1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: GERMANIUM TETRACHLORIDE
SDS Number: SDS-1
Revised Date: 6 MARCH 2014

MANUFACTURER:
Germanium Corporation of America
1634 Lincoln Ave., Utica NY 13502
Information: (315) 381-7401
(315) 853-4900
(315) 381-8814
nswarts@indium.com
lpage@indium.com

EMERGENCY PHONE:
CHEMTREC 24 hrs.
USA: 1 (800) 424-9300
Outside USA: +1 (703) 527-3887

Product Use: Industrial Use - Used in the industrial manufacture of fiber optic equipment or other related uses.

2. HAZARDS IDENTIFICATION

HMIS RATING: HEALTH =3  FIRE = 0  PHYSICAL HAZARD = 2

GHS:

<table>
<thead>
<tr>
<th>Signal Word: Danger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard statement(s)</td>
</tr>
<tr>
<td>H314 Causes severe skin burns and eye damage</td>
</tr>
<tr>
<td>H318 Serious eye damage</td>
</tr>
<tr>
<td>H333 May be harmful if inhaled</td>
</tr>
<tr>
<td>EUH014 Reacts violently with water</td>
</tr>
</tbody>
</table>

Precautionary statement(s)

P233 Keep container tightly closed
P261 Avoid breathing dust/fume/gas/mist/vapors/spray
P270 Do not eat, drink or smoke when using this product
P273 Avoid release to the environment
P280 Wear protective gloves/protective clothing/eye protection/face protection
P362 Take off contaminated clothing and wash before reuse
P301+330+331 IF SWALLOWED: Rinse mouth, do NOT induce vomiting, call a POISON CENTER or doctor/physician
+311
P302+352 IF ON SKIN: Wash with plenty of soap and water
P304 + 341 +310 IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing, immediately call a POISON CENTER or doctor/physician
P305 + 351  IF IN EYES: Rinse continuously with water for several minutes (15 mins)
P310         Immediately call a POISON CENTER/doctor
P402 + P404  Store in a dry place. Store in a closed container

GHS Category Classification:
Category 1 – Serious Eye Damage/Eye irritation
Category 1 B – Skin Corrosion/irritant
Category 3- Single target organ toxicity-single exposure

EC CLASSIFICATION : C     R35, R36/37, R14

DANGER: causes burns by all exposure routes. Fumes in moist air. Material hydrolyzes in contact with moisture/water releasing toxic and corrosive fumes of hydrogen chloride and aqueous hydrochloric acid.

PRIMARY ROUTES OF ENTRY:
Eye √    Inhalation √    Skin √    Ingestion √

POTENTIAL HEALTH EFFECTS:
Eye Contact: Lachrymator (substance which increases the flow of tears). Long and Short term exposure may cause tearing and burns.
Ingestion: May cause burns from mild to serious.
Inhalation: Short-term exposure may cause mild irritation to burns of the respiratory tract. Long term exposure or inhaling large doses may cause serious damage to the respiratory tract. Difficulty in breathing may be experienced, coughing and wheezing, shortness of breath and pulmonary edema.
Skin Contact: Contact will cause burns to the skin from mild to severe, especially if skin is wet.
Chronic: Contact will cause serious damage to respiratory tract, eyes and skin.

3. COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Components</th>
<th>Wt. %</th>
<th>CAS Registry #/EINECS</th>
<th>TWA (mg/m3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERMANIUM TETRACHLORIDE</td>
<td>100</td>
<td>10038-98-9/233-116-7</td>
<td>N.E.</td>
</tr>
</tbody>
</table>

PRODUCT DOES NOT CONTAIN ANY REPORTABLE EU SUBSTANCES OF VERY HIGH CONCERN (SVHC)

4. FIRST AID MEASURES

Eye Contact: Hold eyelids apart and flush eyes with plenty of tepid water for at least 15 minutes or more until no evidence of chemical remains. Seek medical attention immediately.
Ingestion: If patient is conscious, ONLY induce vomiting as directed by trained personnel. NEVER give anything by mouth to an unconscious person. Seek medical attention immediately.
Inhalation: When safe to enter area, remove to fresh air. If not breathing, give artificial respiration or oxygen by trained personnel. Seek immediate medical attention.
Skin Contact: Remove contaminated clothing. Wash affected area with soap and large amounts of water until no evidence of chemical remains. Wash clothing before reuse. Destroy contaminated shoes. Get medical attention immediately.
5. FIRE FIGHTING MEASURES

Flash Point: Not applicable.  
Method: Not established.  
Auto-ignition Temperature: Not established.  

Flammable Limits: Limits not established. Not flammable.  

Extinguishing Media: Regular dry chemical, carbon dioxide and regular foam. Material will react with water and give off fumes. DO NOT USE WATER!

Special Fire Fighting Procedures: Firefighters must wear NIOSH or other approved self-contained breathing apparatus and full protective clothing. Cool containers with water spray well after fire is out. Avoid getting water inside of containers. Stay away from the ends of the tanks. Avoid inhalation of material or combustion by-product. Stay upwind and keep out of low areas. Will decompose upon heating from a fire to produce corrosive and/or toxic fumes.

