



# Material Safety Data Sheet


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## Section 1 - Product and Company Identification

Product name : Cyclohexylamine
Other names : --
Product use : boiler water treatment, rubber accelerator, organic synthesizing intermediate
Supplier's name : San Fu Chemical Co., Ltd., Kaohsiung Plant
Supplier's address : 45, Chung-Heng St., Hsiao Kang Dist., Kaohsiung, Taiwan 812
Supplier's phone : 07-8713492                      Emergency phone : 07-8713492
FAX. : 07-8714233

## Section 2 - Hazards Identification

<p>Classification :</p> <ol style="list-style-type: none"><li>1. Flammable Liquid                      Category 3</li><li>2. Acute Toxicity                              Category 3 (Ingestion)</li><li>3. Acute Toxicity                              Category 3 (Skin)</li><li>4. Acute Toxicity                              Category 3 (Inhalation)</li><li>5. Skin Corrosion/Irritation      Category 1</li><li>6. Serious Eye Damage/Eye Irritation      Category 1</li><li>7. Specific Target Organ Toxicity Repeated Exposure      Category 1</li></ol>
<p>The Most Important Hazards and effect</p> <p>Label element :</p> <ul style="list-style-type: none"><li>■ Hazard symbol : Flame, Skull and Crossbones, Health Hazard, Corrosion</li></ul> <div style="text-align: center;"></div> <ul style="list-style-type: none"><li>■ Signal word : Danger</li></ul> <p>Hazard statement :</p> <ol style="list-style-type: none"><li>1. Flammable liquid and vapor</li><li>2. Harmful if swallowed</li><li>3. Harmful if skin contact</li><li>4. Harmful if inhaled</li><li>5. Cause serious skin burns and eye damage</li><li>6. Cause serious eye damage</li><li>7. Repeated and prolonged overexposure may cause target organ effects</li></ol> <p>Precautionary statement :</p> <ol style="list-style-type: none"><li>1. Keep container in a well-ventilated area.</li><li>2. Keep away from ignition source. Smoking is prohibited.</li><li>3. In case of accident or discomfort, get medical attention immediately.</li><li>4. Avoid exposure to the substance. Use under specific directions.</li><li>5. Wear proper protective clothing, gloves, goggles/mask</li></ol>
Others Hazard : --

## Section 3 - Composition/Information On Ingredients



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pure substance :

Chemical name : Cyclohexylamine
Synonyms : Cyclohexanamine; Hexahydrobenzenamine; Hexahydroaniline; Aminocyclohexane; Aminohexahydrobenzene; CHA
CAS No. : 108-91-8
Ingredient contributing to the hazard(%) : 99.5%

## Section 4 - First Aid Measures

<p>The First-aid Information :</p> <ul style="list-style-type: none"><li>■ Inhalation :<ol style="list-style-type: none"><li>1. If patient is unconscious, wear protective gears before rescuing.</li><li>2. Remove pollutant or move patient to fresh air.</li><li>3. If breathing is difficult, give oxygen by trained personnel.</li><li>4. Avoid unnecessary movement by patient. Symptoms of pulmonary edema may appear after 48 hours.</li><li>5. Get medical attention immediately.</li></ol></li><li>■ Skin Contact :<ol style="list-style-type: none"><li>1. Avoid direct contact with the substance. Wear impermeable gloves if necessary.</li><li>2. Wash off affected area immediately with running water for at least 20 min.</li><li>3. Remove contaminated clothing, shoes, and leather products (e.g. watch, leather belt).</li><li>4. If irritation continues, flush repeatedly and get medical attention immediately.</li><li>5. Thoroughly clean contaminated clothing before reuse or disposal.</li></ol></li><li>■ Eye Contact :<ol style="list-style-type: none"><li>1. Avoid direct contact with the substance. Wear protective goggles/mask if necessary.</li><li>2. Immediately gently irrigate with running water for at least 20 min, lifting lower and upper eyelids occasionally.</li><li>3. Try not to contaminate unaffected area while irrigating.</li><li>4. If irritation continues, flush repeatedly.</li><li>5. Get medical attention immediately.</li></ol></li><li>■ Ingestion :<ol style="list-style-type: none"><li>1. Never give anything by mouth if patient is losing consciousness or unconscious, or having a seizure.</li><li>2. If conscious and alert, rinse mouth thoroughly.</li><li>3. Do not induce vomiting.</li><li>4. Drink 240~300ml water to dilute the substance.</li><li>5. If vomiting occurs spontaneously, makes patient lean forward, avoiding inhalation of vomitus. Rinse mouth and give water continuously.</li><li>6. Get medical attention immediately.</li></ol></li></ul>
The Most Important Symptoms and Hazardous Effects : Severe exposure may cause pulmonary edema in several hours, resulting in shortness of breathing or death.
Protection of First-aiders : Level C protective equipments
Notes to a Physician : If inhaled, consider giving oxygen. If swallowed, consider esophagoscopy, and avoid gastric lavage.



