1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name: Zirconium(IV) fluoride
Product Number: 311464
Brand: Aldrich
CAS-No.: 7783-64-4

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

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO  63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
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): Causes severe skin burns and eye damage.
H314

Precautionary statement(s):
P260: Do not breathe dust or mist.
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): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310    Immediately call a POISON CENTER or doctor/physician.
P321    Specific treatment (see supplemental first aid instructions on this label).
P363    Wash contaminated clothing before reuse.
P405    Store locked up.
P501    Dispose of contents/container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

<table>
<thead>
<tr>
<th>Formula</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular weight</td>
<td>167.22 g/mol</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>7783-64-4</td>
</tr>
<tr>
<td>EC-No.</td>
<td>232-018-1</td>
</tr>
</tbody>
</table>

Zirconium tetrafluoride

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium tetrafluoride</td>
<td>Skin Corr. 1B; Eye Dam. 1; H314</td>
<td>-</td>
</tr>
</tbody>
</table>

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

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. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture
Hydrogen fluoride, Zirconium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available
6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
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
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Hygroscopic Keep in a dry place.

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

8. EXPOSURE CONTROLS/PERSOANL PROTECTION

8.1 Control parameters

Components with workplace control parameters

<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 tetrafluoride</td>
<td>7783-64-4</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></td>
<td>TWA</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.5 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td>Remarks</td>
<td>CAS: number varies with compound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>2.5 mg/m³</td>
<td></td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z37.28-1969</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>2.5 mg/m³</td>
<td></td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
<td></td>
</tr>
<tr>
<td>Bone damage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluorosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substances for which there is a Biological Exposure Index or Indices (see BEI® section)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not classifiable as a human carcinogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>5 mg/m³</td>
<td></td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
<td></td>
</tr>
<tr>
<td>Not classifiable as a human carcinogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEL</td>
<td>10 mg/m³</td>
<td></td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
<td></td>
</tr>
<tr>
<td>Not classifiable as a human carcinogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameters</td>
<td>Value</td>
<td>Biological specimen</td>
<td>Basis</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td>---------------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>TWA 5 mg/m³</td>
<td>USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEL 10 mg/m³</td>
<td>USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA 2.5 mg/m³</td>
<td>USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA 5 mg/m³</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST 10 mg/m³</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Biological occupational exposure limits**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium tetrafluoride</td>
<td>7783-64-4</td>
<td>Fluoride</td>
<td>3 mg/g</td>
<td>In urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
</tbody>
</table>

Remarks: Prior to shift (16 hours after exposure ceases)

Fluoride 10 mg/g In urine ACGIH - Biological Exposure Indices (BEI) End of shift (As soon as possible after exposure ceases)

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 workday.

**Personal protective equipment**

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**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 CE 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 customers. It should not be construed as offering an approval for any specific use scenario.

**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 particle respirator type N100 (US) or type P3 (EN 143) 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).

Control of environmental exposure
Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: powder
b) Odour No data available
c) Odour Threshold No data available
d) pH No data available
e) Melting point/freezing point No data available
f) Initial boiling point and boiling range No data available
g) Flash point Not applicable
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
j) Upper/lower flammability or explosive limits No data available
k) Vapour pressure No data available
l) Vapour density No data available
m) Relative density No data available
n) Water solubility No data available
o) Partition coefficient: n-octanol/water No data available
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available
10.4 **Conditions to avoid**  
Avoid moisture.

10.5 **Incompatible materials**  
Strong oxidizing agents

10.6 **Hazardous decomposition products**  
Other decomposition products - No data available  
In the event of fire: see section 5

11. **TOXICOLOGICAL INFORMATION**

11.1 **Information on toxicological effects**  

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

**Skin corrosion/irritation**  
No data available

**Serious eye damage/eye irritation**  
No data available

**Respiratory or skin sensitisation**  
No data available

**Germ cell mutagenicity**  
No data available

**Carcinogenicity**  
IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Zirconium tetrafluoride)  
NTP: No component 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 identified as a carcinogen or potential carcinogen by OSHA.

**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

**Additional Information**  
RTECS: ZH7875000  
Cough, Shortness of breath, Headache, Nausea, Vomiting

12. **ECOLOGICAL INFORMATION**

12.1 **Toxicity**  
No data available

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 Other adverse effects
No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

14. TRANSPORT INFORMATION

**DOT (US)**
- UN number: 3260  
- Class: 8  
- Packing group: II  
- Proper shipping name: Corrosive solid, acidic, inorganic, n.o.s. (Zirconium tetrafluoride)  
- Marine pollutant: No  
- Poison Inhalation Hazard: No

**IMDG**
- UN number: 3260  
- Class: 8  
- Packing group: II  
- EMS-No: F-A, S-B  
- Proper shipping name: CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. (Zirconium tetrafluoride)  
- Marine pollutant: No

**IATA**
- UN number: 3260  
- Class: 8  
- Packing group: II  
- Proper shipping name: Corrosive solid, acidic, inorganic, n.o.s. (Zirconium tetrafluoride)

15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**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**
No components are subject to the Massachusetts Right to Know Act.

**Pennsylvania Right To Know Components**
- Zirconium tetrafluoride  
  - CAS-No.: 7783-64-4  
  - Revision Date: 2008-06-01

**New Jersey Right To Know Components**
- Zirconium tetrafluoride  
  - CAS-No.: 7783-64-4  
  - Revision Date: 2008-06-01

**California Prop. 65 Components**
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

- **Eye Dam.** Serious eye damage
- **H314** Causes severe skin burns and eye damage.
- **H318** Causes serious eye damage.
- **Skin Corr.** Skin corrosion

**HMIS Rating**
- Health hazard: 3
- Chronic Health Hazard: 
- Flammability: 0
- Physical Hazard: 0

**NFPA Rating**
- Health hazard: 3
- Fire Hazard: 0
- Reactivity Hazard: 0

**Further information**
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**Preparation Information**
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.6
Revision Date: 08/21/2014
Print Date: 12/10/2014