

Safety Data Sheet

1. Product and company identification

Product name : Cyclohexanone
Name of manufacturer : KANTO CHEMICAL CO., INC.
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Name of section : Electronic materials division technical department
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SDS No. : GE00029

2. Summary of danger and Hazard

GHS classification

Physical and chemical hazard

Flammable liquids : Category 3
Pyrophoric liquids : Out of category

Human health hazard

Acute toxicity(oral) : Category 4
Acute toxicity(dermal)
: Category 3
Acute toxicity(inhalation:vapors)
: Category 3
Acute toxicity(inhalation:dust, mists)
: Out of category

Skin corrosion • Irritation

: Category 2

Serious eye damage • Eye irritation

: Category 2A

Skin sensitization : Category 1

Germ cell mutagenicity

: Category 2

Reproductive toxicity

: Category 2

Specific target organ systemic toxicity(single exposure)

: Category 1 、 Category 2、 Category 3 (anesthetic action)

Specific target organ systemic toxicity(repeated exposure)

: Category 1

Environmental hazard

Hazardous to the aquatic environment-acute hazard

: Out of category

Hazardous to the aquatic environment-chronic hazard

Pictogram or symbol	: Out of category 
Signal word	: Danger
Hazard statement	: Flammable liquid and vapor Harmful if swallowed Toxic in contact with skin Toxic if inhaled Causes skin irritation Causes serious eye irritation May cause an allergic skin reaction Suspected of causing genetic defects Suspected of damaging fertility or the unborn child Causes damage to organs (respiratory organs) May cause damage to organs (central nervous system) May cause drowsiness and dizziness Causes damage to organs (central nervous system, bone) through prolonged or repeated exposure
Cautions	
Safety measurements	: Do not handle until all safety precautions have been read and understood. Keep away from ignition sources such as heat, sparks, or open flame. Keep containers tightly closed. Ground container and receiving equipment in case of transport and stirring. Use explosion-proof apparatus. Use only non-sparking tools. Do not breathe dust, mist, and vapor. Use only in a well-ventilated area. Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace. Wear appropriate protective gloves, glasses, clothing, face shield, or mask. Wash protective equipment thoroughly after use. Wash hands thoroughly after handling.
First-aid measures	: If inhaled : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately get medical treatment. If swallowed: Rinse mouth. Get medical treatment if you feel unwell. If in eyes : Rinse cautiously with water for several minutes. Get medical treatment. If on skin : Remove contaminated clothing and the substance. Get medical treatment, if you feel unwell. Wash hands thoroughly after handling. If exposed, get medical treatment.

Get medical treatment, if you feel unwell.
Storage : Tightly container closed and store in a well-ventilated area.
Store locked up.
Disposal : Dispose of contents and containers appropriately in accordance with related regulations.

3. Composition/Information on ingredients

Substance/Mixture : Substance
Chemical name or commercial name : Cyclohexanone
Ingredients and composition : Cyclohexanone min. 99.0%
Chemical formula : C₆H₁₀O
CAS No. : 108-94-1
TSCA Inventory : Registered
EINECS No. : 2036311
Dangerous and hazardous ingredients : Cyclohexanone

4. First aid measures

Inhalation : Remove the victim to fresh air, and make him blow his nose and gargle.
Skin contact : Wash the affected areas under running water.
Eye contact : Wash the affected areas under running water for at least 15 minutes. If necessary, get medical treatment.
Ingestion : Do not induce vomiting because the chemical has high volatility and may increase the risk of aspiration of it into the lungs. Get medical treatment.

Protection for first aid person : Savers wear proper protective equipment like rubber gloves, goggles.

5. Fire fighting measures

Extinguishing media : Dry chemical powder, carbon dioxide, dry sand, foam
Prohibited extinguishing media : Water spray
Particular fire fighting : Move containers from fire area if it can be done without risk, if not possible, apply water from a safe distance to cool and protect surrounding area.
Dry chemical powder, carbon dioxide or dry sand should be used for small fires. Foam extinguisher is effective for a large scale fire.
Protection for firefighters : Wear breathing apparatus.