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## Section 5 - Fire Fighting Measures

Extinguishing Media : dry chemical powder, carbon dioxide, alcohol foam, or water spray
Specific Hazards when Fire-fight : <ol style="list-style-type: none"><li>1. Vapors are heavier than air and may travel to a source of ignition and flash back.</li><li>2. Highly toxic gases may be generated by thermal decomposition or combustion.</li></ol>
Specific Fire-fighting Procedure : <ol style="list-style-type: none"><li>1. Stop leak before fire fighting. If impossible to stop leak and no danger around, let it burn out. If fire fighting without stopping leak, vapors may form an explosive mixture with air.</li><li>2. Isolate materials not caught on fire, and protect personnel.</li><li>3. Move undamaged containers from fire area if safe to do so.</li><li>4. Use water spray to cool containers exposed to fire.</li><li>5. It may be ineffective to extinguish fire with water spray unless fire fighters receive trainings against flammable liquid.</li><li>6. If materials not caught on fire, use water spray to reduce vapors and protect people who try to stop leak.</li><li>7. It is ineffective to extinguish fire with water.</li><li>8. In case of large-scale fire, cool containers with water from unmanned hose holder or monitor nozzles.</li><li>9. If possible, evacuate from fire area and let it burn out.</li><li>10. Keep away from tanks.</li><li>11. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire.</li><li>12. Do not enter unless wear specific protective gears.</li><li>13. Firefighters should wear a self-contained breathing apparatus in pressure demand and full chemical protective suit.</li></ol>
Specific Protection of Firefighters : <ol style="list-style-type: none"><li>1. As in any fire, wear a self-contained breathing apparatus in pressure demand, MSHA/NIOSH (approved or equivalent), and full chemical protective suit.</li><li>2. If necessary, may cover a spark-proof coat on the protective suit.</li></ol>

## Section 6 - Accidental Release Measures

Personal Precautions : <ol style="list-style-type: none"><li>1. Restrict access to area until completion of clean up.</li><li>2. Ensure clean up is conducted by trained personnel only.</li><li>3. Wear proper personal protection gears.</li></ol>
Environmental Precautions : <ol style="list-style-type: none"><li>1. Ventilate area of leak or spill.</li><li>2. Remove all sources of ignition.</li><li>3. Notify the occupational safety health unit or environmental protection unit.</li></ol>
Methods for Cleaning up : <ol style="list-style-type: none"><li>1. Avoid contact with spills.</li><li>2. Prevent from entering sewers or confined space</li><li>3. If safe to do so, stop or reduce spills.</li><li>4. Absorb or dike spill with sand or other inert, stable, and non-flammable materials.</li><li>5. Small spills: Absorb spill with inert materials. Seal in suitable and labeled containers for disposal. Residue may be flushed with plenty of water.</li></ol>



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6. Large spills: Contact the fire department, emergency management agency, or the suppliers immediately.

## Section 7 - Handling and Storage

### Handling :

1. This chemical is combustible and toxic liquid. Engineering measures should be running while handling.
2. The staff should receive proper training and inform the risk and safety handling method.
3. Avoid heat and remove any source of ignition.
4. Prohibit smoking in work and storage area.
5. Unblock the exit routes.
6. Use spark-free tools and explosion proof equipment.
7. Consider install equipment to prevent fire and spilling.
8. In case of leak or spill, immediately put on proper protective gears and leave.
9. In case of leak or spill, report to the supervisor immediately if experience toxic symptoms or sings.
10. Avoid contact this substance or polluted equipments if not wear proper protective gears.
11. Before handling, check leak in a well-ventilated area away from storage place.
12. Handling amount of usage should be kept to a minimum.
13. Avoid spilling while operating. Keep away from any incompatibles.
14. All containers should be regularly checked if any corrosion or leak.
15. Do not pressurize air or inert gases to channel the liquid.
16. Ground all tanks, containers, and pipes.
17. When mixed with water, add appropriate amount into the water while stirring. NOT vice versa. Use cold water to prevent overheating.
18. Follow manufacturer's or supplier's recommendation for container exhaust. If swelling, contact supplier.
19. Do not pour contaminated materials back into the container.
20. Keep container tightly sealed and avoid physical damage.
21. Carefully handle empty containers with residue.

