

SAFETY DATA SHEET

according to regulation (EG) Nr. 1907/2006



Date of issue: 09.10.2013

Revision date: 28.07.2015

Version: 2.1

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY / UNDERTAKING

1.1 Product identifiers

Product name: Germanium tetrafluoride (Ge-72 labelled)
EC-No. (non-labelled): 232-011-3
CAS-No. (non-labelled): 7783-58-6
Index No.: ---
REACH Registration no.: Not required

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Chemical, doping of semiconductors.

1.3 Details of the supplier of the safety data sheet

Supplier: NUKEM Isotopes GmbH,
Industriestrasse 13,
63755 Alzenau, Germany
Telephone: +49 (0)6023 91 1726
Telefax: +49 (0)6023 91 1614
Email: Christian.Schuch@nukemisotopes.de

1.4 Emergency telephone number

24 hr. Emergency Telephone: **+1-703-253-4254** (English / Contract No.: 01009)

2. HAZARDS INDICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

Gases under pressure, liquefied gas, H280
Acute toxicity, Category 1, inhalation, H330
Skin corrosion, Category 1B, H314
Specific Target Organ Toxicity (repeated exposure), Category 1, H372
For the full text of the H-phrases mentioned in this Section, see Section 2.2.

Classification according to directive 67/548/EEG or directive 1999/45/EG

T+: Very toxic C: Corrosive

R-Phrases:

R 26 Very toxic by inhalation
R 35 Causes severe burns

2.2 Label elements

Labeling according to Regulation (EG) Nr. 1272/2008

The substance is classified and labelled according to the CLP regulation.

Hazard statements:



GHS04



GHS05



GHS06



GHS07

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Signal word:

Danger

Hazard statement(s):

- | | |
|------|---|
| H280 | Contains gas under pressure; may explode if heated |
| H330 | Fatal if inhaled. |
| H314 | Causes severe skin burns and eye damage. |
| H372 | Causes damage to organs through prolonged or repeated exposure. |

Precautionary statement(s):

- | | |
|--------------------|--|
| P260 | Do not breathe gas/vapors. |
| P280 | Wear protective gloves/ protective clothing/ eye protection/ face protection. |
| P303 + P361 + P353 | If on skin (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water. |
| P305 + P351 + P338 | If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P304 + P340 | If inhaled: Remove to fresh air and keep at rest in a position comfortable for breathing. |
| P310 | Immediately call a poison center or doctor/ physician. |

Storage:

- | | |
|------|-----------------------------------|
| P403 | Store in a well-ventilated place. |
| P405 | Store locked up. |

Supplemental Hazard Statement - EUH-phrases:

- | | |
|---------|------------------------------------|
| EUH014: | Reacts violently with water. |
| EUH071: | Corrosive to the respiratory tract |

2.3 Other hazards

Not information available

3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Chemical characterization

Substance:

- | | |
|------------------------|--|
| CAS No. (description): | 7783-58-6 (Ge-72 labelled germanium tetrafluoride) |
| EG-No.: | 232-011-3 |
| Formula: | ⁷² GeF ₄ (Ge-72) |
| Molar mass [g/mol]: | ca. 148.6 (depending on Ge-72 enrichment) |

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

If breathed in, move person into fresh air. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

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In case of skin contact

If this chemical contacts the skin, immediately flush the contaminated skin with soap and water. If clothing is contaminated, immediately remove and flush the skin with soap and water. Get medical attention promptly. Assume victim has also been exposed by inhalation. Treat as HF exposure. Consider the use of calcium gluconate.

In case of eye contact

Rinse mouth with water. If swallowed, drink plenty of water and do NOT induce vomiting. Get immediate medical attention.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labeling (see section 2.2) and/or in section 11.

4.3 Indication of any immediate medical attention and special treatment needed

No data available.

4.4 Indication of any immediate medical attention and special treatment needed

No further relevant information available.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing agents:

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Hydrogen fluoride, germanium oxides.

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No further information available.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Stop leak if possible without personal risk and reduce vapors with water spray. Do not get water directly on material. Use personal protective equipment. Avoid breathing vapors, mist or gas and ensure adequate ventilation. Evacuate personnel to safe areas. For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Discharge into the environment must be avoided. Methods and material for containment and cleaning up. Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.3 Reference to other sections

See Section 13 for disposal information.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Handle this material only in a sealed, purged system. Do not heat cylinder by any means to increase discharge rate of product from the cylinder. Avoid inhalation of vapor or mist. For precautions see section 2.2.

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7.2 Conditions for safe storage, including any incompatibilities

Contents under pressure. Store in cool place and keep the container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)

No further relevant information available.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control Parameters

Components with workplace control parameters.

DNEL/DMEL and PNEC-Values:

No information available.

8.2 Exposure controls

Appropriate engineering controls:

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of the workday.

Individual protection measures, such as personal protective equipment:

Body protection:

Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection:

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Eye protection:

Tightly fitting safety goggles. Face shield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Hand protection:

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

8.3 Environmental exposure controls:

Do not let product enter drains.

