Section 1 - Product and Company Information

Product Name: CYCLOHEXANONE EXTRA PURE  
Product Number: 24218  
Brand: RIEDEL  
Company: Sigma-Aldrich Canada, Ltd  
Address: 2149 Winston Park Drive  
Oakville ON L6H 6J8 CA  
Technical Phone: 9058299500  
Fax: 9058299292  
Emergency Phone: 800-424-9300

Section 2 - Composition/Information on Ingredient

Substance Name: CYCLOHEXANONE  
CAS #: 108-94-1  
SARA 313: No  
Formula: C6H10O  
Synonyms: Anone * Cicloesanone (Italian) * Cyclohexanon (Dutch) * Cyclohexanone (ACGIH:OSHA) * Cyclohexyl ketone * Cykloheksanon (Polish) * Hexanon * Hytrol O * KetoHexamethylene * Nadone * NCI-C55005 * Pimelic ketone * Pimelin ketone * RCRA waste number U057 * Sextone  
RTECS Number: GW1050000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW  
Combustible (USA) Flammable (EU). Harmful. Harmful by inhalation, in contact with skin and if swallowed. Irritating to respiratory system. Risk of serious damage to eyes. Readily absorbed through skin. Target organ(s): Liver. Kidneys.

HMIS RATING  
HEALTH: 2*  
FLAMMABILITY: 2  
REACTIVITY: 0

NFPA RATING  
HEALTH: 2  
FLAMMABILITY: 2  
REACTIVITY: 0

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE  
If swallowed, wash out mouth with water provided person is
conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

Section 5 - Fire Fighting Measures

FLAMMABLE HAZARDS
Flammable Hazards: Yes

FLASH POINT
111.2 °F   44 °C   Method: closed cup

EXPLOSION LIMITS
Lower: 1.1 %   Upper: 9.4 %

AUTOIGNITION TEMP
420 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Emits toxic fumes under fire conditions. Combustible liquid.

Section 6 – Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 – Handling and Storage

HANDLING
User Exposure: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

Storage
Suitable: Keep tightly closed. Keep away from heat and open flame.

Section 8 - Exposure Controls / PPE

Engineering Controls
Mechanical exhaust required. Safety shower and eye bath.

Personal Protective Equipment
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). 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.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

General Hygiene Measures
Wash thoroughly after handling.

Exposure Limits, RTECS

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>ACGIH</td>
<td>TWA</td>
<td>25 PPM</td>
</tr>
<tr>
<td>Remarks: Skin</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| USA     | MSHA Standard-air TWA | 50 PPM (200 MG/M3) |
| USA     | OSHA. PEL 8H TWA | 50 PPM (200 MG/M3) |
| New Zealand OEL |
| Remarks: check ACGIH TLV |

| USA     | NIOSH TWA | 25 PPM (SK) |

Exposure Limits

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>NDS</td>
<td></td>
<td>40 MG/M3</td>
</tr>
<tr>
<td>Poland</td>
<td>NDSCh</td>
<td></td>
<td>80 MG/M3</td>
</tr>
<tr>
<td>Poland</td>
<td>NDSP</td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

Section 9 - Physical/Chemical Properties

Appearance
Physical State: Clear liquid
Color: Colorless

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>At Temperature or Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight</td>
<td>98.15 AMU</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>BP/BP Range</td>
<td>154.0 - 156.0 °C</td>
<td></td>
</tr>
<tr>
<td>MP/MP Range</td>
<td>- 47.0 °C</td>
<td></td>
</tr>
<tr>
<td>Freezing Point</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>10 mmHg</td>
<td>38.7 °C</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>3.4 g/l</td>
<td></td>
</tr>
<tr>
<td>Saturated Vapor Conc.</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>SG/Density</td>
<td>0.947 g/cm3</td>
<td></td>
</tr>
<tr>
<td>Bulk Density</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>0.88 ppm</td>
<td></td>
</tr>
<tr>
<td>Volatile%</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>VOC Content</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>
Water Content           N/A
Solvent Content         N/A
Evaporation Rate        N/A
Viscosity               N/A
Surface Tension         35.05 mN/m          20 °C
Partition Coefficient   Log Kow: 0.81
Decomposition Temp.     N/A
Flash Point             111.2 °F 44 °C      Method: closed cup
Explosion Limits        Lower: 1.1 %
                        Upper: 9.4 %
Flammability            N/A
Autoignition Temp       420 °C
Refractive Index        1.45
Optical Rotation        N/A
Miscellaneous Data      N/A
Solubility              Solubility in Water:50 mg/ml H2O
                        Other Solvents: SOLUBLE IN ACETONE, ETHANOL
                        ETHYL ETHER

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
    Stable: Stable.
    Materials to Avoid: Oxidizing agents, Plastics.