### Storage :

1. Store in a cool, dry, well-ventilated area away from sunshine, heat, and incompatible substances.
2. Prohibit smoking and fire around indoor or outdoor tanks.
3. Clearly labeled in the entrance of storage place, no obstacle. Only allowed trained personnel access.
4. Separate the working area, eating area, and protective gear storage place.
5. Working area and storage area should have proper fire extinguishers and equipments to deal with leakage emergency.
6. Check and maintain for the proper labels and physical condition of the containers.
7. Control the storage in a limited amount.
8. Containers should be anticorrosive and tightly sealed. Do not pile up, preventing damage.
9. Store at an appropriate height for operating, better under vision line.
10. Store in the suggested temperature. If necessary, install the temperature alarm.
11. All containers should be regularly checked if any corrosion or leak.
12. Storage equipment should be fireproof and anticorrosive.
13. Use grounded, anti-spark ventilation system, qualified explosion-proof equipments, and safe electricity system.



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14. Consider install equipment to prevent fire and spilling.
15. The barrels that store the flammable liquids should install the pressure reducing valve and vacuum relief valve. If swelling, contact the supplier.
16. Make a threshold at the door and build a slope or a groove in front of the door to enable the fluid leakage to be emitted to a safe place.
17. Avoid the indoor storage in large amount. Ensure the storage in an isolated fireproof building.
18. The storing basin shall be based on the ground with its base completely sealed from leakage, and shall be surrounded by a fluid-protective dike capable of carrying the entire volume of storage.

## Section 8 - Exposure Controls & Personal Protection

Engineering measures :

1. Use independent, spark-proof, and grounded exhaust ventilation.
2. Lead exhaust outlet direct to the outdoor, and take measures for environmental protection.
3. If necessary, use local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
4. Supply fresh air for replacement.

Control parameters			
TWA	STEL	Ceiling	Biological standards
10ppm	15ppm	--	--

Personal protective equipment :

- Respiratory Protection : powered air-purifying respirator with high effective prefilter against dust and acid vapor.
- Hand Protection : impervious protective gloves (except Butyl Rubber, Natural rubber, chloropene rubber, NBR, PVA, PVC, and FKM rubber).
- Eye Protection : chemical safety goggles, and eyewash facilities. No contact lenses.
- Skin and Body Protection :
  1. Wear (anti-corrosive) protective clothing and shoes.
  2. Provide an eyewash facility and a safety shower.

Hygiene measures :

1. Remove contaminated clothes, clean thoroughly before reuse or disposal. Must advise the danger to the laundry worker.
2. Eating or smoking is prohibited.
3. Wash hand thoroughly after handling this substance.
4. Maintain a clean work environment.

## Section 9 - Physical & Chemical Properties

Appearance : liquid	Odor : strong fishy or amine
Color : Transparent or yellowish	Melting Point: --
pH value : --	Boiling point/boiling range : 134.5 °C
Flammability: --	Flash point : 28.3°C
Decomposition temp : --	Test method : closed
Auto ignition temp : 265°C	Explosion properties : 1.5% - 9.4% (volume)
Vapor pressure : 10.7 mmHg	Vapor density : 3.4 (air=1)



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Density : 0.865 @25°C (water=1)	Solubility : Soluble with water
log Kow : 1.49	Evaporation Rate : --

## Section 10 - Stability & Reactivity Data

Stability : Stable
Possible hazardous reactions under specific conditions : <ol style="list-style-type: none"><li>1. Oxidizing agents (including chlorine): May cause violent reaction, fire, and explosion.</li><li>2. Acid, acid chloride, acid anhydride, halogen, halide: May cause violent reaction.</li><li>3. Nitromethane: Cause sensitive explosive mixture.</li><li>4. Calcium hypochlorite, sodium hypochlorite: Form explosive chloramines.</li><li>5. Perchloric acid, nitrosyl: Cause explosion.</li></ol>
Conditions to avoid : static electricity, flame, heat, ignition sources
Materials to avoid : Oxidizing agents (including chlorine), acid, acid chloride, acid anhydride, halogen, halide, nitromethane, calcium hypochlorite, sodium hypochlorite, perchloric acid, nitrosyl
Hazardous decomposition products : --