6. Accidental release measures

- Cautions for personnel : Wear proper equipment and avoid contact with skin and inhalation of vapor. Keep personnel removed from and upwind of fire. Shut off all sources of ignition. Keep away personnel except for authorized ones from spillage area by stretching ropes.
- Cautions for environment : Attention should be given not to cause damage to the environment by flowing of spillage to rivers. In case of the dilution of copious water, do not cause damage to the environment by untreated wastewater.
- Removal measure : Absorb spill with inert material (e.g., diatomaceous earth, sand) and flush residual area with copious amounts of water.
- Prevention of second accident
: Remove nearby sources of ignition and prepare extinguishing media.

7. Cautions of handling and storage

Handling

- Engineering measures : Wear proper equipment not to contact with skin or inhale the vapor. Fire is strictly prohibited.
Ventilate well at working places.

Cautions for safety handling

- : Use with an enclosed system or a local exhaust ventilation.

Cautions

- : Do not contact with oxidizing substances.

Storage

Adequate storage condition

- : Store in a dark, cool place and tightly closed.
Keep out of direct sunlight in a place below 40°C.

Safety adequate container materials

- : Glass, fluorine resin, stainless steel
Do not use vinyl chloride resin, acrylic resin, polystyrene etc.

8. Exposure control/Personal protection

- Engineering measures : Use only with adequate ventilation and in closed systems.

Control parameters

- ACGIH(2009) : 20ppm(TLV-TWA)
50ppm(TLV-STEL)
Transdermal absorption

Protective equipment

Respiration protective equipment

- : Chemical cartridge respirator with an organic vapor cartage or airline respirator

Hands protective equipment

- : Impervious protective gloves

Eyes protective equipment

- : Safety goggles

Skin and body protective equipment

- : Protective clothing, protective boots

9. Physical and chemical properties

- Appearance : Liquid

Color : Colorless-pale yellow
Odor : Camphor like odor
Boiling point : 155.65°C
Melting point : -45°C
Flash point : 42.3°C
Auto-ignition point : 420°C
Explosion characteristics
Explosion limit : upper : 8.1vol% lower : 1.1vol%
Vapor pressure : 4.7hPa (20°C)
Vapor density : 3.4
Specific gravity : 0.950g/cm³ (20°C)
Solubility
Solubility in solvents : Water ; 15%(10°C)
log Pow : 0.81
Other data : Viscosity : 2.2cP (25°C)

10. Stability and reactivity

Stability : Stable under normal usage.
Reactivity : May react with oxidizing substances.
Incompatible conditions : Light, heat
Incompatible materials : Oxidizing substances
Hazardous decomposition products
: Carbon monoxide

11. Toxicological information

Acute toxicity : Harmful if swallowed(category 4)
Toxic in contact with skin(category 3)
Toxic if inhaled(vapor) (category 3)
Inhalation(dust, mist) : Out of category
rat oral LD50=1296mg/kg
rat inhalation LC50=2450ppm/4H(vapor)
rat inhalation LC50>LC50=8000ppm/4H(mist)
rabbit skin LD50=947mg/kg
Skin corrosiveness : Causes skin irritation(category 2)

Although there is a report that in a rabbit test with 2 samples of cyclohexanone, rabbits exhibited necrosis after occlusive application of one sample, then the sample was classified as corrosive (SIDS (access on Apr. 2009)), in an evaluation for corrosiveness in rabbits, no corrosion occurred in any rabbit (SIDS (access on Apr. 2009)). Application of the undiluted substance with open contact was non-irritating to rabbit skin (SIDS (access on Apr. 2009)). Additionally, although application of a 99% solution for 24-hour under occlusive conditions caused strong skin irritation, the effects slowly resolved and disappeared during a seven day period after application (PATTY (5th, 2001)). Based on these evidence of non-corrosive, the substance was classified into category 2.

Irritation to skin, eyes : Causes serious eye irritation(category 2A)

The undiluted substance placed in the eyes of rabbits produced marked irritation and corneal injury (ACGIH (2003)). When the undiluted substance was applied to rabbit eyes, corneal injury with mild iritis and conjunctivitis was reversible, but the eyes still showed mild corneal damage at 14 days (SIDS (access on Apr. 2009)). Based on these data, the substance was classified into category 2A.

Respiratory sensitization or Skin sensitization

: Respiratory sensitization : Not possible to classify because of insufficient data.

May cause an allergic skin reaction(category 1)

Since it is listed on Frosch contact allergen list, it was classified into category 1.

Mutagenicity : Suspected of causing genetic defects(category 2)

Based on a positive result in a rat bone marrow chromosomal aberration test by subcutaneous injection (in vivo somatic cell mutagenicity test), the substance was classified into category 2.

