Number: 012

Section 1. Product and Company Identification

Product name: Cyclohexanone
Synonyms: -
Recommended use and Restrictions on use: Organic synthesis, meaning aspic acid and caprolactam (almost 95%); polyvinyl chloride and polymers of them; isobutylene ester polymer; paint remover; coloring; paint remover, varnish; decontaminant; metal degreasing; gloss agents; homogenizing agents of dyeing silk and matting silk; lubricant additive; cellulose; natural or synthetic resin; wax; solvents of the fat.
Manufacturer, Importer, or Supplier: Shiny Chemical Industrial Co., Ltd. Address: No.5, Yeong Gong 1st Rd, Yeong An Dist., Kaohsiung 82841, Taiwan, R.O.C. Telephone: +886-7-8619171 ext. 711~714
Emergency telephone number: +886-7-8619171 ext. 711~714 Fax: +886-7-6222620

Section 2. Hazards Identification

Classification:

1. Specific target organ toxicity substances (repeated exposure), Category 1
2. Acute toxic (Ingestion), Category 4
3. Acute toxic (Skin), Category 3
4. Serious damage/irritation to the eyes matter, Category 2A
5. Corrosion / irritation skin substance, Category 2
6. Germ cell mutagenicity substance, Category 2
7. Flammable liquids, Category 3
8. Toxic for reproduction, Category 2

Label elements:

Hazard pictograms: Flame, Toxicity, Health Hazards

Signal word: Danger

Hazard Statements:

1. Causes damage to organs through prolonged or repeated exposure.
2. Harmful if swallowed.
3. Toxic in contact with skin.
4. Causes serious eye irritation.

5. Causes skin irritation.
6. Suspected of causing genetic defects.
7. Flammable liquid and vapour.
8. Suspected of damaging fertility or the unborn child.

Precautionary statements:

1. Do not breathe gas/fumes/vapor/mist.
2. Avoid contact with eyes.
3. Keep containers in a well-ventilated place.

Other Hazards: -

Section 3. Composition/Information on Ingredients

Pure substance

Chemical Name: Cyclohexanone

Synonyms: Anone, Cyclohexyl ketone, Hexanon, Ketohexamethylene, Nadone, Pimelic ketone, Pimelin ketone, Sextone

CAS NO. : 108-94-1

Weight: 100%

Section 4. First Aid Procedures

Description of first aid measures:

• Inhalation:

1. Ensure self-safety based protection procedures before rescue.
2. Remove to fresh air.
3. If breathing stops, have trained personnel administer artificial respiration.
4. Get medical attention immediately.

• Skin contact:

1. Wear seepage-proof gloves if necessary to avoid touching such a chemical material.
2. Wash contaminated sites tenderly with warm water for 20~30 minutes.
3. Remove contaminated clothing, shoes, and leather when washing.
4. Get medical attention immediately.
5. Clean contaminated clothing, shoes, and leather thoroughly before reuse or abandon.

• Eye contact:

1. Wear seepage-proof gloves if necessary to avoid touching such a chemical material.
2. Immediately lift eyelids, flushing eyes with plenty of water for at least 20 minutes until removing contaminated materials.
3. Don't let that water flush to the uncontaminated eye.

4. Wash repetitively if irritation persists.
5. Get medical attention immediately.

• Ingestion:

1. Never give anything by mouth to an unconscious person.
2. Have conscious victims gargle with water.
3. Don't induce vomiting.
4. Have victim drink 240~300 mL of water.
5. Get medical attention immediately.

The most Important Symptoms and Hazardous Effects: Central nervous system depression.

Protection for emergency personnel: Use appropriate personal protective equipment such as class C clothing to take first aid in a safety area.

Notes to Physicians: If swallowed, consider gastric lavage and activated carbon.

Section 5. Firefighting Measures

Suitable extinguishing media: Chemical dry, foam and carbon dioxide.

Special hazards during firefighting:

1. Flammable liquids, more than 44℃, with air will produce explosive mixture.
2. Vapors heavier than the air kind will propagate to distant places. It may cause flash back when meeting fire sources.
3. May accumulate in low-lying areas to increase risk of burning and toxicity.
4. Heated containers may break in a fire scene.

