

Cyclohexanone

1. IDENTIFICATION

A. Product name:

Cyclohexanone

B. Recommended use of the chemical and restrictions on use:

Industrial Solvent

C. Information of manufacturer, supplier:

Company:

SK GlobalChemical Co.,Ltd.

Address:

SK building seorindong jongrogu seoul korea
140-1 wonchondong yuseonggu daejeon korea
110 gosadong namgu ulsan korea

Emergency Telephone No:

82-2-2121-6823
82-42-609-8449
82-52-208-3357

2. HAZARD IDENTIFICATION

A. Classification:

Flammable liquids : 3
Acute Toxicity-Oral : 4
Acute Toxicity-Dermal : 3
Acute Toxicity-Inhalation : 3
Skin corrosion/irritation : 2
Eye Damage/Irritation : 2A
Germ cell mutagenicity : 2
Carcinogenicity : 2
Toxic to reproduction : 2
Specific target organ toxicity(single exposure) : 1
Specific target organ toxicity(single exposure) : 2
Specific target organ toxicity(single exposure) : 3
Specific target organ toxicity(repeated exposure) : 1
Aspiration hazard : 2

B. Label element, including precautionary statements:

Symbols:



Signal word(s):

Danger

Hazard statement(s):

- H226: Flammable liquid and vapour
- H302: Harmful if swallowed
- H305: May be harmful if swallowed and enters airways
- H311: Toxic in contact with skin
- H315: Causes skin irritation
- H319: Causes serious eye irritation
- H331: Toxic if inhaled
- H335: May cause respiratory irritation; or H:336 May cause drowsiness and dizziness
- H341: Suspected of causing genetic defects <...>
- H351: Suspected of causing cancer <...>
- H361: Suspected of damaging fertility or the unborn child <...> <<...>>
- H370: Causes damage to organs <...> <<...>>
- H371: May cause damage to organs <...> <<...>>.
- H372: Causes damage to organs <...> through prolonged or repeated exposure

Precautionary statement(s):

Prevention

- P201: Obtain special instructions before use.
- P202: Do not handle until all safety precautions have been read and understood.
- 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.
- P260: Do not breathe dust/fume/gas/mist/vapours/spray.
- P261: Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264: Wash ... thoroughly after handling.
- P270: Do not eat, drink or smoke when using this product.
- P271: Use only outdoors or in a well-ventilated area.
- P280: Wear protective gloves/protective clothing/eye protection/face protection.
- P281: Use personal protective equipment as required.
- P282: Wear cold insulating gloves/face shield/eye protection.

Response

- P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
- P302+P352: IF ON SKIN: Wash with plenty of soap and water.
- P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P307+P311: IF exposed: Call a POISON CENTER or doctor/physician.
- P308+P313: IF exposed or concerned: Get medical advice/attention.
- P309+P311: IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.
- P311: Call a POISON CENTER or doctor/physician.
- P312: Call a POISON CENTER or doctor/physician if you feel unwell.

- P314: Get medical advice/attention if you feel unwell.
- P321: Specific treatment (see ... on this label).
- P322: Specific measures (see ... on this label).
- P330: Rinse mouth.
- P331: Do NOT induce vomiting.
- P332+P313: If skin irritation occurs: Get medical advice/attention.
- P337+P313: If eye irritation persists: Get medical advice/attention.
- P361: Remove/Take off immediately all contaminated clothing.
- P362: Take off contaminated clothing and wash before reuse.
- P363: Wash contaminated clothing before reuse.
- P370+P378: In case of fire: Use ... for extinction.

© Storage

- P403+P233: Store in a well-ventilated place. Keep container tightly closed.
- P405: Store locked up.

© Disposal

- P501: Dispose of contents/container to (in accordance with local/regional/national/international regulation).

C. Other hazards which do not result in classification:

- o NFPA : Health: 1, Fire: 2, Reactivity: 0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical identity	Common name, synonym	CAS number	Percentages(%)
Cyclohexanone	Anone, Cyclohexyl ketone, Hexanon	108-94-1	99

4. FIRST AID MEASURES

A. Eye contact:

1. Where necessary, wear impervious gloves to avoid contact with this chemical.
2. Immediately hold the upper and lower eyelids open and gently flush the affected eye with slow-moving lukewarm water for 20 minutes, or continue flushing until the contaminant is flushed off.
3. Avoid clean water flowing in the un-affected eye.
4. If irritation persists after flushing, repeat flushing.
5. Immediately obtain medical attention.

B. Skin contact:

1. Where necessary, wear impervious gloves to avoid contact with this chemical.
2. Gently wash skin with lukewarm water for 20 minutes or continue washing until the contaminant is cleared.
3. During washing, remove contaminated clothing, shoes and leather accessories.
4. Immediately obtain medical attention.
5. Do not reuse contaminated clothing, shoes, and leather accessories before they are totally cleaned, or discard them.

