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

1.1 Product identifiers

Product name: Tetraethyl orthosilicate

Product Number: 86578
Brand: Aldrich
Index-No.: 014-005-00-0
CAS-No.: 78-10-4

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 Street
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)

- Flammable liquids (Category 3), H226
- Acute toxicity, Inhalation (Category 4), H332
- Eye irritation (Category 2A), H319
- Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

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: Warning
Hazard statement(s)
H226 Flammable liquid and vapor.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.

Precautionary statement(s)
P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P403 + P235 Store in a well-ventilated place. Keep cool.
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

SECTION 3: Composition/information on ingredients
3.1 Substances
Synonyms: Tetraethoxysilane
Orthosilicic acid tetraethyl ester

Formula: C₈H₂₀O₄Si
Molecular weight: 208.33 g/mol
CAS-No.: 78-10-4
EC-No.: 201-083-8
Index-No.: 014-005-00-0

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>tetraethyl silicate</td>
<td>Flam. Liq. 3; Acute Tox. 4; Eye Irrit. 2A; STOT SE 3; H226, H332, H319, H335</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada
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
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air.

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

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

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). 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

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, silicon oxides
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
In the event of fire, wear self-contained breathing apparatus.

5.4 Further information
Under fire conditions, material may decompose to form flammable and/or explosive mixtures in air. Remove container from danger zone and cool with water. 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: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. 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. Risk of explosion.

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 with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store under nitrogen.
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.
Moisture sensitive.
Storage class (TRGS 510): 3: Flammable liquids

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

<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>tetraethyl silicate</td>
<td>78-10-4</td>
<td>TWA</td>
<td>10 ppm</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

Remarks
Upper Respiratory Tract irritation
Eye irritation
Kidney damage
<table>
<thead>
<tr>
<th>Limits for Air Contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TWA</strong></td>
</tr>
<tr>
<td><strong>USA. NIOSH Recommended Exposure Limits</strong></td>
</tr>
<tr>
<td><strong>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</strong></td>
</tr>
<tr>
<td><strong>PEL</strong></td>
</tr>
</tbody>
</table>

### 8.2 Exposure controls

**Appropriate engineering controls**
Change contaminated clothing. Preventive skin protection recommended. Wash hands 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). Safety glasses

**Skin protection**
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Chloroprene
Minimum layer thickness: 0.65 mm
Break through time: 240 min
Material tested:KCL 720 Camapren®

**Body Protection**
Flame retardant antistatic protective clothing.

**Respiratory protection**
required when vapours/aerosols 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. Risk of explosion.
### 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><strong>a)</strong> Appearance</td>
<td>Form: liquid, Color: colorless</td>
</tr>
<tr>
<td><strong>b)</strong> Odor</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>c)</strong> Odor Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>d)</strong> pH</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>e)</strong> Melting point/freezing point</td>
<td>Melting point: -82.5 °C (-116.5 °F) at ca.1,013 hPa</td>
</tr>
<tr>
<td><strong>f)</strong> Initial boiling point and boiling range</td>
<td>168 °C 334 °F</td>
</tr>
<tr>
<td><strong>g)</strong> Flash point</td>
<td>45 °C (113 °F) - closed cup - DIN 51755 Part 1</td>
</tr>
<tr>
<td><strong>h)</strong> Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>i)</strong> Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>j)</strong> Upper/lower flammability or explosive limits</td>
<td>Upper explosion limit: 23 %(V), Lower explosion limit: 1.3 %(V)</td>
</tr>
<tr>
<td><strong>k)</strong> Vapor pressure</td>
<td>&lt; 1 hPa at 20 °C (68 °F)</td>
</tr>
<tr>
<td><strong>l)</strong> Vapor density</td>
<td>7.19 - (Air = 1.0)</td>
</tr>
<tr>
<td><strong>m)</strong> Relative density</td>
<td>0.934 g/mL at 25 °C (77 °F)</td>
</tr>
<tr>
<td><strong>n)</strong> Water solubility</td>
<td>1.49 g/L at 23 °C (73 °F) at 7 hPa - soluble</td>
</tr>
<tr>
<td><strong>o)</strong> Partition coefficient: n-octanol/water</td>
<td>log Pow: 3.18 at 40 °C (104 °F) - Bioaccumulation is not expected.</td>
</tr>
<tr>
<td><strong>p)</strong> Autoignition temperature</td>
<td>222 °C (432 °F) at 960.8 hPa</td>
</tr>
<tr>
<td><strong>q)</strong> Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>r)</strong> Viscosity</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>s)</strong> Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td><strong>t)</strong> Oxidizing properties</td>
<td>No data available</td>
</tr>
</tbody>
</table>

