SAFETY DATA SHEET

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

1.1 Product identifiers

Product name: Cyclohexanone

Product Number: 398241
Brand: Sigma-Aldrich
Index-No.: 606-010-00-7
CAS-No.: 108-94-1

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 ST
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, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Acute toxicity, Dermal (Category 4), H312
Skin irritation (Category 2), H315
Serious eye damage (Category 1), H318
Short-term (acute) aquatic hazard (Category 3), H402

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

2.2 GHS Label elements, including precautionary statements
Hazard statement(s)
H226 Flammable liquid and vapor.
H302 + H312 + H332 Harmful if swallowed, in contact with skin or if inhaled.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H402 Harmful to aquatic life.

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.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/ eye protection/ face protection.
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
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 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235 Store in a well-ventilated place. Keep cool.
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

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>C6H10O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Molecular weight : 98.14 g/mol
CAS-No. : 108-94-1
EC-No. : 203-631-1
Index-No. : 606-010-00-7
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. If breathing stops: mouth-to-mouth breathing or artificial respiration. Oxygen if necessary. Immediately call in physician.

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

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately 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
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.

For the full text of the H-Statements mentioned in this Section, see Section 16.
5.3 **Advice for firefighters**
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 **Further information**
Remove container from danger zone and cool with water. 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**
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. 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>Ingredients with workplace control parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Cyclohexanone</td>
</tr>
</tbody>
</table>

Remarks
Upper Respiratory Tract irritation
Eye irritation
Confirmed animal carcinogen with unknown relevance to humans
Danger of cutaneous absorption

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>From</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEL</td>
<td>50 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

Upper Respiratory Tract irritation
Eye irritation
Confirmed animal carcinogen with unknown relevance to humans
Danger of cutaneous absorption

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>From</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
<td>25 ppm</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
<td></td>
<td>100 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Potential for dermal absorption

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>From</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
<td>50 ppm</td>
<td>USA. Occupational Exposure Limits (OSHA)</td>
</tr>
<tr>
<td></td>
<td>200 mg/m³</td>
<td>Table Z-1 Limits for Air Contaminants</td>
</tr>
</tbody>
</table>

The value in mg/m³ is approximate.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>From</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL</td>
<td>25 ppm</td>
<td>California permissible exposure limits</td>
</tr>
<tr>
<td></td>
<td>100 mg/m³</td>
<td>for chemical contaminants (Title 8, Article 107)</td>
</tr>
</tbody>
</table>

Skin

### 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>Cyclohexanone</td>
<td>108-94-1</td>
<td>1,2-Cyclohexanediol</td>
<td>80 mg/l</td>
<td>Urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
</tbody>
</table>

Remarks
End of shift at end of workweek

<table>
<thead>
<tr>
<th>Component</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
</table>
| Cyclohexanol   | 8 mg/l     | Urine | ACGIH - Biological Exposure Indices (BEI) | End of shift (As soon as possible after exposure ceases)

### 8.2 Exposure controls

#### Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face 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). Tightly fitting safety goggles

**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: butyl-rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested: Butoject® (KCL 898)

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: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 120 min
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

**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.

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**SECTION 9: Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Appearance</td>
</tr>
<tr>
<td></td>
<td>Form: liquid</td>
</tr>
<tr>
<td>b)</td>
<td>Odor</td>
</tr>
<tr>
<td></td>
<td>Stinging</td>
</tr>
<tr>
<td>c)</td>
<td>Odor Threshold</td>
</tr>
<tr>
<td></td>
<td>0.12 ppm</td>
</tr>
<tr>
<td>d)</td>
<td>pH</td>
</tr>
<tr>
<td></td>
<td>ca.7 at 70 g/l at 20 °C (68 °F)</td>
</tr>
<tr>
<td>e)</td>
<td>Melting point/freezing point</td>
</tr>
<tr>
<td></td>
<td>Melting point/range: -47 °C (-53 °F) - lit.</td>
</tr>
<tr>
<td>f)</td>
<td>Initial boiling point and boiling range</td>
</tr>
<tr>
<td></td>
<td>155 °C 311 °F - lit.</td>
</tr>
<tr>
<td>g)</td>
<td>Flash point</td>
</tr>
<tr>
<td></td>
<td>44 °C (111 °F) - closed cup</td>
</tr>
<tr>
<td>h)</td>
<td>Evaporation rate</td>
</tr>
<tr>
<td></td>
<td>No data available</td>
</tr>
<tr>
<td>i)</td>
<td>Flammability (solid, gas)</td>
</tr>
<tr>
<td></td>
<td>No data available</td>
</tr>
<tr>
<td>j)</td>
<td>Upper/lower flammability or explosive limits</td>
</tr>
<tr>
<td></td>
<td>Upper explosion limit: 9.4 % (V)</td>
</tr>
<tr>
<td>k)</td>
<td>Vapor pressure</td>
</tr>
<tr>
<td></td>
<td>ca.24 hPa at 50 °C (122 °F)</td>
</tr>
<tr>
<td>l)</td>
<td>Vapor density</td>
</tr>
<tr>
<td></td>
<td>No data available</td>
</tr>
</tbody>
</table>
m) Relative density 0.947 g/cm³ at 25 °C (77 °F)

n) Water solubility ca.90 g/l at 20 °C (68 °F)

o) Partition coefficient: log Pow: 0.86 at 25 °C (77 °F) - Bioaccumulation is not expected.

p) Autoignition 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

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).