## Section 11 - Toxicological Information

Route of exposure : skin, inhalation, eye, ingestion
Symptoms : Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema
Immediate Toxicity : <ul style="list-style-type: none"><li>■ Skin :<ol style="list-style-type: none"><li>1. Undiluted liquid causes skin irritation, redness, pain, and possibly serious burns.</li><li>2. 25% solution may cause serious irritation.</li></ol></li><li>■ Inhalation :<ol style="list-style-type: none"><li>1. 4~10ppm have no effect; higher concentration of vapor or mist causes respiratory tract irritation.</li><li>2. Short exposure may cause temporary nausea, dizziness, restlessness, and rapid heart beating.</li><li>3. Severe exposure may cause pulmonary edema in several hours, resulting in breathing difficulty and death.</li></ol></li><li>■ Eye :<ol style="list-style-type: none"><li>1. Cause laboratory animal serious eye damage, and even burn and permanent injure.</li><li>2. Vapors of amine in low concentration can cause 'blue haze' and 'halo vision', because 1 to 3-hour exposure to amine causes temporary edema of the eye, blurring vision with blue haze, which usually disappears after one day and leaves no permanent effect. It is still unknown whether cyclohexylamine has the same effect.</li></ol></li><li>■ Ingestion : Skin color changes into indigo.<ul style="list-style-type: none"><li>● LD<sub>50</sub>: 156 mg/kg (Oral 、 rat); 277mg/kg (Skin 、 rabbit)</li><li>● LC<sub>50</sub>: 1850 ppm (Inhalation 、 rat); burns of oral cavity, throat, and oesophagus.</li><li>● 125mg/48H (Skin 、 human): serious irritation</li><li>● 2mg/24H (Skin 、 rabbit): serious irritation</li><li>● 50µg/24H (Eye 、 rabbit): serious irritation</li></ul></li></ul>



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## Specific effects :

1. Prolonged exposure to some amine can cause respiratory tract allergies. Though patient without allergy is not affected by low concentration, patient with allergy may appear symptoms of inflammation of the larynx and bronchi, such as stridor, shortness of breath, sneezing, runny nose, or blocked nose. It is still unknown whether cyclohexylamine causes respiratory tract allergies.
2. Repeated or prolonged contact with some amine can cause skin allergy. If so, even small amount can cause skin irritation. Symptoms include redness, itchiness, rash, and swelling.
3. 25% cyclohexylamine solution may cause skin allergy.
4. A short test found cyclohexylamine can cause mutation of human white blood cell.

## Section 12 - Ecological Information

### Ecotoxicology : --

- LC<sub>50</sub>(fish) : --
- EC<sub>50</sub>(Aquatic Invertebrates) : --
- Bioconcentration factor (BCF) : 7.99

### Persistence and degradability :

1. When emitted to air, cyclohexylamine photooxidizes hydroxyl (half-life of about 1.82 days).
2. Cyclohexylamine in water may evaporate into the air or hydrolyze, but cannot be absorbed by precipitates. In water, no sign of bioconcentration appears in organisms.
3. Cyclohexylamine in water and soil may be decomposed biologically.
  - Half-Life (Air) : --
  - Half-Life (Water surface) : --
  - Half-Life (Groundwater) : --
  - Half-Life (Soil) : --

### Bioaccumulative potential : --

Mobility in soil : If emitted into soil, cyclohexylamine may evaporate into the air or leach into groundwater.

### Other adverse effects : --

## Section 13 - Disposal Considerations

### Methods of disposal :

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

## Section 14 - MSDS Transport Information

UN classification number : 2357

Proper D.O.T Shipping Name : Cyclohexylamine

Hazard Class : Class 8: Corrosive; Class 3: Flammable Liquids

Packing Group : II



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Marine pollution : No
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Specific precautionary transport measures and conditions : --
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## Section 15 - Regulatory Information

Regulations :

1. Labor Safety and Health Facilities Regulations
2. Toxic Chemical Substances Labeling and Safety Data Regulations
3. Permissible Exposure Limits of Hazardous Substances in the Work Environment
4. Road Traffic Safety Regulations
5. Industrial Waste Storage and Disposal Regulations
6. Public Hazardous Materials and Flammable Pressurized Gases Establishment Standards and Safety Control Regulations

## Section 16 - Other Information

Literature references	1. CHEMINFO Data Bank, CCINFO CD, 2005-3 2. RTECS Data Bank, TOMES PLUS CD, Vol.65, 2005 3. HSDB Data Bank, TOMES PLUS CD, Vol.65, 2005 4. ChemWatch Data Bank, 2005-3		
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