperature, odorless</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling Point</td>
<td>2830</td>
</tr>
<tr>
<td>Density (gm/cc)</td>
<td>5.323 at 25°C</td>
</tr>
<tr>
<td>Vapor Pressure @ 20°</td>
<td>NA</td>
</tr>
<tr>
<td>% Volatile By Volume (%)</td>
<td>NA</td>
</tr>
<tr>
<td>Reaction With Water</td>
<td>ND</td>
</tr>
<tr>
<td>Evaporation Rate (H₂O=1)</td>
<td>ND</td>
</tr>
<tr>
<td>Solubility In Water</td>
<td>Insoluble</td>
</tr>
<tr>
<td>Melting Point</td>
<td>925-975 (937.12 best value)</td>
</tr>
</tbody>
</table>

### Fire and Explosion Hazard Data

<table>
<thead>
<tr>
<th>Flash Point</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autoignition Temperature (°C)</td>
<td>NA</td>
</tr>
<tr>
<td>Flammability</td>
<td>Hazard as fine dust or powder</td>
</tr>
<tr>
<td>Extinguishing Media</td>
<td>Use dry chemical, CO₂.</td>
</tr>
<tr>
<td>Special Fire Fighting Procedures</td>
<td>Wear self-contained breathing apparatus and full protective clothing to prevent contact with skin and eyes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unusual Fire &amp; Explosion Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material may emit toxic fumes if involved in a fire. Moderate fire and explosion hazard as a fine powder/dust when exposed to air or flame When material is finely divided, it burns in C12 or Br₂. Relatively stable, unaffected by air, becomes oxidized above 600°C</td>
</tr>
</tbody>
</table>
GERMANIUM
MATERIAL SAFETY DATA SHEET

HEALTH HAZARD INFORMATION

TOXICITY DATA
ipr-rat LD50: 750mg/kg
ipr-pgp LDLO: 400mg/kg
scu-rbt LD50: 845mg/kg

HMIS RATING:
HEALTH: 2  FLAMMABILITY: 2  REACTIVITY: 1  PERSONAL PROTECTION: F

ROUTES OF ENTRY
INHALATION: Yes
SKIN: Yes
INGESTION: Yes

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:
Respiratory Disorders

EFFECTS OF OVEREXPOSURE (acute and chronic):
INHALATION: a respiratory irritant, coughing, sneezing, difficulty breathing and pulmonary edema possible. May irritate mucous membranes of the nose and throat.
DERMAL: irritation, inflammation, redness possible. May cause dermatitis.
EYE: irritation, inflammation, watering and redness possible.
OTHER: *SEE ATTACHED SHEET*

CARCINOGENICITY: None  NTP: No  IARC MONOGRAPHS: No  OSHA REGULATE: No

EMERGENCY FIRST AID PROCEDURES:
INGESTION: Administer 1-2 glasses of milk or water and induce vomiting
INHALATION: Remove to fresh air, give oxygen if breathing is difficult
SKIN CONTACT: Wash affected area with soap and water
EYE CONTACT: Flush eyes for at least 15 minutes with lukewarm water
*Seek Medical Attention Under all Circumstances Mentioned Above*

REACTIVITY DATA

STABILITY
Stable
Heat

CONDITIONS CONTRIBUTING TO UNSTABILITY

INCOMPATIBILITY (MATERIALS TO AVOID)
Aqua regia, concentrated HNO3 or H2SO4, fused alkalis, nitrates or carbonates, halogens, oxidants GeO2, GeO

HAZARDOUS DECOMPOSITION PRODUCTS
Will Not Occur

HAZARDOUS POLYMERZATION CONDITIONS TO AVOID
Heat, incompatible materials
GERMANIUM
MATERIAL SAFETY DATA SHEET

SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Wear self-contained breathing apparatus and full protective clothing. Isolate area
where
spill occurred and ensure proper ventilation, vacuum spill using high efficiency unit
and place in container for proper disposal. Take care not to raise dust.

WASTE DISPOSAL METHOD:
Consult federal, state and local regulations for proper disposal.

SPECIAL PROTECTIVE INFORMATION

RESPIRATORY PROTECTION
NIOSH approved dust-mist-fume cartridge
respirator

LOCAL EXHAUST
Maintain below TLV

MECHANICAL (general)
Recommended

SPECIAL
Handle in a dry, inert atmosphere

OTHER
NA

PROTECTIVE GLOVES
Neoprene

EYE PROTECTION
Safety glasses

OTHER PROTECTIVE EQUIPMENT
Wear protective clothing to prevent
contamination of skin and clothes

SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING/STORAGE:
Store in tightly closed containers in a cool, dry place. Wash hands and face
thoroughly after handling and before meals.

TRANSPORTATION REQUIREMENTS
DOT CLASS: Not Classified
UN NUMBER: NC
IMCO CLASS: NC
OTHER:

PRECAUTIONARY LABELING
NONE

THE ABOVE INFORMATION IS ACCURATE TO THE BEST OF OUR KNOWLEDGE. HOWEVER, SINCE DATA, SAFETY
STANDARDS AND GOVERNMENT REGULATIONS ARE SUBJECT TO CHANGE THE CONDITIONS OF HANDLING AND
USE, OR MISUSE ARE BEYOND OUR CONTROL, ANGSTROM SCIENCES MAKE NO WARRANTY, EITHER
EXPRESSED OR IMPLIED, WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE
INFORMATION CONTAINED HEREIN AND DISCLAIMS ALL LIABILITY FOR THE RELIANCE THEREON. USER
SHOULD SATISFY HIMSELF THAT HE HAS ALL CURRENT DATA RELEVANT TO HIS PARTICULAR USE.

NA= NOT APPLICABLE
ND= NO DATA FOUND
ATTACHED SHEET FOR GERMANIUM

OTHER: Germanium compounds are considered to be of a low order of toxicity, but rare instances of poisoning have been reported in the literature. Interest is high in this material because of its close chemical relationship to arsenic. It has been found that the dioxide stimulates the generation of red blood cells, but it is believed to be relatively non-toxic. When germanium is given in sub-lethal amounts, it causes a pronounced tolerance to be exhibited. Germanium compounds are considered much less toxic than the corresponding lead and tin compounds.