Explosion Sensitivity: Mechanical Impact: Not available
Static Discharge: Not available

6. ACCIDENTAL RELEASE MEASURES

Spill or Leak Procedures: Wear the appropriate personal protective equipment (chemical resistant gloves, chemical resistant clothing, with a vapor barrier, chemical resistant boots or shoe covers and respirator) prior to addressing any type of spill. Do not touch spilled material. Stop leak if possible without personal risk. Small spills or leaks: Absorb with sand or other non-combustible material such as absorbent mat/ pillow/ boom. Do not allow any material to enter the drains. Collect spilled material and dispose of in a covered waste container. Properly label container. Large spills: Isolate area, keep unnecessary personnel away and deny entry. Contact the appropriate trained individuals who will be wearing the correct personal protective clothing including a self-contained breathing apparatus.(SCBA) Spillage may require evacuation/isolation measures. Do not allow spillage to enter any drains, waterways or ground. Contain spill if necessary. Air circulating systems may need to be shut down to avoid spreading of vapors. All waste must be disposed of in accordance with applicable state, federal and local regulations. Consult the Emergency Guide Book, Guide #154 for additional emergency spill information and evacuation/isolation distances.

7. HANDLING AND STORAGE

Handling and Storage Precautions: Store product in cool dry area in tightly sealed containers. Product should be kept away from incompatible substances. Store under an inert atmosphere. Follow applicable regulations and requirements. Personnel should be familiar with the proper use of the material and the materials container.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Handling of material shall be within a glove box or other equipment where conditions are controlled. Proper ventilation is required when handling product, in order to reduce or eliminate exposure. Material is reactive in air and will fume upon contact to air and water. Avoid exposure to product.
Personal protection:
Eyes: Chemical safety glasses/goggles and face-shield. Provide an emergency eyewash/shower in the immediate work area. Do not wear contact lenses when working with this product.
Respirator: A NIOSH approved or other authority approved full-face air purifying respirator with an acid gas/particulate chemical cartridge is recommended when exposure concentrations are at a minimum. For unknown concentrations use either a self-contained breathing apparatus (SCBA) with full face piece, or any supplied-air respirator with full face-piece and operated in a pressure demand or other positive-pressure mode in combination with separate escape supply.
Skin: Compatible chemical (acid) resistant gloves. (Nitrile/Neoprene any rated for Hydrochloric acid)
Other: Lab coat or chemical resistant clothing, eyewash shower unit in work area. Avoid the use of contact lenses when using this product.
Work/Hygienic Practices: Maintain good housekeeping. Clean up spills immediately. Avoid eating, smoking or drinking in the work area. Wash hands thoroughly with soap and water immediately upon leaving the work area.

No established OSHA Permissible Exposure Levels for Germanium Tetrachloride.
Hydrogen chloride 7647-01-0 (ACGIH 2 ppm ceiling limit, OSHA 5 ppm ceiling limit)
OEL – Russia: Short term exposure level (STEL) 1 mg/m³ January 1993
Bulgaria: TWA 1mg/m³
Latvia: TWA 1 mg/m³
Lithuania: 1 mg/m³ (germanium)

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Colorless, mobile, fuming liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>Acidic odor/Irritating odor</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.87 @20 C</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>76 mmHg @20 C</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting/Freezing Point</td>
<td>-57 F (-49.5 C)</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>83.1 C / 84 C @ 750 mm Hg</td>
</tr>
<tr>
<td>pH</td>
<td>&lt;1 (corrosive)</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Reacts</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not available</td>
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<tr>
<td>Molecular weight</td>
<td>214.40</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

General: May react with evolution of heat on contact with water. Releases toxic fuming gases. Releases corrosive fuming gases.
Conditions to Avoid: Contact with water. Avoid heat, flames, sparks and other sources of ignition. May ignite or explode on contact with combustible materials.
Incompatible Materials: Bases, oxidizing materials, water.
Contact with air or water will generate – fuming products such as hydrogen chloride.
Hazardous Polymerization: Will not occur.
Physical Hazards: Reacts on contact with air, water or heat: fuming material.
11. TOXICOLOGICAL INFORMATION

Carcinogenicity:
- NTP: No
- OSHA: No
- IARC: No

Irritation Data:
- 50-mg eyes- rabbit severe

LD50:
- 56 mg/kg intravenous-mouse

LC50:
- 44 gm/m³/2 hour(s) inhalation-mouse

TCLo lowest published toxic concentration – inhalation: rodent (mouse) 500 mg/m³ – 2 hours/40 D-I

Local Effect:
- Corrosive: inhalation, skin, eye, ingestion

See Registry of Toxic Effects of Chemical Substances (RTECS) Number – LY5225000 for additional information.

Health Effects

Inhalation:

Acute Exposure: Germanium Tetrachloride: can cause irritation and burns to the respiratory system.

