

## Product Safety Summary for Cyclohexanone

### **SUBSTANCE NAME**

Cyclohexanone  
Cyclohexanon  
Cyclohexanone (7Cl, 8Cl, 9Cl)  
Anon  
Anone  
Pimelin ketone  
Pimelic ketone

### **GENERAL STATEMENT**

Cyclohexanone is a light yellow liquid with an odor that resembles peppermint oil. It is an organic compound that is mainly used as a chemical intermediate for the production of monomers and as a solvent in a range of formulated products for use by professional users and consumers. In general, the health hazards are low, but protection against inhalation, skin and eye contact is required. Cyclohexanone is a flammable liquid and it can be regarded as non-hazardous to the environment.

### **CHEMICAL IDENTITY**

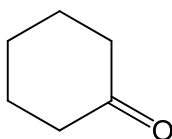
**EC Name:** cyclohexanone

**EC-No. :** 203-631-1

**CAS-No. :** 108-94-1

**Molecular formula:** C<sub>6</sub>H<sub>10</sub>O

**Structural formula:**



### **USES AND APPLICATIONS**

Cyclohexanone is a light yellow liquid. It is produced by the oxidation of cyclohexane and subsequent treatment of the reaction product. Cyclohexanone is mainly used as an intermediate to produce monomers, particularly for the production of well-known plastics like polyamide. In industrial use, it is also commonly used as intermediate for the manufacturing of fine chemicals. Furthermore it finds application as a laboratory reagent and as a solvent in a wide variety of formulated products, including products for professional uses and consumer products. It is used in formulated products like adhesives, coatings, paints, printing inks and biocidal and plant protection products.

## **PHYSICAL CHEMICAL PROPERTIES**

Cyclohexanone is a light yellow liquid at room temperature and pressure, with a smell like peppermint oil.

**Melting point/range:** -31 °C at atmospheric pressure

**Boiling point/boiling range:** 154.3 °C at 1013.25 hPa

**Decomposition temperature:** Not determined

**Flashpoint:** 44 °C (closed cup)

**Flammability (solid, gaseous):** Flammable upon ignition

**Selfignition temperature:** 420 °C at 1013 at hPa

**Explosion limits:**

**Lower:** 1.05 vol % (air)

**Upper:** 9.9 vol % (air)

**Explosive properties:** Non explosive.

**Molecular weight:** 98.143

**pH value:** 6.6 at 20 °C

**log Pow:** 0.86 at 25 °C

**Vapor pressure:** 7 hPa at 30 °C

**Vapor density:** Not determined

**Relative density:** 0.9465 g/cm<sup>3</sup> at 20 °C

**Dissociation constant:** Not applicable

**Solubility in/Miscibility with water:** 86 g/l at 20 °C

**Dynamic Viscosity:** 2.2 mPa.s at 25 °C

**Oxidizing properties:** No oxidizing properties

## **HEALTH EFFECTS**

Cyclohexanone is moderately hazardous for human health. The acute toxicity via oral and dermal exposure is proved to be low. However, inhalation exposure studies showed some adverse acute effects, sufficient enough to classify it as hazardous. Also irritation and corrosivity studies showed adverse effects on the skin and in the eyes. On the other hand, the results of oral repeated dose testing give no rise to concern. Mutagenicity tests, in vitro and in vivo, were negative as well as carcinogenicity, fertility and reproductive toxicity studies.

Cyclohexanone is a flammable liquid and care needs to be taken to avoid the risks of this inherent hazard property when handling Cyclohexanone in pure form or in high concentrations.

| EFFECT ASSESSMENT                       | RESULT  |
|---|---|
| Acute Toxicity (oral/dermal/inhalation) | Cyclohexanone has a low acute toxicity for oral and dermal exposure but inhalation exposure studies suggest that it needs to be considered harmful for that exposure route. |
| Irritation/Corrosivity                  | Cyclohexanone is irritating and corrosive to the skin and to the  |

|   |  |
|---|--|
| (skin/eye/respiratory tract)              | eyes.  |
| Sensitization<br>(skin/respiratory tract) | Based on the available data, Cyclohexanone is not considered to have skin or respiratory sensitization properties. |
| Mutagenicity                              | All available test data indicates that Cyclohexanone does not cause mutagenic effects.                             |
| Carcinogenicity                           | Oral carcinogenicity study data suggests that Cyclohexanone is not carcinogenic.                                   |
| Reproductive Toxicity                     | All available data suggest that Cyclohexanone has no adverse fertility or reproductive effects.                    |
| Repeated Dose Exposure                    | Test results with oral and intravenous exposure indicate that there is no marked repeated dose toxicity.           |

