

Material Safety Data Sheet

1. Identification of the Product & Company

Product Name : Chlorine
Other Name : —
Suggested Use and Restriction :
Company Name, Address, and Telephone No. : Yee Fong Chemical & Industrial Co., Ltd. Taoyuan Plant/No. 377, Haihu E. Rd., Lujhu Township, Taoyuan County, Taiwan
Emergency Telephone No./Fax No. : TEL : (03) 3541944 ; FAX : (03) 3541957

2. Hazard Identification

GHS Classification :
<ol style="list-style-type: none">1. Pressurization Gas2. Oxidative Gas Category 13. Acute Toxicity Category 1 (Inbreathe)4. Corrosive/Skin Irritated Substance Category 15. Serious Damage/Eyes Irritated Substance Category 16. Water Environmental Damaged Substance Category 1

Label Element :



• Signal Word : **Warning**

• Hazard Statement :

Toxicity Chemical Substance Category 3:

If the substance is exposed, human health and lives will be damaged and harmed immediately.

1. Pressurization Gas Contained; It will be Exploded if in heat.
2. May causes serious flaming; An oxidizer.
3. Fatal if in breathe.
4. Causes serious eyes damage.
5. Serious poisoning for aquatic animals.

• Precautionary Statements :

1. Keep containers in dry and cool area.
2. Keep away from fire- No Smoking.
3. If in eyes, rinse with water and seek for medical advice.
4. Do not pour into gutter.
5. Wear eyes and face protection.

Other Hazard : -

3. Composition, Information on Ingredients

English Name : Chlorine
Synonym : Molecular Chlorine, Liqdefied Chlorine Gas
CAS No. : 7782-50-5
Hazardous Ingredients(%) : 100%

4. First Aid Measures

First Aid Procedures Under Different Exposure :

• In Breathe :

1. Wear protective equipment before first aid. °
2. Remove patient to fresh air place and away from contaminants.

<p>3. If in hard breathing, give patient oxygen by well-trained personnel.</p> <p>4. Do not remove patient if necessary.</p> <p>5. The symptom of pulmonary edema may delaying for 48 hours.</p> <p>6. Seek for medical treatment immediately.</p> <p>• Skin Contact :</p> <p>1. Avoid to direct contact the chemicals; wear gloves if necessary.</p> <p>2. Flush with plenty of warm water immediately for over 20 minutes and take off contaminated clothes while in flushing.</p> <p>3. Seek for medical advice immediately if the irritation is persisting.</p> <p>4. The contaminated clothes should be cleaned completely to reuse or abandon.</p> <p>5. Do not compress or chafe patient' s affected part.</p> <p>6. Cover swab on affected part.</p> <p>7. Patient is not allowed to smoke or drink any alcohol.</p> <p>• Eye Contact :</p> <p>1. Rinse with warm water immediately for 30 minutes.</p> <p>2. Be cautious of contaminated water flow into another eye.</p> <p>3. Seek for medical treatment immediately if irritation is persisting.</p>
<p>The Most Dangerous Symptoms & Hazardous Effects : 1. Irritation 2. Hard Breathing 3. Burning 4. Pulmonary Edema if overdoes.</p>
<p>Protection for Medical Personnel : Personnel are not allowed to enter contaminated area to remove patient if not wearing level A protective clothes. Personnel should wear level C protective equipment to do first-aid in save area.</p>
<p>Doctor' s Advices : If in breathe, give patient oxygen, avoid doing gastric lavage or vomiting.</p>

5. Fire Fighting Measures

<p>Suitable Extinguishing : Small Fire: Chemical loose powder, carbon dioxide</p> <p>Big Fire: Water mist, Foam</p>
<p>Specific hazard that may be encountered when extinguishing :</p> <p>1. Chlorine is heavy than air and will deposit in low-laying place.</p> <p>2. Comburent if burning in chlorine will produce poisonous substance.</p> <p>3. Containers or steel cylinders will crack in heat.</p>
<p>Specific Extinguishing Procedures :</p> <p>1. Put out fire in safe and protective range.</p>