9. PHYSICAL/CHEMICAL PROPERTIES

General Information

Appearance:	Form: Gaseous at 20°C
Odor:	No information available.
Odor threshold:	No information available.
pH-value (50 g/l) at 20 °C:	No information available.
Melting point (at. 4.04 bar):	-15 °C

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Sublimation point:	-36.5 °C
Flash point:	No information available.
Flammability (solid, gaseous):	No information available.
Ignition temperature:	No information available.
Decomposition temperature:	> 1000 °C
Self-igniting:	No information available.
Danger of explosion:	No information available.
Explosion limits:	Lower: No information available. Upper: No information available.
Oxidizing properties:	The substance or mixture is classified as oxidizing with the category 3.
Vapor pressure (at -16 °C):	4.042 bar
Density at 0 °C:	2.162 g/cm ³
Density at -195 °C:	3.148 g/cm ³
Bulk density:	ca. 800 kg/m ³
Evaporation rate:	No information available.
Solubility in / Miscibility with water:	Hydrolysis.
Partition coefficient: n-octanol/water:	No information available.
Viscosity, dynamic:	No information available.

10. STABILITY AND REACTIVITY

10.1 Reactivity

See section 10.3.

10.2 Chemical stability

Decomposition at T > 1000 °C

10.3 Possibility of hazardous reactions

The substance can react dangerously with:

Acids, water and heat

10.4 Conditions to avoid

Heating and moisture.

10.5 Incompatible materials

Water, alkali metals, calcium oxide, acids.

10.6 Hazardous decomposition products

Hydrogen fluoride, fluorine, germanium dioxide

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity:

Currently, there is no LD50 Oral, Skin or LC50 Inhalation data for Germanium Tetrafluoride. By analogy to hydrogen fluoride, under ISO 10298:2010, LC50 (Inhalation-Rat) 1307 ppm/h for hydrogen fluoride, which is the main decomposition product.

Therefore, the LC50 for Germanium Tetrafluoride is estimated to be 319 ppm.

Additionally, Germanium Tetrafluoride is expected to produce irritation of the skin, eyes and upper respiratory system. The effects of skin exposure may be delayed, this may make it difficult to associate the injury with the exposure.

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Chronic and sub chronic data

No information for Germanium Tetrafluoride are available. However, prolonged exposure to hydrogen fluoride produces systemic increase in fluoride, which may result in diseases of bones, liver, and kidneys and in hypocalcemia. germanium tetrafluoride is not listed in the *Registry of Toxic Effects of Chemical Substances* (RTECS); no information on its carcinogenicity is available.

11.2 Additional toxicological information

Corrosive after contact with skin, eyes or at inhalation.

Material reacts with moisture on the skin, eyes, and mucous membranes to generate hydrogen fluoride. Hydrogen fluoride is extremely destructive and may cause deep progressive burns that induce subcutaneous tissues to become blanched and bloodless resulting in lesions of dead tissue that are slow to heal.

11.3 Further information

Central nervous system disorders, bone, joint or tooth disorders, eye disorders, kidney disorders, respiratory disorders, skin disorders and allergies.

The product should be handled with the care usual when dealing with chemicals.

12. ECOLOGICAL INFORMATION

12.1 Toxicity (GESTIS)

No information available.

12.2 Persistence and degradability

No information available.

12.3 Bioaccumulative potential

No information available.

12.4 Mobility in soil

No information available.

12.5 Results of PBT and vPvB assessment

PBT: Not applicable.

vPvB: Not applicable.

12.6 Other adverse effects

After contact with moisture, hydrolyzes to fluorogermanic acid and hydrofluoric acid.

Discharge into the environment must be avoided.

13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment methods

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D003

14. TRANSPORT INFORMATION

14.1 UN-Number

ADR/RID, IMDG, IATA: UN 3304

14.2 UN proper shipping name

ADR/RID: COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S. (GERMANIUM TETRAFLUORIDE)

IMDG: COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S. (GERMANIUM TETRAFLUORIDE)

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IATA:	Compressed gas, toxic, corrosive, n.o.s. (Germanium Tetrafluoride)
Passenger Aircraft:	Not permitted for transport
Cargo Aircraft:	Not permitted for transport

14.3 Transport hazard class(es)

ADR/RID, IMDG, IATA: 2.3 (8)

14.4 Packing group

ADR/RID, IMDG, IATA: ---

14.5 Environmental hazards:

ADR/RID, IMDG, IATA: No

14.6 Special precautions for user

ADR/RID, IMDG, IATA: No information available.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:

No

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

No information available.

15.2 Chemical safety assessment

A Chemical Safety Assessment has not been carried out.

16. OTHER INFORMATION

Disclaimer

Product is supplied for research and laboratory use only. Not for drug, household or other uses.

Warranty

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. See invoice or packing slip for additional terms and conditions of sale.