### **ENVIRONMENTAL EFFECTS**

Based on the values of the octanol water partition coefficient and Henry's constant, Cyclohexanone distributes mainly into water and air. Cyclohexanone's toxicity to aquatic species is low. It is also readily biodegradable and has a low bioaccumulation potential. Also, since the overall toxicity of cyclohexanone is low, it can be concluded that it is not hazardous to the environment or to humans through environmental exposure.

| EFFECT ASSESSMENT | RESULT  |
|-------------------|---|
| Aquatic Toxicity  | Studies indicate that Cyclohexanone is not toxic to fish and to daphnia and has a low toxicity to algae and aquatic plants. |

| FATE AND BEHAVIOR         | RESULT   |
|---------------------------|--|
| Biodegradation            | Cyclohexanone is readily biodegradable in water.<br>Biodegradability in soil and sediment is not relevant.   |
| Bioaccumulation potential | Basing on its logPow value, significant accumulation of Cyclohexanone in organisms is not expected.  |
| PBT/vPvB conclusion       | Regarding all available data on biotic and abiotic degradation, bioaccumulation and toxicity, it can be stated that the substance does not fulfill the PBT criteria nor the vPvB criteria. |

### **EXPOSURE**

#### **Human Health**

Exposure can occur to workers in industrial facilities where Cyclohexanone is produced, stored, handled or processed. Professional users or consumers may come into contact with Cyclohexanone through commonly used formulated products, such as adhesives, coatings, paints, printing inks and biocidal and plant protection products. Based on the physical properties of Cyclohexanone skin contact and inhalation are the most likely routes of exposure. Consumer applications are such that consumer exposure will typically be infrequent, for

brief periods or in small quantities. Therefore the use of Cyclohexanone by the consumer is not considered to pose a health risk. However, the level of exposure to professional and industrial users may be such that risk management measures must be taken.

### **Environment**

The probability of release of Cyclohexanone in concentrated form to any of the environmental compartments is low under normal industrial use conditions. Also the environmental release of Cyclohexanone from formulated products will be insignificant under normal use conditions. Cyclohexanone is readily biodegradable; therefore, accidental release of small quantities to waste water or surface water should not cause further environmental exposure.

### **RISK MANAGEMENT RECOMMENDATIONS**

Cyclohexanone poses some risks that need to be managed. Exposure via inhalation, skin and eye contact must be avoided, specifically by industrial users and certain professional users. The exposure levels of consumers are low; therefore, typical consumer uses do not require specific risk management measures. Personnel handling the substance need to be trained in the safe use of Cyclohexanone and workers who may be exposed to it need to be protected by taking adequate measures to protect against chemical exposure. Respiratory protection devices with organic gas filters must be worn, as well as protective clothing, gloves and tightly fitting safety goggles.

Also the flammability of Cyclohexanone poses risks that need to be carefully managed, so risk management needs to focus also on fire prevention. Workers should be properly informed about the risks and trained in the prevention and protection measures to be adopted. Containers and equipment containing Cyclohexanone should be correctly labeled clearly indicating its flammability hazard. Operations involving the possible release of liquid or vapor should be carried out using closed processes or, failing this, in well-ventilated areas or in installations with local extraction systems. The creation and accumulation of static discharge during transfer of the substance should be controlled by precautionary measures such as grounding and bonding containers and equipment. For environmental protection in case of accidental release: do not allow product to reach sewage system or any water course. Retain and dispose of contaminated wash water.

### **STATE AGENCY REVIEW**

This substance has been registered under REACH (EC) No. 1907/2006.

Cyclohexanone is included in the OECD list of High Production Volume (HPV) chemicals.

Cyclohexanone is listed in the following Chemical Inventories: AICS, ENCS, EINECS, NZIoC, DSL Canada, IECSC, KECI, TSCA, PICCS.

### **REGULATORY INFORMATION/CLASSIFICATION AND LABELING**

**Classification of the substance according to REGULATION (EC) No 1272/2008:**

**Flammable liquid:** Flammable liquid Category 3; H226 Flammable liquid and vapour.

**Acute toxicity:** Category 4; Oral; H302 Harmful if swallowed.  
**Acute toxicity:** Category 4; Dermal; H312 Harmful in contact with skin.  
**Acute toxicity:** Category 4; Inhalation; H332 Harmful if inhaled.  
**Skin/Eye (Corrosion/irritation):** Skin Irritation Category 2; H315 Causes skin irritation.  
 Eye Damage Category 1; H318 Causes serious eye damage.