Carcinogenic effects : Not possible to classify because of insufficient data

IARC classifies group 3(not classifiable as to carcinogenicity in humans)

Effects on the reproductive system

: Suspected of damaging fertility or the unborn child(category 2)

In a two-generation reproduction test in rats by inhalation exposure, toxic symptoms such as lacrimation, irregular breathing and ataxia was observed in the high dose group (5700 mg/m³). In this group, there was a reduction in the number of offspring, which was interpreted as a decrease in male fertility, and reduced survival of the offspring. Based on the data, the substance was classified into category 2.

Specific target organ systemic toxicity single exposure

: Cause damage to organs (respiratory organs) (category 1)

May cause damage to organs (central nervous system) (category 2)

May cause drowsiness and dizziness(category 3)

Following oral administration of the substance to rats and mice, hypnotic signs appeared. As a symptom following inhalation exposure to guinea pigs and oral administration to rabbits, anesthesia is reported. Based on the data, the substance was classified into category 3 (narcotic effects). Since there are reports that a high concentration exposure resulted in deaths and that symptoms noted at acute toxic doses (LD50: 1300 - 3500 mg/kg) were central nervous system depression, the substance was classified into category 2 (central nervous system).

Based on the findings of hemorrhage of lungs in rat by oral administration of 475 - 3800 mg/kg and lesions in mouse such as congestion and edema of the lungs, focal to diffuse hemorrhage of the lung parenchyma by inhalation exposure (vapor) of 19.2mg/L for 90 minutes (7.2 mg/L for 4 hours), the substance was classified into category 1 (respiratory system).

Specific target organ systemic toxicity repeated exposure

: Cause damage to organs (central nervous system, bone) through prolonged or repeated exposure(category 1)

Neurotoxic effects were examined in a group of 75 workers from a furniture factory who were exposed while coating wood with cyclohexanone. The exposures were observed to cause an increase in the percentage of reported neurotoxic symptoms (mood disorders, memory difficulties, sleep disturbances, etc.). There is a report that the substance depresses the central nervous system. Based on these data, the substance was classified into category 1 (central nervous system).

In the above mentioned examination, an increase in the percentage of reported rheumatic symptoms (bone pain, joint pain, and muscular pain) was observed. Out of these symptoms, bone pain was reported on another document. Therefore, the substance was classified into category 1 (bone).

Aspiration hazard : Not possible to classify because of insufficient data.

12. Ecological information

Ecotoxicity

Fish toxicity : Acute aquatic toxicity : Out of category
 Chronic aquatic toxicity : Out of category
 Pimephales promelas LC50=527mg/L/96H

Rediualbility and degradability

: High biodegradability
 87% by BOD

Ecorediualbility : Not available

13. Disposal consideration

Residual disposal : Burn in a chemical incinerator equipped with an afterburner and a scrubber. Or entrust approved waste disposal companies with the disposal.

Containers : In case of disposal of empty bottles, dispose bottles after removing the content thoroughly.

14. Transport information

UN class : Class 3(Flammable liquids) P. G. III

UN number : 1915

Marine regulation information

UN No. : 1915

Proper shipping name : CYCLOHEXANONE
Class : 3
Sub risk : -
Packing group : III
Marine pollutant : Not applicable

Aviation regulation information

UN No. : 1915
Proper shipping name : Cyclohexanone
Class : 3
Sub risk : -
Packing group : III

15. Regulatory information

Ensure this material in compliance with federal requirements and ensure conformity to local regulations.

16. Other information

References Dictionary of Organic Compounds, The society of Synthetic Organic Chemistry, Kodansha Ltd. (1985)
Dangerous Properties of Industrial Materials, 6th ed. N. I. Sax Van Nostrand Reinhold Company (1984)
Handbook of Dangerous Substances Springer-Verlag Tokyo (1991)
Handbook of 15710 Chemical Products, The Chemical Daily Co. (2010)

The information contained herein is based on several references and the present state of our knowledge. However the SDS does not always cover all information about the product, handle the product carefully. The information is intended to ordinary usage, in case of particular handlings, conduct appropriate safety measurements. The information herein is only provision of information, and it does not represent a guarantee the properties of the product. The Safety Data Sheet (SDS) is prepared based on JIS Z7253, and it has the same required elements on the Material Safety Data Sheet (MSDS) which is prepared based on JIS Z7250:2010.