SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Zirconium(IV) chloride
Product Number: 221880
Brand: Aldrich
CAS-No.: 10026-11-6

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

Identified uses: Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES
Telephone: +1 314 771-5765
Fax: +1 800 325-5052

1.4 Emergency telephone

Emergency Phone #: 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Corrosive to Metals (Category 1), H290
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word: Danger
Hazard statement(s): May be corrosive to metals.
The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada.

Precautionary statement(s)
P234 Keep only in original container.
P260 Do not breathe dust.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P363 Wash contaminated clothing before reuse.
P390 Absorb spillage to prevent material damage.
P405 Store locked up.
P406 Store in corrosive resistant container with a resistant inner liner.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS
Reacts violently with water.
Corrosive to the respiratory tract.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: Zirconium tetrachloride

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>zirconium(IV) chloride</td>
<td>Met. Corr. 1; Skin Corr. 1B; Eye Dam. 1; H290, H314, H318</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.
SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
Water Foam

5.2 Special hazards arising from the substance or mixture
Not combustible.
May not get in touch with: Water
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.
SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Advice on safe handling
Keep workplace dry. Do not allow product to come into contact with water.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Storage conditions
No metal containers.
Tightly closed. Dry.
Never allow product to get in contact with water during storage.
Handle and store under inert gas. Moisture sensitive.

Storage class
Storage class (TRGS 510): 8B: Non-combustible, corrosive hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Ingredients with workplace control parameters
The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>zirconium(IV) chloride</td>
<td>10026-11-6</td>
<td>TWA</td>
<td>5 mg/m³</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>5 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td></td>
<td>Not classifiable as a human carcinogen</td>
</tr>
<tr>
<td>STEL</td>
<td>10 mg/m³</td>
<td></td>
<td></td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not classifiable as a human carcinogen</td>
</tr>
<tr>
<td>PEL</td>
<td>5 mg/m³</td>
<td></td>
<td></td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
</tr>
<tr>
<td>STEL</td>
<td>10 mg/m³</td>
<td></td>
<td></td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin 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.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our

Aldrich - 221880
customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
protective clothing

**Respiratory protection**
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

**Control of environmental exposure**
Do not let product enter drains.

### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Appearance Form: powder Color: white</td>
<td></td>
</tr>
<tr>
<td>b) Odor odorless</td>
<td></td>
</tr>
<tr>
<td>c) Odor Threshold No data available</td>
<td></td>
</tr>
<tr>
<td>d) pH No data available</td>
<td></td>
</tr>
<tr>
<td>e) Melting point/freezing point Melting point/range: 331 °C (628 °F)</td>
<td></td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range No data available</td>
<td></td>
</tr>
<tr>
<td>g) Flash point ()Not applicable</td>
<td></td>
</tr>
<tr>
<td>h) Evaporation rate No data available</td>
<td></td>
</tr>
<tr>
<td>i) Flammability (solid, gas) The product is not flammable. - Flammability (solids)</td>
<td></td>
</tr>
<tr>
<td>j) Upper/lower flammability or explosive limits No data available</td>
<td></td>
</tr>
<tr>
<td>k) Vapor pressure 1 hPa at 190 °C (374 °F)</td>
<td></td>
</tr>
<tr>
<td>l) Vapor density No data available</td>
<td></td>
</tr>
<tr>
<td>m) Density 2.8 g/cm3 at 25 °C (77 °F) - lit.</td>
<td></td>
</tr>
<tr>
<td>Relative density 2.7620 °C - OECD Test Guideline 109</td>
<td></td>
</tr>
<tr>
<td>n) Water solubility 2 g/l</td>
<td></td>
</tr>
<tr>
<td>o) Partition coefficient: n-octanol/water No data available</td>
<td></td>
</tr>
<tr>
<td>p) Autoignition temperature No data available</td>
<td></td>
</tr>
<tr>
<td>q) Decomposition temperature No data available</td>
<td></td>
</tr>
</tbody>
</table>
9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Sensitive to moisture

10.3 Possibility of hazardous reactions
Exothermic reaction with:
Ether
Ethanol
Hydrogen fluoride
Alkalines
Acids
Violent reactions possible with:
Water
The generally known reaction partners of water.
Risk of ignition or formation of inflammable gases or vapours with:
Alkali metals

10.4 Conditions to avoid
Moisture.

10.5 Incompatible materials
Acids, Alcohols, Amines, Reacts violently with water., Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
Skin - in vitro test
Result: Corrosive - 4 h
(In Vitro Membrane Barrier Test Method for Skin Corrosion - CORROSITEX)

Serious eye damage/eye irritation
Remarks: No data available
Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA’s list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information
RTECS: ZH7175000
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.
Granulomatous lesions have been observed in susceptible individuals following use of preparations containing zirconium. The lesions are probably of allergic epitheloid origin., Headache, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to daphnia LC50 - Daphnia magna (Water flea) - 2 mg/l - 3 Weeks
and other aquatic invertebrates(Chronic toxicity)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available
12.4 **Mobility in soil**  
No data available

12.5 **Results of PBT and vPvB assessment**  
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 **Endocrine disrupting properties**  
No data available

12.7 **Other adverse effects**  
No data available

---

**SECTION 13: Disposal considerations**

13.1 **Waste treatment methods**

**Product**
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

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**SECTION 14: Transport information**

**DOT (US)**
- UN number: 2503  
- Class: 8  
- Packing group: III  
- Proper shipping name: Zirconium tetrachloride  
- Reportable Quantity (RQ): 5000 lbs  
- Poison Inhalation Hazard: No

**IMDG**
- UN number: 2503  
- Class: 8  
- Packing group: III  
- EMS-No: F-A, S-B  
- Proper shipping name: ZIRCONIUM TETRACHLORIDE

**IATA**
- UN number: 2503  
- Class: 8  
- Packing group: III  
- Proper shipping name: Zirconium tetrachloride

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**SECTION 15: Regulatory information**

**SARA 302 Components**
This material does not contain any components with a section 302 EHS TPQ.

**SARA 313 Components**
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**
Acute Health Hazard

**Massachusetts Right To Know Components**

CAS-No.   
Revision Date
zirconium(IV) chloride 10026-11-6 1989-08-11

**Pennsylvania Right To Know Components**
zirconium(IV) chloride 10026-11-6 1989-08-11

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### SECTION 16: Other information

**Further information**

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. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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