Firefighting procedures:

1. Evacuate and extinguish fire from safe distance or protected areas.
2. Place in windward areas to avoid dangerous vapor and poisonous decomposing materials.
3. Stop the leak first before extinguishing fire. Let it burn if leaks cannot be stopped and have on harm in surroundings. If extinguishing fire in advance without stopping leaks, vapors with the air will form explosive mixtures and ignite again.
4. Isolate unfired materials and protect personnel.
5. Move containers form the fire scene in safety situations.
6. Cool exposed storage tanks or containers with the water mist.
7. It may be invalid to extinguish fire with water mist but can dilute leaks and flush ignition sources away.
8. If leaks have not ignited, spray water mist to disperse vapors and protect the personnel stop spill.
9. It is invalid to extinguish fire with spouts.
10. Large fire of large-scale area, use auto-operated control shelf of water mist or auto-waved extinguishing water aims.

11. Evacuate form a fire scene as possible and let the fire thoroughly.
12. Keep away from and storage tanks.
13. When safety valves of storage tanks alarm or change color, evacuate immediately.
14. Forbid personnel without special protective apparatus entering.

Protective equipment for firefighters: Extinguishing staffs should wear an approved/certified respirator, splash goggles, and firefighting coats.

Section 6. Accidental Release Measures

Personal precautions:

1. Restrain personnel from close to spilled areas before totally cleaning out.
2. Confirm the cleaning work be responsible by trained staffs.
3. Wear appropriate personal protective equipment.

Environmental precautions:

1. Ventilate this area.
2. Remove all sources of ignition.
3. Report to governmental safety and hygiene institutes and related units.

Methods for cleaning up:

1. Do not touch spill material.
2. Try to stop or reduce spill under safety permission.
3. Transport spilled containers outside or place in a well-ventilated isolation area. Remove residual liquids to other proper containers.
4. Avoid leaks to flush to sewer or confined space.
5. Small spill: absorb by inert absorbing agents and place in covered and labeled containers. Spray water on spill area. Spray water on spilled areas.
6. Large spill: Use sand, soil, and inert materials to block spill. Suck the liquid into proper containers with the pump or vacuum equipment. Absorb residual spill by inert absorbing agents and place in covered and labeled containers. Use water wash spilled areas.
7. Notes: Contaminated absorbing agents have same risk as spill.

Section 7. Handling and Storage

Handling:

1. This material is flammable and toxic liquids. Engineering control should be applied and make the best use of use personal protective equipment when handling. Educate staffs risk of this material and safety training of use.
2. Remove all ignition sources away from heat and incompatible substances.
3. There should be a "No smoking" sign in workspace.
4. Empty barrels, containers, and pipelines may have risk residuals. Don't weld, cut,

hole or do other heat work before clearing up.
5. Prepare emergency apparatus of extinguishing fire and handling leaks at any time.
6. Avoid mist or vapors. Operate in well-ventilated assigned place and adopt the minimum consumption. Separate operation and storage areas.
7. Wear appropriate personal protective equipments to avoid contacting with this chemical or contaminated apparatus if necessary.
8. Don't use with incompatible substances (strong oxidizing agents).
9. Use storage containers made of compatible substances. Package carefully to avoid spray out.
10. All operations of opening, pouring, and mixing should be in windward areas.
11. Don't pour contaminated liquids back to original storage containers.
12. Containers should be labeled, confined and prevented from damage while not using.