Chronic Exposure: There have been lasting changes in the respiratory system function reported in animals. Extremely destructive to tissue of the mucous membranes and upper respiratory tract.

Skin Contact:

Acute Exposure: May cause irritation or acid type burns, possibly severe.

Chronic Exposure: Effects depend on concentration and duration of exposure. Repeated or prolonged contact with corrosive substances may result in dermatitis or effects as in acute exposure.

Eye Contact:

Acute Exposure: Vapor may cause tearing, conjunctivitis, and irritation, possibly severe.

Chronic Exposure: Effects depend on concentration and duration of exposure. Repeated or prolonged contact with corrosive substances may result in conjunctivitis or effects as in acute exposure.

Ingestion:

Acute Exposure: Corrosive substance. May cause immediate pain and severe burns of the mucous membranes. There may be discoloration of the tissues. Swallowing and speech may be difficult at first and then almost impossible. The effects on the esophagus and gastrointestinal tract may range from irritation to severe corrosive. Edema of the epiglottis and shock may occur.

Chronic Exposure: Corrosive substance. Depending on the concentration level, repeated ingestion may cause effects as with acute ingestion. Ingestion of high concentrations may cause death.

Reproductive Toxicology: Not available
Sensitization to Product: See Section 3
Irritancy to Product: See Section 3
Teratogenicity: Not available
Mutagenicity: Not available
Synergistic Products: Not available

Specific target organ toxicant, single exposure, Category 3 with respiratory tract irritation (hydrochloric acid)
Signs and symptoms of over exposure such as - burning sensation, cough, wheezing, shortness of breath, inflammation and edema of the bronchi. Product may be destructive to tissue of the mucous membranes and upper respiratory tract, eyes and skin.

12. ECOLOGICAL INFORMATION
Do not discharge to any water way or sewer drain.
No further information is available at this time.

13. DISPOSAL CONSIDERATION
Waste Disposal Method: Dispose of in accordance with all applicable regulations. In US follow 40 CFR 262, Hazardous Waste D002 and D003 classification. In Europe follow the Special Waste Regulations. Containers are to be properly disposed of when they have reached their useful life. Do not reuse the container for anything other than this product.

14. TRANSPORT INFORMATION
Transport in accordance with applicable regulations and requirements. US DOT 49 CFR 172.101 Shipping Information:

UN 2922, Corrosive Liquid, Toxic, N.O.S., 8, PG II (Germanium Tetrachloride) (Fuming Material)
Transport labeling requirements: Corrosive Class 8 and Toxic Class 6.1
Note: Product must have protective cap and be placed within a protective container designed especially for this product.
Other:
Cargo Aircraft:: 30 liter maximum quantity per container allowed - IATA
Due to safety reasons transport by cargo aircraft only – IATA. No passenger aircraft.
IMDG: Stowage Segregation: “Stow Clear of living quarters” – IMDG
Stowage Location: Category B: may be stowed “on deck” or “under deck” cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than 25.
IMDG Code segregation group 1 – Acids
EmS: F-A, S-B

All containers (product and if applicable overpack) must be properly marked and labeled.
Marine pollutant: No

15. REGULATORY INFORMATION
The information in this Safety Data Sheet meets the requirements of the United States Occupational Safety and Health Act and regulations promulgated thereunder (29 CFR 1910.1200 ET. SEQ.),

This product has been classified in accordance with the hazard criteria of the Canadian Products Regulation (CPR).

Canadian WHMIS:
This product has been classified in accordance with the Mexican regulations NOM-018-STPS-2000 and NOM-010-STPS-1999.

This product has been classified in accordance with the hazard criteria of the Commission Directive 91/155/EEC and EH40.
This product has been classified in accordance with the guidelines set by the Dept of Industrial Health of the Republic of Singapore.

California PROP 65: No
SARA 313 Listing: No
SARA 302/304: No
CERCLA 103: No
EPA TSCA 12(b) Export Notification: Not Listed

Listed:
EPA TSCA Inventory
Canadian Domestic Substance List
Europe Inventory of Existing Commercial Chemical Substances (EINECS): 233-116-7
China Inventory of Existing Chemical Substances
Philippines Inventory of Chemicals and Chemical Substances

**EC Risk and Safety Phrases:**
RoHS 2 (2011/65/EU) complaint.

**Risk**
R14 Reacts violently with water
R35 Causes severe burns
R36/37 Irritating to eyes and respiratory system

**Safety**
S20/21 When using do not eat, drink or smoke
S24/25 Avoid contact with skin and eyes
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S36/39 Wear suitable protective clothing and eye/face protection
S46 If swallowed, seek medical advice immediately and show this container or label
### 16. OTHER INFORMATION

<table>
<thead>
<tr>
<th>HMIS Hazard Rating:</th>
<th>Health:</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fire:</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Physical Hazard:</td>
<td>2</td>
</tr>
</tbody>
</table>

**Revised Date:** 6 MARCH 2014  
**Prepared by:** Nancy Swarts, For the Germanium Corporation of America  
**Approved by:** Nancy Swarts, For the Germanium Corporation of America

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