

Material Safety Data Sheet

Germanium

Hazards identified or described in this document (if any) only apply in case of exposure to dust, fumes or particles of the composing chemical or chemicals of this product generated through specific treatments or manipulations such as polishing, welding, heat treatment etc.

Section 1. Chemical product and company identification

Common name : Germanium
Material uses : Other non-specified industry: Infrared optical applications ; Sputtering targets.
IPDS Code : 83635975
Validation date : 10 / 25 / 2005 United States
In case of emergency : Emergency telephone number North America : 1-800-567-7455

Section 2. Composition, information on ingredients

<u>Name</u>	<u>CAS #</u>	<u>% by weight</u>	<u>Exposure limits</u>
Germanium	7440-56-4	100	ACGIH TLV (United States, 1/2005). TWA: 10 mg/m ³ 8 hour/hours. Form: Inhalable TWA: 3 mg/m ³ 8 hour/hours. Form: Respirable

Section 3. Hazards identification

Remarks : Hazards identified or described in this document (if any) only apply in case of exposure to dust, fumes or particles of the composing chemical or chemicals of this product generated through specific treatments or manipulations such as polishing, welding, heat treatment etc.

Physical state and Appearance : Solid.

Emergency overview : Caution!
MAY CAUSE DAMAGE TO THE FOLLOWING ORGANS: KIDNEYS.

Routes of entry : Not available.

Potential acute health effects

- Eyes** : No known significant effects or critical hazards.
- Skin** : No known significant effects or critical hazards.
- Inhalation** : No known significant effects or critical hazards.
- Ingestion** : No known significant effects or critical hazards.

Potential chronic health effects : **CARCINOGENIC EFFECTS:** Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.

Medical conditions aggravated by over-exposure : Repeated or prolonged exposure to the substance can produce target organs damage.

See toxicological information (section 11)

Section 4. First aid measures

- Eye contact** : Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.
- Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Inhalation** : Move exposed person to fresh air. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if symptoms occur. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Ingestion** : Wash out mouth with water. Remove dentures if any. Move exposed person to fresh air. Keep person warm and at rest. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if symptoms occur. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Section 5. Fire fighting measures

- Flammability of the product** : Non-flammable.
- Auto-ignition temperature** : Not applicable.
- Flash points** : Not applicable.
- Flammable limits** : Not applicable.
- Products of combustion** : Not applicable.
- Fire hazards in the presence of various substances** : Can ignite with chlorine and bromine.
- Fire-fighting media and instructions** : Use an extinguishing agent suitable for the surrounding fire.
 No specific hazard.
 See section 11 for more detailed information on health effects and symptoms.
- Special protective equipment for fire-fighters** : No special protective clothing is required.
- Special remarks on fire hazards** : Can ignite with chlorine and bromine.

Special remarks : Not available.
on explosion
hazards

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : If emergency personnel are unavailable, vacuum or carefully scoop up spilled material and place in an appropriate container for disposal by incineration. Avoid creating dusty conditions and prevent wind dispersal.

Section 7. Handling and storage

Handling : No special measures required.

Storage : No special measures required.
Incompatible with halogens, hydrogen peroxide, chlorinated hydrocarbons, fluorine, nitric acid, oxidizing agents and sulfuric acid.

Additional information : Incompatibility with various substances : Hydrogen chloride (HCl).

Section 8. Exposure controls, personal protection

Engineering controls : Use process enclosures, local exhaust ventilation or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fumes or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.

Recommended: EU : safety glasses with side-shields (EN 166) .

USA and Canada : Wear ANSI compliant safety glasses with side shields

Skin protection / Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Body: Recommended: Protective gloves should be worn under normal conditions of use.

Respiratory : Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Personal protective equipment (Pictograms) :



Personal protection in case of a large spill : No special protective clothing is required.

Product name

Exposure limits

Germanium

ACGIH TLV (United States, 1/2005). Notes: Particulates (Insoluble)
Not Otherwise Specified (PNOS)TWA: 10 mg/m³ 8 hour/hours. Form: InhalableTWA: 3 mg/m³ 8 hour/hours. Form: Respirable

Consult local authorities for acceptable exposure limits.

Hygiene measures

General information : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking.
If cleaning the inside of the equipment and collecting adhering substances, use appropriate personal protective equipment.

Section 9. Physical and chemical properties

Physical state and Appearance : Solid.

Color : Gray.

Odor : Odorless.

Taste : Not available.

Molecular weight : 72.59 g/mole

Molecular formula : Ge

pH : Not applicable.

Bolling/condensation point : 2830°C (5126°F)

Melting/freezing point : 937.4°C (1719.3°F)

Critical temperature : Not available.

