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

1.1 Product identifiers
   Product name: Tetrahydrofuran
   Product Number: 360589
   Brand: Sigma-Aldrich
   Index-No.: 603-025-00-0
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 109-99-9

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 Chemie BV
   Stationsplein 4
   3331 LL ZWIJNDRECHT
   NETHERLANDS
   Telephone: +31 78-620-5411
   Fax: +31 78-620-5421
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #: 112

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Flammable liquids (Category 2), H225
   Acute toxicity, Oral (Category 4), H302
   Eye irritation (Category 2), H319
   Carcinogenicity (Category 2), H351
   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 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram
   Signal word: Danger
Hazard statement(s)
- H225: Highly flammable liquid and vapour.
- H302: Harmful if swallowed.
- H319: Causes serious eye irritation.
- H335: May cause respiratory irritation.
- H351: Suspected of causing cancer.

Precautionary statement(s)
- P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P280: Wear protective gloves/ protective clothing/ eye protection/ face protection.
- P301 + P312 + P330: IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
- P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P370 + P378: In case of fire: Use dry powder or dry sand to extinguish.
- P403 + P235: Store in a well-ventilated place. Keep cool.

Supplemental Hazard information (EU)
- EUH019: May form explosive peroxides.

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
- Formula: \( C_4H_8O \)
- Molecular weight: 72.11 g/mol
- CAS-No.: 109-99-9
- EC-No.: 203-726-8
- Index-No.: 603-025-00-0

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrahydrofuran</td>
<td>Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2; Carc. 2; STOT SE 3; H225, H302, H319, H351, H335</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
Consult a physician. Show this safety data sheet to the doctor in attendance.

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

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**SECTION 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 firefighting if necessary.

**5.4 Further information**  
Use water spray to cool unopened containers.

---

**SECTION 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.

---

**SECTION 7: Handling and storage**

**7.1 Precautions for safe handling**  
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. 
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**  
Store in cool place. 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. 
Store under inert gas. Test for peroxide formation periodically and before distillation. Dry residue is explosive. Dry residue is explosive. Store under inert gas. Test for peroxide formation periodically and before distillation.

**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

Components with workplace control parameters

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.

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

**Splash contact**
- Material: Nitrile rubber
- Minimum layer thickness: 0.5 mm
- Break through time: 12 min

Material tested: Camatril® (KCL 733 / Aldrich Z677590, 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.

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>Appearance</strong></td>
<td>Form: liquid, clear</td>
</tr>
<tr>
<td></td>
<td>Colour: colourless</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>Ether-like</td>
</tr>
<tr>
<td><strong>Odour Threshold</strong></td>
<td>No data available</td>
</tr>
</tbody>
</table>
d) pH ca.7

e) Melting point/freezing point
Melting point/range: -108,44 °C at 1.013,25 hPa

f) Initial boiling point and boiling range
65,0 - 67,0 °C at 1.013,25 hPa

g) Flash point
-17,0 °C - closed cup

h) Evaporation rate
No data available

i) Flammability (solid, gas)
No data available

j) Upper/lower flammability or explosive limits
Upper explosion limit: 11,8 %(V)
Lower explosion limit: 1,8 %(V)

k) Vapour pressure
170 hPa at 20,0 °C

l) Vapour density
ca.2,5 at 25 °C - (Air = 1.0)

m) Relative density
0,89 g/cm3

n) Water solubility
soluble

o) Partition coefficient: n-octanol/water
log Pow: 0,46

p) Auto-ignition temperature
215 °C at 1.013 hPa

q) Decomposition temperature
No data available

r) Viscosity
0,518 mm2/s at 25 °C - 0,403 mm2/s at 50 °C -

s) Explosive properties
Not explosive, In use may form flammable/explosive vapour-air mixture.

9.2 Other safety information
Relative vapour density ca.2,5 at 25 °C - (Air = 1.0)

SECTION 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 (250 ppm)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Strong oxidizing agents, Acids

10.6 Hazardous decomposition products
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 - 1.650 mg/kg
LD50 Inhalation - Rat - 6 h - 14.7 mg/l
Remarks: Material may be irritating to mucous membranes and upper respiratory tract.
LD50 Dermal - Rat - > 2.000 mg/kg

**Skin corrosion/irritation**
Based on available data, the classification criteria are not met.

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Risk of serious damage to eyes.
(Draize Test)

**Respiratory or skin sensitisation**
Based on available data, the classification criteria are not met.

**Germ cell mutagenicity**
In vivo tests did not show mutagenic effects

**Carcinogenicity**
Suspected human carcinogens
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.

**Reproductive toxicity**
No toxicity to reproduction

**Specific target organ toxicity - single exposure**
May cause drowsiness or dizziness. - Nervous system
May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure**
The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

**Aspiration hazard**
No aspiration toxicity classification

**Additional Information**
RTECS: LU5950000
Central nervous system depression, Cough, chest pain, Difficulty in breathing, Exposure to high airborne concentrations can cause anesthetic effects.

SECTION 12: Ecological information

12.1 Toxicity

**Toxicity to fish**
LC50 - Pimephales promelas (fathead minnow) - 2.160 mg/l - 96 h

**Toxicity to daphnia and other aquatic invertebrates**
EC50 - Daphnia magna (Water flea) - 382 mg/l - 24 h

**Toxicity to algae**
Growth inhibition IC50 - Algae - 3.700 mg/l - 192 h

12.2 Persistence and degradability
Biodegradability (OECD Test Guideline 301)
Remarks: According to the results of tests of biodegradability this product is 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**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**
No data available

SECTION 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.

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

SECTION 14: Transport information

14.1 **UN number**
ADR/RID: 2056
IMDG: 2056
IATA: 2056

14.2 **UN proper shipping name**
ADR/RID: TETRAHYDROFURAN
IMDG: TETRAHYDROFURAN
IATA: Tetrahydrofuran

14.3 **Transport hazard class(es)**
ADR/RID: 3
IMDG: 3
IATA: 3

14.4 **Packaging group**
ADR/RID: II
IMDG: II
IATA: II

14.5 **Environmental hazards**
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 **Special precautions for user**
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

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

15.2 **Chemical Safety Assessment**
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
EUH019 May form explosive peroxides.
H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H351 Suspected of causing cancer.

Further information
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