C. Inhalation:

1. Before performing first aid, be well protected to ensure your own safety.
2. Move away contaminating source or move the victim to fresh air.
3. If the victim stops breathing, immediately provide artificial respiration by trained people if the heart stops beathing, provide CPR.
4. Immediately obtain medical attention.

D. Ingestion:

1. If the victim is about to lose consciousness or has lost consciousness or is in a spasm, do not feed the victim anything.
2. If the victim is conscious, give water to rinse his/her mouth.
3. Do not attempt to induce vomiting.
4. Give the victim 240~340ml of water to drink.

E. Most important symptoms/effect, acute and delayed:

High concentration vapors will cause inhibition of the nerve system.

F. Indication of immediate medical attention and special treatment needed, if necessary:

Wear Class C protective equipment and perform first aid in a safe area.
In case of swallowing, consider gastric lavage with perfusion of activated charcoal.

5. FIRE-FIGHTING MEASURES**A. Suitable extinguishing media:**

Dry chemical, alcohol-resistant foam, Carbon dioxide.

B. Specific hazards arising from the chemical:

1. Flammable liquid will form an explosive mixture with air at temperatures more than 44°C.
2. Vapor is heavier than air and can travel far away to an ignition source and flash back.
3. It will accumulate at lower ground level and increase risk fo fire and toxicology.
4. Containers in fire may break when subjected to heat.

C. Special protective equipment and precautions for firefighters:

Firefighters must wear respirator, protective gloves and fire-fighting clothing.

6. ACCIDENTAL RELEASE MEASURES**A. Personal precautions, protective equipment and emergency procedures:**

Wear personal protective equipment.
Immediately evacuate personnel to safe areas.
Keep people away from and upwind of spill/leak.
Ensure adequate ventilation.
Remove all sources of ignition.
Do not swallow.
Avoid breathing vapours, mist or gas.
Avoid contact with skin, eyes and clothing.

B. Environmental precautions:

Prevent further leakage or spillage if safe to do so.
Prevent product from entering drains.
Discharge into the environment must be avoided.
Do not flush into surface water or sanitary sewer system.
Do not allow run-off from fire fighting to enter drains or water courses.

C. Methods and materials for containment and cleaning up:

Ventilate the area.
No sparking tools should be used.

Use explosion-proof equipment.
Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13).

7. HANDLING AND STORAGE

A. Precautions for safe handling:

Wear personal protective equipment.
Use only in well-ventilated areas.
Keep container tightly closed.
Do not smoke.
Do not swallow.
Avoid breathing vapours, mist or gas.
Avoid contact with skin, eyes and clothing.

B. Conditions for safe storage, including incompatibilities:

Store in area designed for storage of flammable liquids.
Protect from physical damage.
Keep containers tightly closed in a dry, cool and well-ventilated place.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Keep away from heat and sources of ignition.
Keep away from direct sunlight.
Store away from incompatible substances.
Container hazardous when empty.
Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits in the air of the workplace, biological limit values:

- o Korea Industrial Safety and Health Act
 - TWA: 25ppm, 100mg/m³
 - STEL: 50ppm, 200mg/m³
- o OSHA
 - TWA: 25ppm
 - STEL: 50ppm

B. Appropriate engineering controls:

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:
Adequate ventilation should be provided so that exposure limits are not exceeded. Use explosion-proof ventilation equipment.

C. Individual protection measures:

Respiratory protection:

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
For rescue and maintenance work in storage tanks use self-contained breathing apparatus.

Eye protection:

Do not wear contact lenses.
Wear as appropriate:
Safety glasses with side-shields
If splashes are likely to occur, wear:
Goggles or face shield, giving complete protection to eyes

○ Hand protection:

Solvent-resistant gloves
Gloves must be inspected prior to use.
Replace when worn.

○ Body protection:

Wear as appropriate:
Solvent-resistant apron and boots
Flame retardant antistatic protective clothing
If splashes are likely to occur, wear:
Protective suit.

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance (physical state, colour etc):

Clear colorless Liquid

B. Odour:

Acetone mint odor

C. Odour threshold:

0.12 – 100 ppm (with detection)

D. pH:

Nearly neutral

E. Melting point/freezing point:

-47 °C

F. Initial boiling point and boiling range:

157 °C

G. Flash point:

44 °C (Closed cup)

H. Evaporation rate:

0.29 (n-BuAc1)

I. Flammability(solid, gas) :

Not applicable

J. Upper/lower flammability or explosive limits:

9.4% / 1.1% (100°C)

K. Vapour pressure:4 mmHg_{20°C}**L. Solubility(ies):**

Slightly soluble(2.3g/100g water 20°C)

M. Vapour density:

3.38 (Air1)

N. Specific gravity:

0.95

O. Partition coefficient: n-octanol/water:0.81 (log K_{ow})**P. Auto-ignition temperature:**

420 °C

Q. Decomposition temperature:

No Data Available.