Storage:
1. Store in shady, cool, dry, and well-ventilated place that sunshine cannot directly illuminate, and keep away from heat, ignition sources, and incompatible substances.
2. Storage apparatus should be constructed with the refractory materials.
3. The floor should be constructed with the impermeable materials to avoid absorbing from the floor.
4. Set slope, doorsill or dig grooves in an entrance to discharge spill to safe places.
5. Storage areas should be labeled clearly with no barriers. Permit assigned or trained personnel to enter.
6. Separate storage, refreshment, and protective apparatus areas.
7. Have appropriate fire extinguisher and leak cleaning apparatus near storage areas.
8. Store, become more and more firm containers made of compatible substances. Non-use or empty barrels should keep close prevent from damage and heap.
9. Check containers regularly whether damage or leak, and storage materials overdue.
10. Check all new containers whether appropriately labeled and no damage. Renew damaged containers and prepare new containers and labels at any time.
11. Store spill in containers made of compatible substances.
12. Store in accordance with the storage temperature suggested by chemical manufacturers or suppliers. Install warm-detecting sirens if necessary to alarm temperature is too high or too low.
13. Storage tanks have earth connection and connected with other apparatus by

using same electric potential.
14. Store in approved fire-proof cabinets or storage rooms.
15. Must be ground storage tanks. Seal whole area on the bottom to avoid seepage surrounded with liquids dikes, which can block the whole capacity.

Section 8. Exposure controls

Engineering controls:
1. Direct outside exhaust vents.
2. Supply adequate fresh air to replenish the exhausted air.

Control parameters			
TWA	STEL	CEILING	BEIs
25 ppm (skin)	37.5 ppm (skin)	-	-

Personal protective equipment:
• Respiratory protection:
1. Below 625 ppm: Continuous flow, air-feed type or chemical type with organic vapor cartridges respiratory protective equipment.
2. Below 700 ppm: Dynamical type with organic vapor cartridges or chemical full-type respiratory protective equipment, mask with organic vapor cartridges, portable full-type or air-feed type respiratory protective equipment.
3. Unknown: Portable positive-pressure type respiratory protective equipment, positive-pressure full-and air-feed type respiratory protective equipment assisted by portable positive-pressure type.
4. Escape: Mask with organic vapor cartridges, escape-type portable respiratory protective equipment.

• Hand protection: Seepage-proof gloves of butyl rubber, 4H, polyvinyl alcohol, etc.
• Eye protection: Chemical safety goggles and masks.
• Skin and physical protection: Above rubber coveralls, work boots, safety showers.

Hygiene measures:
1. Remove contaminated clothing quickly as possible after work. Clean clothing before reuse or abandon. Tell cleaning staffs the harmfulness.
2. Forbid smoking or eating in workplace.
3. After handling this material, wash hands thoroughly.
4. Keep workplace clean.

Section 9. Physical and Chemical Properties

Appearance: White to the yellowish. Oil liquid	Odor: Acetone, peppermint
Odor threshold: 1. 0.12 ~ 100 ppm (monitor)	Melting point: -47°C

2. 0.12 ppm (censor)	
pH: -	Boiling point/Boiling range: 157°C
Flammability (solid, gas): -	Flash point: 44°C Test method: close cup
Decomposition temperature: -	
Auto-ignition temperature: 420°C	Explosion limits: 1.1% (100°C) ~ 9.4%
Vapor pressure: 4 mmHg (20°C)	Vapor density: 3.38 (air=1)
Density: 0.95 (Water=1)	Solubility: Little soluble (2.3g/100g water, 20°C)
Partition coefficient (n-octanol/water, log K_{ow}): 0.81	Volatility rate: 0.29 (N-Butyl acetate=1)

Section 10. Stability and Reactivity

Chemical stability: Stable under ordinary conditions. May form peroxidative substances.
Possibility of hazardous reactions: 1. Strong oxidizing agents (peroxidative substances, nitric acid and peroxide sodium): Increase fire and explosion risk. 2. Nitric acid and hydrogen peroxides: Form oil-like explosive peroxidative substances. 3. Corrode most plastics.
Conditions to avoid: Heat, naked lights, flames, and ignition sources.
Materials to avoid: Strong oxidizing agents.
Hazardous decomposition products: -