2. Stay in upwind place to avoid dangerous vapor or toxic decomposer.
3. Quarantine the unfired substances and protect personnel.
4. Withdraw from the fire place in safety.
5. Cool the containers and storage tanks which are exposed in fire place.
6. Remove all the inflammable and flammable substances, especially olein or lubricant.
7. Be cautious when putting out the fire. Do not put water directly on chlorine or chlorine liquid.
8. Backflow to steel cylinder may fracture the steel cylinder.
9. Do not block the safety valve.
10. If leaking doesn' t burn, spray water to disperse the vapor and protect personnel' s safety.
11. Fire in large-scale area should use auto water-spray controller or auto fire-fighting equipment.
12. Retreat from the fire area as soon as possible and let the fire burn out.
13. Stay away from storage tank.
14. Retreat immediately if the exhaust valve of the tank is ringing or discolor.
15. People who doesn' t wear protective equipment are not allowed to enter in.

Specific Protection and Equipment for Fire-fighters : Fire-fighters should wear A class airtight chemical protective cloth and air-respirator.

6. Accidental Release Measure

Personal Precautions :

1. Restrict to enter contaminated area before cleaning complete.
2. Confirm the cleaning work is responsible for by well-trained personnel.
3. Wear personal protective equipment.

Environmental Consideration :

1. Put out or remove all the fire-burning substances.
2. To ventilate this area.
3. Report to the security or environmental organization.

Cleaning Method :

1. Do not touch leaking substances.
2. Try to stop leaking or decrease leaking in safety.
3. Avoid the leaking substance flow into sewer, ditch, or other airtight area.
4. Use caustic soda, soda dust, or lime-contained solution to absorb and neutralize to store in the container which made in steel or lead.

7. Handling & Storage

Handling :

1. Personnel should be well-trained and be told the dangerous of the substance and the safe of operate methods.
2. Working place should supply the emergency handling equipment and protective equipments which can easily get anytime.
3. Personnel should familiar with the symptoms of poisoning and the first-aid measures.
4. Operate the system in airtight area if possible.
5. Avoid producing vapor or mist, and do not leak to the air of working area.
6. Do not smoke or contact with combustibile matters.
7. Consider to install the alert system or leaking detector.
8. Do not operate with incompatible substances.
9. Do not heat the steel tank which is pressurize.
10. The steel tank should be straight on the floor and fixed on the wall.
11. Keep the tank clean and avoid contaminated; use special truck to transport and avoid operating by greasy dirt hand.
12. After use, the valve should be closed tight and don' t switch the pressure valve.
13. The empty tank should not fill in another gas.
14. Examine the tank in regular.

- ### Storage :
1. Stored in closed containers and keep away from the working place of dry and cold.
 2. Use special truck to remove the tank.
 3. Do not handle by greasy dirt hand.

4. Avoid the tank falling or crashing.
5. Closed all valves if not use.
6. Turn on the valve entirely when using and turn on and off at least one time to avoid frozen every day.
7. Take minimum operating in cool and dry working area.
8. Working place should have emergency equipments for fire-distinguishing and leaking situation.
9. Stored in cool and dry place.
10. Avoid sunlight and keep away from heat and incompatible substances.
11. The temperature of steel tank should not over 51°C, and keep the tank straight and fixed on the floor.
12. The containers should be avoided crashing or any physical damage.
13. The store area should use corrosive lighting and air system.
14. Containers should be closed if not using.
15. Do not store over 6 months.
16. Containers should be labeled and separated from empty containers.

8. Exposure Controls

Engineering Controls : –			
Control Parameters			
Average Allowable Concentration of Eight Hours Time Weighted	Average Allowable Concentration of Short Period	Maximum Allowable Concentration	Biological Indicators: LC50(animal test, absorbing way)
–	–	–	293 ppm/1H(rate, breathe in)
Personal Protection :			

<ul style="list-style-type: none"> • Eye Protection : Chemical Goggles, whole-face mask, eye-washing machine. • Respiratory Protection : Protective Respirator • Hand Protection : Rubber Gloves • Skin & Body Protection : Wear Imperious clothing such as boots or body suits. Body and eye flushing equipment is required in working place.
<p>Hygienic Measures :</p> <ol style="list-style-type: none"> 1. Take off contaminated clothes immediately after work and clean thoroughly before wearing or abandoning. Be sure to tell the danger of contaminants to cloth-washing personnel. 3. Do not smoke, eat, and drink. 4. Wash hands thoroughly after processing. 5. Maintain the working place cleaned.