R. Viscosity:

2.133cp (21 °C)

10. STABILITY AND REACTIVITY**A. Chemical stability:**

Material is stable under normal conditions

B. Possibility of hazardous reactivity:

Not expected to occur.

C. Conditions to avoid:

Heat, sparks, open flame, other ignition sources, and oxidizing conditions.

D. Incompatible materials:

Strong oxidizers such as hydrogen peroxide, nitric acid, sulphuric acid, etc.

E. Hazardous decomposition products:

Carbon oxides (CO, CO₂)

11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposures:

Inhalation exposure:

May cause irritation, headache, sleepiness, dizziness, orientation loss.

Ingestion exposure:

May cause irritation, vomiting, headache, dizziness, orientation loss, pulmonary congestion.

Skin exposure:

May cause skin irritation.

Eye exposure:

May cause eye irritation

B. Delayed and immediate effects and also chronic effects from short and long term exposure:

Acute toxicity:

- o Oral – LD₅₀(rat):1535mg/kg (IUCLID)
- o Skin –L D₅₀(Rabbit):948mg/kg (IUCLID)
- o Inhalation– LC₅₀(rat):8000ppm/4h (IUCLID), 2450ppm (ACGIH)

Skin corrosion/irritation:

May cause skin irritation.

Serious eye damage/irritation:

May cause slight eye irritation.

Respiratory sensitization:

No Data Available.

Skin sensitization:

Not expected to be a sensitizer.

Carcinogenicity:

IARC Group3 – Causes newly born rat poisoning
ACGIH A3 – It is impossible to judge is as carcinogenic to the human body

Germ cell mutagenicity:

Investigated as a tumorigen, mutagen and reproductive effector

Reproductive toxicity:

Animals tests show that this substance and vapour in high concentrations possibly causes reduction in foetal/pup body weight.

○ Specific target organ systemic toxicity–single exposure:

Category 1 (liver, spleen, central nervous system),
Category 2 (lung),
Category 3 (narcotic effects, respiratory tract irritation)

○ Specific target organ systemic toxicity–repeated exposure:

Group 1 : Cyclohexanone may have effects the kidney, liver and central nervous system

○ Aspiration hazard:

Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis.

C. Numerical measures of toxicity(such as acute toxicity estimate):

- o Fishes : LC50 527mg/L/96hr
- o Algae : EC50 573mg/L/48hr

12. ECOLOGICAL INFORMATION

A. Aquatic, terrestrial organisms toxicity:

No Data Available.

B. Persistence and degradability:

Expected to be readily biodegradable.
Half-life period(Air): 24~100Hr

C. Bioaccumulative potential:

Expected to bioaccumulate.

D. Mobility in soil:

Adsorbs to soil and has low mobility

E. Other adverse effects:

No Data Available.

13. DISPOSAL CONSIDERATIONS

A. Disposal methods:

Use only licensed transporters and permitted facilities for waste disposal.

B. Disposal considerations(Specify disposal container and methods):

Product – Methods of disposal: The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Incineration in suitable incineration plant. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements

Packaging – Methods of disposal: The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

14. TRANSPORT INFORMATION

A. UN Number:

UN 1915

B. UN Proper Shipping Name:

Cyclohexanone

C. Transport hazard class(es):

Class: 3

D. Packing group, if applicable:

Packing Group: III

E. Environmental hazards:

not applicable

F. Special precautions for user:

No data available

15. REGULATORY INFORMATION

A. Safety, health and environmental regulations specific for the product in question:

Applicable regulations:

Rule of Labor Safety and Health Facilities

Rule of Designation and Identification for dangerous Goods and Harmful Substances.

Rules of Poisoning Prevention of Organic Solvent.

Standard for Allowable Concentrations of Harmful Substance in Air in Labor Working Environment.

Road Safety Rules.

Method and Facility Standards for Industrial Waste Storage, Clearance and Disposal.

Regulations Governing Safety and up Standard for Public Dangerous Goods and Flammable Compressed gases.

16. OTHER INFORMATION

A. References and sources for data:

- 1) SK energy corporation R&D Center
- 2) Globally Harmonized System of classification and labelling of chemicals(GHS), United Nations.
- 3) United States National Library of Medicine.
- 4) EINECS (European Inventory of Existing Commercial chemical Substances)
- 5) JAISH(Japan Advanced Information Center of Safety and Health)
- 6) IARC(International Agency for Research on Cancer.)
- 7) NIOSH (The National Institute for Occupational Safety and Health)
- 8) ACGIH (American Conference of Governmental Industrial Hygienists.)
- 9) IUCLID Data

- 10) ICSC (International Chemical Safety Cards)– ILO
- 11) Transport of Dangerous Goods–UN
- 12) Korea Industrial Safety and Health Act

B. Originated date:

2015. 5. 7.

C. Revision number and date:

Revision number: 0.

Final revision data: 2015. 5. 7.