HAZARDOUS DECOMPOSITION PRODUCTS
    Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

HAZARDOUS POLYMERIZATION
    Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
    Skin Contact: May cause skin irritation.
    Skin Absorption: Readily absorbed through skin. Harmful if
    absorbed through skin.
    Eye Contact: Causes severe eye irritation.
    Inhalation: Harmful if inhaled. Material is irritating to mucous
    membranes and upper respiratory tract.
    Ingestion: Harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)

SIGNS AND SYMPTOMS OF EXPOSURE
    Symptoms of exposure may include burning sensation, coughing,
    wheezing, laryngitis, shortness of breath, headache, nausea, and
    vomiting. Exposure can cause: CNS depression. Incoordination. To
    the best of our knowledge, the chemical, physical, and
    toxicological properties have not been thoroughly investigated.
    Prolonged or repeated exposure to skin causes defatting and
    dermatitis.

TOXICITY DATA

    Oral
    Rat
    1620 UL/KG
    LD50
Inhalation
Rat
8,000 ppm
LC50

Intraperitoneal
Rat
1130 MG/KG
LD50
Remarks: Gastrointestinal:Other changes.

Subcutaneous
Rat
2170 MG/KG
LD50

Oral
Mouse
1400 mg/kg
LD50

Intraperitoneal
Mouse
1230 MG/KG
LD50
Remarks: Gastrointestinal:Other changes.

Skin
Rabbit
1 ML/KG
LD50

Intraperitoneal
Rabbit
1540 MG/KG
LD50
Remarks: Gastrointestinal:Other changes.

Oral
Mammal
3000 mg/kg
LD50

Inhalation
Mammal
25,000 mg/m3
LC50

IRRITATION DATA

Eyes
Human
75 ppm

Skin
Rabbit
500 mg
Remarks: Open irritation test

Eyes
Rabbit
20 mg
Remarks: Severe irritation effect

Eyes
Rabbit
0.25 mg
24H
Remarks: Severe irritation effect

CHRONIC EXPOSURE - CARCINOGEN
Result: This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC CARCINOGEN LIST
Rating: Group 3

ACGIH CARCINOGEN LIST
Rating: A4

CHRONIC EXPOSURE - MUTAGEN
Species: Human
Dose: 100 UMOL/L
Cell Type: leukocyte
Mutation test: Cytogenetic analysis

Species: Human
Dose: 5 UG/L
Cell Type: lymphocyte
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 7500 UL/L
Cell Type: ovary
Mutation test: Sister chromatid exchange

Species: Hamster
Dose: 7500 UL/L
Cell Type: ovary
Mutation test: Mutation in mammalian somatic cells.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD
Result: Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Species: Rat
Dose: 105 MG/M3/4H
Route of Application: Inhalation
Exposure Time: (1-20D PREG)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Species: Mouse
Dose: 11 GM/KE
Route of Application: Oral
Exposure Time: (8-12D PREG)
Result: Effects on Newborn: Growth statistics (e.g., reduced weight gain).
Species: Mouse  
Dose: 1400 PPM/6H  
Route of Application: Inhalation  
Exposure Time: (6-17D PREG)  
Result: Specific Developmental Abnormalities: Musculoskeletal system. Maternal Effects: Other effects. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: EC50 Daphnia  
Species: Daphnia magna  
Time: 24 h  
Value: 820 mg/l

Test Type: LC50 Fish  
Species: Leuciscus idus  
Time: 48 h  
Value: 536.0 - 752.0 mg/l

Test Type: LC50 Fish  
Species: Pimephales promelas (Fathead minnow)  
Time: 96 h  
Value: 480.0 - 630.0 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT

Proper Shipping Name: Cyclohexanone  
UN#: 1915  
Class: 3  
Packing Group: Packing Group III  
Hazard Label: Flammable liquid  
PIH: Not PIH

IATA

Proper Shipping Name: Cyclohexanone  
IATA UN Number: 1915  
Hazard Class: 3  
Packing Group: III

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION

Symbol of Danger: Xn  
Indication of Danger: Harmful.  
R: 10-20  
S: 25  
Safety Statements: Avoid contact with eyes.
US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Combustible (USA) Flammable (EU). Harmful.
Risk Statements: Harmful by inhalation, in contact with skin and if swallowed. Irritating to respiratory system. Risk of serious damage to eyes.
Safety Statements: Keep away from sources of ignition - no smoking. Do not breathe vapor. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: No
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

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 Inc. shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.