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heating.

10.5 Incompatible materials
No data available

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

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 1,620 mg/kg
Remarks: (ECHA)
LC50 Inhalation - Rat - male and female - 4 h - > 6.2 mg/l
Remarks: (ECHA)
LD50 Dermal - Rabbit - 1,100 mg/kg
Remarks: (External MSDS)

Skin corrosion/irritation
Skin - Rabbit
Result: irritating - 4 h
(OECD Test Guideline 404)
Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Irreversible effects on the eye
Remarks: (ECHA)
Risk of corneal clouding.

**Respiratory or skin sensitization**

**Germ cell mutagenicity**
Mutagenicity (mammal cell test):
Result: negative

Ames test
Escherichia coli/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 on OSHA’s list of regulated carcinogens.

**Reproductive toxicity**

**Specific target organ toxicity - single exposure**
Acute oral toxicity - Stomach/intestinal disorders, Risk of aspiration upon vomiting.,
Aspiration may cause pulmonary edema and pneumonitis.
Acute inhalation toxicity - In high doses:, Irritation symptoms in the respiratory tract.

**Specific target organ toxicity - repeated exposure**

**Aspiration hazard**

**Additional Information**

Repeated dose toxicity - Rat - male and female - Oral - 2,160 h - NOAEL (No observed adverse effect level) - 143 mg/kg
RTECS: GW1050000

Prolonged or repeated exposure to skin causes defatting and dermatitis., Cough, Shortness of breath, Headache, Nausea, Vomiting, Incoordination., Inhalation of high concentrations may cause:, Central nervous system depression, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Systemic effects:
After absorption of large quantities:
Headache, Salivation, Nausea, Vomiting, Dizziness, narcosis, Coma
The following applies to ketones in general: when vapours/aerosols occur, mucosal irritations, coughing, and dyspnoea after inhalation. The absorption of large quantities leads to: CNS depression (narcosis). Repeated skin contact leads to a degreasing effect, with secondary inflammation possible. Toxic effects on the liver and kidneys cannot be excluded after high doses. The inhalation of droplets may result in the formation of oedemas in the respiratory tract.
Other dangerous properties can not be excluded.
Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

**Toxicity to fish**

flow-through test LC50 - Pimephales promelas (fathead minnow) - 527 - 732 mg/l - 96 h
(OECD Test Guideline 203)

**Toxicity to daphnia and other aquatic invertebrates**

static test EC50 - Daphnia magna (Water flea) - 800 mg/l - 24 h
(DIN 38412)

**EC5 - Protozoa** - 573 mg/l - 48 h
Remarks: (maximum permissible toxic concentration)(IUCLID)

**Toxicity to algae**

IC5 - Scenedesmus quadricauda (Green algae) - 370 mg/l - 8 d
Remarks: (IUCLID)

static test EC50 - Chlamydomonas reinhardtii (green algae) - 32.9 mg/l - 72 h
Remarks: (ECHA)

**Toxicity to bacteria**

EC5 - Pseudomonas putida - 180 mg/l - 16 h
Remarks: (maximum permissible toxic concentration)(Lit.)

static test EC50 - activated sludge - > 1,000 mg/l - 30 min
(OECD Test Guideline 209)

12.2 Persistence and degradability

**Biodegradability**

aerobic - Exposure time 14 d
Result: 87 % - Readily biodegradable.
(MITI test)

aerobic - Exposure time 28 d
Result: 90 - 100 % - Readily biodegradable.
(OECD Test Guideline 301F)

**Theoretical oxygen demand**

2,608 mg/g
((calculated))
Remarks: (Lit.)

12.3 Bioaccumulative potential

12.4 Mobility in soil

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
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local 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: 1915  Class: 3  Packing group: III
Proper shipping name: Cyclohexanone
Reportable Quantity (RQ): 5000 lbs
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1915  Class: 3  Packing group: III
Proper shipping name: CYCLOHEXANONE
EMS-No: F-E, S-D

IATA
UN number: 1915  Class: 3  Packing group: III
Proper shipping name: Cyclohexanone

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
Reportable Quantity: F003 lbs

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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Version: 6.3  Revision Date: 10/07/2020  Print Date: 03/12/2022