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

1.1 Product identifiers

Product name : Cyclohexanone
Product Number : 29140
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
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

Sigma-Aldrich - 29140
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>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula</td>
<td>C₆H₁₀O</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>98.14 g/mol</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>108-94-1</td>
</tr>
</tbody>
</table>

Sigma-Aldrich - 29140
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. 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.

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
Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.
### Storage class
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>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>TWA</td>
<td>20 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>STEL</td>
<td>50 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>TWA</td>
<td>25 ppm 100 mg/m3</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Potential for dermal absorption</td>
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</table>

#### Biological occupational exposure limits

<table>
<thead>
<tr>
<th>Biological occupational exposure limits</th>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>1,2-</td>
<td>80 mg/l</td>
<td>Urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Cyclohexan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ediol</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Remarks</td>
<td>End of shift</td>
<td>at end of workweek</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cyclohexanol</td>
<td></td>
<td>8 mg/l</td>
<td>Urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
<td></td>
</tr>
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<tr>
<td></td>
<td>End of shift (As soon as possible after exposure ceases)</td>
<td></td>
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</tbody>
</table>
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 EN 16523-1 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)

- **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**
Recommended Filter type: Filter A (acc. to DIN 3181) for vapours of organic compounds

- The entrepreneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
- 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

a) Appearance
   Form: clear, liquid
   Color: colorless, to, light yellow

b) Odor
   Stinging

c) Odor Threshold
   0.12 ppm

d) pH
   ca.7 at 70 g/l at 20 °C (68 °F)

e) Melting point/freezing point
   Melting point/range: -47 °C (-53 °F) - lit.

f) Initial boiling point and boiling range
   155 °C 311 °F - lit.

g) Flash point
   44 °C (111 °F) - 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: 9.4 %(V)
   Lower explosion limit: 1.1 %(V)

k) Vapor pressure
   ca.7 hPa at 30 °C (86 °F)

l) Vapor density
   3.39 - (Air = 1.0)

m) Density
   0.947 g/mL at 25 °C (77 °F) - lit.
   Relative density
   No data available

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

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

p) Autoignition temperature
   420 °C (788 °F) at 1,013 hPa

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   none

9.2 Other safety information

Surface tension
   35.05 mN/m at 20 °C (68 °F)

Relative vapor density
   3.39 - (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).

10.3 Possibility of hazardous reactions
Risk of explosion with:
- Nitric acid
- Hydrogen peroxide
- Oxidizing agents
- Mineral acids

10.4 Conditions to avoid
Heating.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
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)
Symptoms: Stomach/intestinal disorders, Risk of aspiration upon vomiting., Aspiration may cause pulmonary edema and pneumonitis.
LC50 Inhalation - Rat - male and female - 4 h - > 6.2 mg/l - vapor
Remarks: (ECHA)
Symptoms: In high doses:, Irritation symptoms in the respiratory tract.
LD50 Dermal - Rabbit - 1,100 mg/kg
Remarks: (External MSDS)

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

Serious eye damage/eye irritation
Eyes - In vitro study
Result: Irreversible effects on the eye
Remarks: (ECHA)
Remarks: Risk of corneal clouding.
**Respiratory or skin sensitization**
Maximization Test - Guinea pig
Result: negative
Remarks: (ECHA)

**Germ cell mutagenicity**
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Ames test
Test system: Escherichia coli/Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: unscheduled DNA synthesis assay
Test system: human diploid fibroblasts
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 482
Result: negative
Test Type: Micronucleus test
Species: Mouse
Cell type: Bone marrow
Application Route: Oral
Method: OECD Test Guideline 474
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**
No data available

**Specific target organ toxicity - single exposure**
Inhalation - May cause respiratory irritation. - Respiratory Tract

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

11.2 Additional Information
Repeated dose toxicity - Rat - male and female - Oral - 3 Months - NOAEL (No observed adverse effect level) - 143 mg/kg

RTECS: GW10500000
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 bacteria

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

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 Endocrine disrupting properties
No data available

12.7 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. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

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

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.

Reportable Quantity: F003 lbs
### Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>1993-02-16</td>
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</tbody>
</table>

### Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>1993-02-16</td>
</tr>
</tbody>
</table>

### 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.