9. Physical and Chemical Properties

Appearance : White pellet powder, easy to be damp	Odor : Pungency taste, tear
Odor Threshold : 0.08ppm	Melting Point : -101°C
PH : Acidity	Boiling Point/Boiling Range : -34.1°C
Inflammability (solid/ liquid) : -	Flash Point : -
Decomposition : -	Test Method : -
Ignition Temperature : -	Explosion Limits : -
Vapor Pressure : 6.64ppm@20°C	Vapor Density : 2.48(air=1)
Density : 1.467@0°C (water=1)	Solubility : 0.73g/100g water
Octanol/Water Partition Coefficient (log Kow) : -	Evaporation Rate : -

10. Stability & Reactivity

Stability : Stable ◦
Hazardous Reaction under Specific Conditions : -

Conditions to Avoid : Temperature is over 121°C, Water content exist
Substances to be Avoided : 1. Acid Substances(Avoid to react) 2. Water(high hygroscopicity, Heat increased if dissolve, Cautious of burning)
Hazardous Decomposition : —

11. Toxicological Information

Routes of Exposure : Breathe in, Skin contact, Eye contact
Symptoms : Irritation, Coughing, Hard Breathing, Chest Pain, Vomiting, Pulmonary Edema, Skin Irritation, Chilblain, Ablepsia, Burn, Thirst, Convulsions, and Nausea.
Acute Toxicity : Inbreathe: <ol style="list-style-type: none"> 1. Causes nose, pharynx, and the upper respiratory tract serious irritate, even causes pulmonary edema if overdoes. 2. In 0.2ppm will causes nose itchy. 3. In 1.0ppm will causes dry pharynx, coughing, and a little hard breathe. 4. In 1.3ppm will causes serious headache and breathless. 5. Over 30ppm will cause serious coughing, chocking, chest pain, and vomiting. 6. Over exposed will causes bronchitis and pulmonary edema; the symptoms may delaying for 48 hours after exposed. 7. In 1000ppm will causes death. Skin Contact: <ol style="list-style-type: none"> 1. In high consistency will causes serious irritation, burning, and get blisters. 2. Direct contact to skin will causes serious irritation, burning, even chilblain. Eye Contact: <ol style="list-style-type: none"> 1. Serious irritated and causes burning, irritation, prickle, and burst into tears. 2. Direct contact will causes burning, permanent damage, even ablepsia.
慢毒性或長期毒性 : Contact in 5ppm frequently or for long-term may have

effect for breathing, causes nose irritation, hard breathing, abnormal heartbeat, chest pain, and corrode the enamel of tooth.

12. Ecological Information

Eco-toxicity : Chlorine will change into acidity and toxicity for fish in the water, so keep away from water resource.

Persistence and Degradability : –

Bioaccumulation : Chlorine will react to water and cell, so it is impossible to accumulate.

The Liquidity of the Soil : –

Other Adverse effects : Chlorine is a strong oxidizer, so it is unstable in water and oxidizes the inorganic substances in water soon. It also can oxidize the organic substances, but the rate is slow.

13. Disposal Considerations

Refer to Toxic Chemical Substances Control Act, the industrial waste storage, clearance and processing methods and related laws, prohibit indiscriminate dumping.

14. Transport Information

UN NO. : 1017

International Shipping Name : Chlorine

Hazard Classification of Transportation : Toxicity Gas category 2 & 3, and corrosive substance category 8.

Packing Group : --

Marine Pollutant (Yes/No) : --

Specific Delivery Methods and Precautions : Refer to traffic safety

15. Regulatory Information

<p>Applicable Laws & Regulation :</p> <ol style="list-style-type: none"> 1. Labor Safety and Sanitation rules 2. Organic solvent poisoning prevention rules 3. The rules of the traffic safety 4. General rules of the dangerous and harmful materials 5. Standards of permissible concentration of harmful substances in the working environment 6. Storage of industrial waste clean-up processing methods and facilities standards

16. Other Information

Reference	<ol style="list-style-type: none"> 1. Industrial Technology Research Institute: The Center For Safety & Health Tecnology. MSDS. 2. Handbook of Toxic and Hazardous Chemicals and Carcinogens 3. Hazardous Substances Data Bank(HSDB)Archives , ChemKnowledge Disk , Volume 50, 2001 	
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