**Labeling according to REGULATION (EC) No 1272/2008:**

**Pictogram:**



**Signal word:** Danger

**Hazard statements:** H226: Flammable liquid and vapour.  
 H302: Harmful if swallowed.  
 H312: Harmful in contact with skin.  
 H332: Harmful if inhaled.  
 H315: Causes skin irritation.  
 H318: Causes serious eye damage.

**CONTACT INFORMATION WITHIN COMPANY**

For further information on this substance or product safety summaries in general, please contact:

**Company:** UBE Industries, Ltd.

**Department:** Caprolactam Business Unit

**Address:** Seavans North Bldg., 1-2-1 Shibaura, Minato-ku, Tokyo

**Town/Country:** Japan

**Postal code:** 105-8449

**E-mail:** [ube-cpl@ube-ind.co.jp](mailto:ube-cpl@ube-ind.co.jp)

**Additional information can be found at:**

<http://www.ube.co.jp>

**GLOSSARY**

|                |  |
|----------------|--|
| Acute toxicity | Harmful effect resulting from a single or short term exposure to a substance.                        |
| AICS           | Australian Inventory of Chemical Substances.   |
| Biodegradation | Decomposition or breakdown of a substance under natural conditions (actions of micro-organisms etc). |

|                          |  |
|--------------------------|--|
| Bioaccumulation          | Progressive accumulation in living organisms of a chemical substance present in the environment.   |
| Canadian DSL             | Domestic Substances List of Canada.  |
| Carcinogenicity          | Substance effects causing cancer.  |
| CAS                      | Chemical Abstracts Service (division of the American Chemical Society).  |
| Chronic toxicity         | Harmful effect after repeated exposures or long term exposure to a substance.  |
| EINECS                   | European Inventory of Existing Commercial Chemical Substances  |
| ENCS                     | Existing Notified Chemical Substances (Japan).   |
| Flash point              | The lowest temperature at which vapor of the substance may form an ignitable mixture with air.   |
| Genotoxicity             | Substance effect that causes damage to genes, including mutagenicity and clastogenicity.   |
| GHS                      | Globally Harmonized System of Classification and Labeling of Chemicals   |
| HPV                      | High Production Volume Chemicals.  |
| Hydrolyze                | Undergo hydrolysis; decompose by reacting with water.  |
| IECSC                    | Inventory of Existing Chemical Substances Produced or Imported in China.   |
| Intermediate             | Substance that is manufactured for and consumed in or used for chemical processing in order to be transformed into another substance.  |
| KECI                     | Korean Existing Chemical Inventory.  |
| Monomer                  | Means a substance which is capable of forming covalent bonds with a sequence of additional like or unlike molecules under the conditions of the relevant polymer-forming reaction used for the particular process. |
| Mutagenicity             | Substance effect that cause mutation on genes.   |
| NZIoC                    | New Zealand Inventory of Chemicals   |
| PBT                      | Persistent, bioaccumulative, toxic chemical.   |
| Persistence              | Refers to the length of time a compound stays in the environment, once introduced.   |
| PICCS                    | Philippine Inventory of Chemicals and Chemical Substances.   |
| Risk Management Measures | Engineering controls, conditions and protective equipment needed to be implemented to ensure that the risks to human health and the environment are adequately controlled.   |

|                              |   |
|------------------------------|---|
| REACH (EC) No. 1907/2006     | European Commission Regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals. |
| REGULATION (EC) No 1272/2008 | European Commission Regulation on Classification, Labeling and Packaging of Substances and Mixtures.                |
| Reproductive toxicity        | Including teratogenicity, embryotoxicity and harmful effects on fertility.  |
| Sensitizing                  | Allergenic.   |
| Sediment                     | Topsoil, sand and minerals washed from land into water forming in the end a layer at the bottom of rivers and sea.  |
| TSCA                         | Toxic Substance Control Act (USA).  |
| Vapor pressure               | A measure of a substance's property to evaporate.   |
| vPvB                         | Very persistent, very bio-accumulative.   |

**DISCLAIMER**

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of UBE INDUSTRIES, LTD. The data on this sheet related only the specific material designated herein. UBE INDUSTRIES, LTD. assumes no legal responsibility for use or reliance upon these data.