1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name: Diethyl ether

Product Number: 673811

Brand: Sigma-Aldrich

Index-No.: 603-022-00-4

CAS-No.: 60-29-7

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)

Flammable liquids (Category 1), H224

Acute toxicity, Oral (Category 4), H302

Eye irritation (Category 2A), H319

Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

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)

H224: Extremely flammable liquid and vapour.

H302: Harmful if swallowed.

H319: Causes serious eye irritation.

H336: May cause drowsiness or dizziness.

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.
Take precautionary measures against static discharge.

Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

Wash skin thoroughly after handling.

Do not eat, drink or smoke when using this product.

Use only outdoors or in a well-ventilated area.

Wear protective gloves/ protective clothing/ eye protection/ face protection.

**P243**

**P261**

**P264**

**P270**

**P271**

**P270**

**P280**

**P301 + P312**

**P303 + P361 + P353**

**P304 + P340**

**P305 + P351 + P338**

**P312**

**P330**

**P337 + P313**

**P370 + P378**

**P403 + P233**

**P403 + P235**

**P405**

**P501**

---

### 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides., Repeated exposure may cause skin dryness or cracking.

May form explosive peroxides.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

**Synonyms**: Ether

Ethyl ether

**Formula**: C₄H₁₀O

**Molecular Weight**: 74.12 g/mol

**CAS-No.**: 60-29-7

**EC-No.**: 200-467-2

**Index-No.**: 603-022-00-4

**Hazardous components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diethyl ether</td>
<td>Flam. Liq. 1; Acute Tox. 4; STOT SE 3; H224, H302, H336</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**

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.

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
Carbon oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
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. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

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

8. EXPOSURE CONTROLS/PERSONAL 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>Diethyl ether</td>
<td>60-29-7</td>
<td>TWA</td>
<td>400 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

**Remarks**
- Central Nervous System impairment
- Upper Respiratory Tract irritation

<table>
<thead>
<tr>
<th>STEL</th>
<th>500 ppm</th>
<th>USA. ACGIH Threshold Limit Values (TLV)</th>
</tr>
</thead>
</table>
| Central Nervous System impairment
| Upper Respiratory Tract irritation |

<table>
<thead>
<tr>
<th>TWA</th>
<th>400 ppm</th>
<th>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,200 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks**
- See Appendix D - Substances with No Established RELs

<table>
<thead>
<tr>
<th>STEL</th>
<th>500 ppm</th>
<th>USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,500 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

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.

- **Splash contact**
  - Material: Fluorinated rubber
  - Minimum layer thickness: 0.7 mm
  - Break through time: 30 min
  - Material tested: Vitoject® (KCL 890 / Aldrich Z677698, 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, Flame retardant antistatic protective clothing, 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 AXBEK (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).

- **Control of environmental exposure**
  - Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: liquid
   Colour: colourless

b) Odour
   no data available

c) Odour Threshold
   no data available

d) pH
   no data available

e) Melting point/freezing point
   Melting point/range: -116 °C (-177 °F)

f) Initial boiling point and boiling range
   34.6 °C (94.3 °F) at 1,013 hPa (760 mmHg)

g) Flash point
   -40 °C (-40 °F) - closed cup - DIN 51755 Part 1

h) Evaporation rate
   no data available

i) Flammability (solid, gas)
   no data available

j) Upper/lower flammability or explosive limits
   Upper explosion limit: 48 % (V)
   Lower explosion limit: 1.8 % (V)

k) Vapour pressure
   189 hPa (142 mmHg) at 0 °C (32 °F)
   389 hPa (292 mmHg) at 10 °C (50 °F)
   563 hPa (422 mmHg) at 20 °C (68 °F)
   863 hPa (647 mmHg) at 30 °C (86 °F)
   1,228 hPa (921 mmHg) at 40 °C (104 °F)
   2,311 hPa (1,733 mmHg) at 60 °C (140 °F)

l) Vapour density
   2.56 - (Air = 1.0)

m) Relative density
   0.71 g/cm3 at 20 °C (68 °F)

n) Water solubility
   65 g/l at 20 °C (68 °F)

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

Relative vapour density 2.56 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
   no data available

10.2 Chemical stability
   Stable under recommended storage conditions.
   Contains the following stabiliser(s):
   BHT (1 ppm)

10.3 Possibility of hazardous reactions
   Vapours may form explosive mixture with air.
10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Oxidizing agents, Strong acids

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
LD50 Oral - rat - 1,215 mg/kg
(OECD Test Guideline 401)

LC50 Inhalation - mouse - 30 min - 31000 ppm
Remarks: Behavioral: Convulsions or effect on seizure threshold.

LC50 Inhalation - rat - 4 h - 32000 ppm
LD50 Dermal - rabbit - > 14.2 g/kg
no data available

Skin corrosion/irritation
Skin - rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
in vivo assay - mouse
Result: Did not cause sensitisation on laboratory animals.
(OECD Test Guideline 429)

Germ cell mutagenicity
no data available

Carcinogenicity
no data available

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

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

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
May cause drowsiness or dizziness.
Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: KI5775000

Inhalation may provoke the following symptoms:
Cough, chest pain, Difficulty in breathing, Dizziness, Drowsiness, Contact with eyes can cause:, Redness, Provokes tears., Blurred vision, Prolonged or repeated exposure to skin causes defatting and dermatitis.

Liver - Irregularities - Based on Human Evidence
Liver - Ingestion may provoke the following symptoms:, Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity
Toxicity to fish    LC50 - Pimephales promelas (fathead minnow) - 2,560 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates  EC50 - Daphnia magna (Water flea) - 165 mg/l - 24 h (DIN 38412)
Toxicity to algae    NOEC - Desmodesmus subspicatus (green algae) - > 100 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability
Biodegradability    Result: - Not readily biodegradable.

12.3 Bioaccumulative potential
No bioaccumulation is to be expected (log Pow <= 4).

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
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1155    Class: 3    Packing group: I
Proper shipping name: Diethyl ether
Reportable Quantity (RQ): 100 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1155    Class: 3    Packing group: I    EMS-No: F-E, S-D
Proper shipping name: DIETHYL ETHER
Marine pollutant: No

IATA
UN number: 1155       Class: 3       Packing group: I
Proper shipping name: Diethyl ether

15. REGULATORY INFORMATION

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

SARA 313 Components
SARA 313: 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

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
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<td>Diethyl ether</td>
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<td>1993-04-24</td>
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Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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<tr>
<td>Diethyl ether</td>
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</tr>
</tbody>
</table>

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.

Acute Tox.   Acute toxicity
Flam. Liq.   Flammable liquids
H224        Extremely flammable liquid and vapour.
H302        Harmful if swallowed.
H319        Causes serious eye irritation.
H336        May cause drowsiness or dizziness.
STOT SE     Specific target organ toxicity - single exposure

HMIS Rating
Health hazard: 2
Chronic Health Hazard: *
Flammability: 4
Physical Hazard: 2

NFPA Rating
Health hazard: 2
Fire Hazard: 4
Reactivity Hazard: 0

Further information
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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.

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

Version: 5.3  Revision Date: 06/24/2014  Print Date: 10/21/2014