1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name: $(<I>S</>)-(+)\text{-}3$-Hydroxytetrahydrofuran

Product Number: 296686

Brand: Aldrich

CAS-No.: 86087-23-2

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 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 4), H227

Skin irritation (Category 2), H315

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)

H227: Combustible liquid.

H315: Causes skin irritation.

H319: Causes serious eye irritation.
H335 \hspace{1cm} \text{May cause respiratory irritation.}

Precautionary statement(s)

P210 \hspace{1cm} \text{Keep away from heat/sparks/open flames/hot surfaces. No smoking.}
P261 \hspace{1cm} \text{Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.}
P264 \hspace{1cm} \text{Wash skin thoroughly after handling.}
P271 \hspace{1cm} \text{Use only outdoors or in a well-ventilated area.}
P280 \hspace{1cm} \text{Wear protective gloves/ eye protection/ face protection.}
P302 + P352 \hspace{1cm} \text{IF ON SKIN: Wash with plenty of soap and water.}
P304 + P340 + P312 \hspace{1cm} \text{IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.}
P305 + P351 + P338 \hspace{1cm} \text{IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.}
P332 + P313 \hspace{1cm} \text{If skin irritation occurs: Get medical advice/ attention.}
P337 + P313 \hspace{1cm} \text{If eye irritation persists: Get medical advice/ attention.}
P362 \hspace{1cm} \text{Take off contaminated clothing and wash before reuse.}
P370 + P378 \hspace{1cm} \text{In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.}
P403 + P233 \hspace{1cm} \text{Store in a well-ventilated place. Keep container tightly closed.}
P403 + P235 \hspace{1cm} \text{Store in a well-ventilated place. Keep cool.}
P405 \hspace{1cm} \text{Store locked up.}
P501 \hspace{1cm} \text{Dispose of contents/ container to an approved waste disposal plant.}

2.3 \text{Hazards not otherwise classified (HNOC) or not covered by GHS - none}

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 \text{Substances}

\begin{itemize}
  \item \text{Synonyms: (\textit{S})-\textit{(+)}-Tetrahydro-3-furanol}
  \item \text{Formula: } C_4H_8O_2
  \item \text{Molecular weight: 88.11 g/mol}
  \item \text{CAS-No.: 86087-23-2}
\end{itemize}

\begin{table}[h!]
\centering
\begin{tabular}{|l|l|l|}
\hline
\textbf{Component} & \textbf{Classification} & \textbf{Concentration} \\
\hline
(S)-\textit{(+)}-Tetrahydro-3-furanol & Flam. Liq. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; H227, H315, H319, H335 & <= 100 % \\
\hline
\end{tabular}
\end{table}

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

4. FIRST AID MEASURES

4.1 \text{Description of first aid measures}

\textbf{General advice}
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

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

\textbf{In case of skin contact}
Wash off with soap and plenty of water. Consult a physician.

\textbf{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 firefighting 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). 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 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
   Keep container tightly closed in a dry and well-ventilated place.
   Storage class (TRGS 510): 10: Combustible liquids

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
   Contains no substances with occupational exposure limit values.

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
Safety glasses with side-shields conforming to EN166 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.

Body Protection
Impervious 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 ABEK (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: clear, liquid
   Colour: colourless

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
   80 °C (176 °F) at 20 hPa - lit.

g) Flash point
   79 °C (174 °F) - closed cup

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
   1.103 g/cm3 at 25 °C (77 °F)

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
   Heat, flames and sparks.
10.5 Incompatible materials
   Strong oxidizing agents, Acid chlorides, Acid anhydrides
10.6 Hazardous decomposition products
   Hazardous decomposition products formed under fire conditions. - Carbon oxides
   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: 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 on OSHA’s list of regulated carcinogens.
   Reproductive toxicity
   No data available
   No data available
   Specific target organ toxicity - single exposure
   Inhalation - May cause respiratory irritation.
Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

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

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((S)-(+)Tetrahydro-3-furanol)

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
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
NA-Number: 1993 Class: NONE Packing group: III
Proper shipping name: Combustible liquid, n.o.s. ((S)-(+)Tetrahydro-3-furanol)
Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

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.

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

**Pennsylvania Right To Know Components**

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
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<td>86087-23-2</td>
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**New Jersey Right To Know Components**

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**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.

- H227  Combustible liquid.
- H315  Causes skin irritation.
- H319  Causes serious eye irritation.
- H335  May cause respiratory irritation.

**HMIS Rating**

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<thead>
<tr>
<th>Health hazard:</th>
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<tbody>
<tr>
<td>Chronic Health Hazard:</td>
<td>2</td>
</tr>
<tr>
<td>Flammability:</td>
<td>2</td>
</tr>
<tr>
<td>Physical Hazard</td>
<td>0</td>
</tr>
</tbody>
</table>

**NFPA Rating**

| Health hazard: | 0 |
| Fire Hazard: | 2 |
| Reactivity Hazard: | 0 |

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.0  Revision Date: 05/26/2018  Print Date: 11/18/2018