Specific gravity : 5.323 (Water = 1)

Vapor pressure : Not available.

Vapor density : Not available.

Volatility : Not available.

Odor threshold : Not available.

Evaporation rate : Not available.

VOC : Not available.

Viscosity : Not available.

LogK_{ow} : Not available.

Ionicity (in water) : Not available.

Dispersibility properties : Not available.

Solubility : Insoluble in cold water.

Physical/chemical properties comments : Not available.

Section 10. Stability and reactivity

Stability and reactivity : The product is stable.

Conditions of instability : Incompatible with halogens, hydrogen peroxide, chlorinated hydrocarbons, fluorine, nitric acid, oxidizing agents and sulfuric acid.

Incompatibility with various substances : Highly reactive or incompatible with the following materials: oxidizing materials and alkalis.
Incompatibility with various substances : Hydrogen chloride (HCl).

Section 11. Toxicological information

Toxicity data

<u>Ingredient name</u>	<u>Test</u>	<u>Result</u>	<u>Route</u>	<u>Species</u>
Germanium	LC50	>5000 mg/m ³ (4 hour/hours)	Inhalation	Rat [TNO-CIVO V88.086 - February 1988]

Chronic effects on humans : May cause damage to the following organs: kidneys.

Remarks : Repeated or prolonged exposure to the substance can produce kidney damage.

Specific effects

Carcinogenic effects : No known significant effects or critical hazards.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

BOD and COD : Not available.

Biodegradable/OECD : Not available.

Mobility : Not available.

Products of degradation : Not available.

Special remarks on the products of biodegradation : Not available.

Section 13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. This product is recyclable. Consideration of disposal via this route should be given.

Waste stream : Not available.

Consult your local or regional authorities.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	Not regulated.	-	-	-		-
TDG Classification	Not regulated.	-	-	-		-
ADR/RID Class	Not regulated.	-	-	-		-
IMDG Class	Not regulated.	-	-	-		-

IATA-DGR Class	Not regulated.	-	-	-	-
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Section 15. Regulatory information

HCS Classification : Target organ effects
 May cause damage to the following organs: kidneys.

U.S. Federal regulations : TSCA 8(b) inventory: Germanium
 SARA 302/304/311/312 extremely hazardous substances: No products were found.
 SARA 302/304 emergency planning and notification: No products were found.
 SARA 302/304/311/312 hazardous chemicals: No products were found.
 SARA 311/312 MSDS distribution - chemical inventory - hazard identification: No products were found.
 Clean Water Act (CWA) 307: No products were found.
 Clean Water Act (CWA) 311: No products were found.
 Clean Air Act (CAA) 112 accidental release prevention: No products were found.
 Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
 Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

State regulations : No products were found.
WARNING: This product contains chemical/chemicals known to the state of California to cause reproductive harm (female).: No products were found.

International regulations

DSCL (EEC) : This product is not classified according to EU legislation.
International lists : Australia (NICNAS): Germanium
 China: Germanium
 Korea (TCCL): Germanium
 Canada : CEPA NDSL: Germanium



WHMIS (Canada) : Not controlled under WHMIS (Canada).

Section 16. Other information

Label requirements : MAY CAUSE DAMAGE TO THE FOLLOWING ORGANS: KIDNEYS.

Hazardous Material Information System (U.S.A.)	<table border="1"> <tr> <td>Health</td> <td style="text-align: right;">*</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Fire hazard</td> <td></td> <td style="text-align: right;">0</td> </tr> <tr> <td>Reactivity</td> <td></td> <td style="text-align: right;">0</td> </tr> <tr> <td>Personal protection</td> <td></td> <td style="text-align: right;">C</td> </tr> </table>	Health	*	1	Fire hazard		0	Reactivity		0	Personal protection		C
Health	*	1											
Fire hazard		0											
Reactivity		0											
Personal protection		C											

National Fire Protection Association (U.S.A.) :

Health		Flammability
		Instability
		Special

References : Not available.
Date of issue : 10 / 25 / 2005
Date of previous issue : No previous validation
Version : 1

Notice to reader

To the best of our knowledge, the information contained in this Material Safety Data Sheet is accurate and reliable on presently available resources. However, neither the seller nor any of its subsidiaries assumes any responsibility or liability whatsoever for the accuracy or completeness of the information contained herein.

This Material Safety Data Sheet shall not constitute a guarantee for any specific product features. Final determination of suitability of this material is the sole responsibility of the user.

All materials may present unknown hazards and should be used and handled with caution and following reasonable safety procedures. Consequently the buyer assumes all risks in connection with the use and handling of this material.