Section 11. Toxicological Information

Exposure Route: Skin, inhalation, ingestion, eye.
Symptoms: Headache, nausea, dizziness, somnolence, confused consciousness, loss of consciousness, death, irritation of eye and skin.
Acute toxicity: • Inhalation: 1. Exposure for 3~5 minutes, 75 ppm irritates nose and throat; 50 ppm irritates throat; and 25 ppm has no feeling. 2. High concentration of vapors may cause central nervous system depression such as headache, nausea, dizziness, somnolence, and confused consciousness. 3. Extreme high concentration may cause loss of consciousness and death. • Skin: 1. The liquid can cause moderate to severe irritation according to dose at high concentration. 2. Skin absorption can cause symptoms of central nervous system depression

shown as inhalation.
• Eyes:
1. The solution greater than 15% concentration can induce severe and corrosive eye damage. It may cause the permanent injury or blindness. The solution lower than 10% concentration can induce mild irritation.
2. Vapors can irritate eyes.
• Ingestion:
1. A large amount if ingestion may cause symptoms of central nervous system depression shown as inhalation.
2. When inhaled in lung, it may cause lethal lung edema and respiratory failure. Heart stops beating and death may occur.
• LD_{50} (animal test, entry): 1,535 mg/kg (rat, swallow); 948 mg/kg (rabbit, skin).
• LC_{50} (animal test, entry): 8,000 ppm/4 hour(s) (rat, inhalation).
• 500 mg/24 hour(s) (rabbit, skin): cause mild irritation.
• 20 mg/24 hour(s) (rabbit, skin): cause severe irritation.

Chronic / Long-term toxicity:
1. These liquid are degreasing agents. Long-term repeated exposure may cause dermatitis.
2. 11 gm/kg (pregnant rats 8 ~ 12 days, swallow) may cause newborn toxicity.
3. Carcinogenic effects: A4 (not classifiable for human or animal) by ACGIH, 3 (not classifiable for human) by IARC.

Section 12. Ecological Information

Ecological toxicity:
1. LC_{50} (fish): -
2. EC_{50} (aquatic invertebrates): -
3. Bioconcentration factor (BCF): -

Persistence and degradability:
1. It may biodegrade readily.
2. When released into the water, this material may evaporate and biodegrade.
3. When released into the air, this material may react with photochemically produced hydroxyl radicals and have a half-life of about 1.3 days.
• Half-life (Air): 24 ~ 100 hours
• Half-life (Water surface): 74 ~ 100 hours
• Half-life (Groundwater): -
• Half-life (Soil): -

Bioaccumulative potential: Not possible to accumulate.

Mobility in soil: When released into the soil, this material is expected to evaporate and biodegrade.

Other adverse effects: Harm marine organisms.

Section 13. Disposal Considerations

Waste disposal: 1. Consult references to regulations. 2. Waste must be disposed of in accordance with warehousing conditions. 3. Adopt particular incineration or sanitary burying.

Section 14. Transport Information

United Nations Number (UN No.): 1915
UN Proper Shipping Name: Cyclohexanone
Transport Hazard classes: 3
Packaging Group: III
Marine pollutant (Yes/No): No
Specific Transport Measures and Precautionary Conditions: -

Section 15. Regulatory Information

Applicable Regulations: 1. Labor Safety and Health Law. 2. Regulation of Labeling and Hazard Communication of Dangerous and Harmful Materials. 3. Organic solvent poisoning prevention rules. 4. Harmful substances concentration permission standards in the labor working environment. 5. Road Traffic Safety Rules. 6. Industrial waste storage and disposal facilities standard. 7. Public Hazardous Substances & Flammable Pressurized Gases Establishment Standards & Safety Control Regulations.

Section 16. Other Information

References	1. CHEMINFO database, CCINFO CD-RAW, 2005-2 2. HAZARDTEXT database, TOMES PLUS CD-RAW, Vol.63, 2005 3. RTECS database, TOMES PLUS CD-RAW, Vol.63, 2005 4. HSDB database, TOMES PLUS CD-RAW, Vol.63, 2005 5. ChemWatch database, 2004-4
Created by	Shiny Chemical Industrial Co., Ltd.
	Address: No.5, Yeong Gong 1st Rd., Yeong An Dist., Kaohsiung City Telephone: +886-7-8619171 ext. 711~714
Revision Date	2019/09/01
Notes	The symbol " - " in this sheet indicates no available information; the

	symbol " / " indicates the information is not applicable to the substance.