#### 9.2 Other safety information

- Relative vapor density: 7.19 - (Air = 1.0)

### SECTION 10: Stability and reactivity

#### 10.1 Reactivity

Vapor/air-mixtures are explosive at intense warming.

#### 10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature).
May decompose on exposure to moist air or water.

10.3 **Possibility of hazardous reactions**
No data available

10.4 **Conditions to avoid**
Heating.

10.5 **Incompatible materials**
Strong oxidizing agents, Strong acids

10.6 **Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, silicon oxides
Other decomposition products - No data available
In the event of fire: see section 5

---

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - male and female - > 2,500 mg/kg
(OECD Test Guideline 423)
LD50 Oral - Rat - 6,270 mg/kg
Remarks: (RTECS)
LC50 Inhalation - Rat - male - 4 h - 10 mg/l
(OECD Test Guideline 403)
LD50 Dermal - Rabbit - 5,878 mg/kg
Remarks: (RTECS)
No data available

**Skin corrosion/irritation**
Skin - Rabbit
Result: No skin irritation - 4 h
(OECD Test Guideline 404)

**Serious eye damage/eye irritation**
Causes serious eye irritation. (Regulation (EC) No 1272/2008, Annex VI)

**Respiratory or skin sensitization**
Buehler Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

**Germ cell mutagenicity**
Ames test
Salmonella typhimurium
Result: negative

**Carcinogenicity**
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
The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Acute oral toxicity - Irritations of mucous membranes in the mouth, pharynx, oesophagus and gastrointestinal tract.
Acute inhalation toxicity - mucosal irritations, Cough, Shortness of breath, Inhalation may lead to the formation of oedemas in the respiratory tract., Possible damages: , damage of respiratory tract

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
Repeated dose toxicity - Rat - male and female - Gavage - NOAEL (No observed adverse effect level) - 10 - 50 mg/kg
RTECS: VV9450000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Systemic effects:
After uptake of large quantities:
Tiredness, narcosis
Damage to:
Kidney
Other dangerous properties can not be excluded.
Handle in accordance with good industrial hygiene and safety practice.

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

<table>
<thead>
<tr>
<th>Toxicity to fish</th>
<th>semi-static test LC50 - Danio rerio (zebra fish) - &gt; 245 mg/l - 96 h (Regulation (EC) No. 440/2008, Annex, C.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxicity to daphnia and other aquatic invertebrates</td>
<td>flow-through test EC50 - Daphnia magna (Water flea) - &gt; 75 mg/l - 48 h (OECD Test Guideline 202)</td>
</tr>
<tr>
<td>Toxicity to algae</td>
<td>static test ErC50 - Pseudokirchneriella subcapitata - &gt; 100 mg/l - 72 h (OECD Test Guideline 201)</td>
</tr>
<tr>
<td>Toxicity to bacteria</td>
<td>static test EC50 - activated sludge - &gt; 100 mg/l - 3 h (OECD Test Guideline 209)</td>
</tr>
</tbody>
</table>

12.2 Persistence and degradability

| Biodegradability | aerobic - Exposure time 28 d |

Aldrich - 86578
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

SECTION 13: Disposal considerations

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

SECTION 14: Transport information

DOT (US)
UN number: 1292  Class: 3  Packing group: III
Proper shipping name: Tetraethyl silicate
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 1292  Class: 3  Packing group: III  EMS-No: F, E, S-D
Proper shipping name: TETRAETHYL SILICATE
Marine pollutant: Yes

IATA
UN number: 1292  Class: 3  Packing group: III
Proper shipping name: Tetraethyl silicate

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
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

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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