



# Safety Data Sheet

## CHLORINE

MVC-MSDS-C-001P  
Issue Date : 04/15/15  
Rev. Code : 03-A  
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### I. PRODUCT AND COMPANY IDENTIFICATION

Product Name	Liquid Chlorine
Recommended use of the chemical and restrictions on use	Used in water treatment and disinfection, as bleaching agent, particularly for paper and textiles; in the manufacture of bleaching powder and chemicals such as PVC, chlorinated hydrocarbons, ethylene glycol, glycerine and tetraethyl lead. Chlorine is 2.5 times heavier than air. It is not an explosive or flammable gas but reacts violently with oils, solvents, grease, ammonia, acetone, etc.
Manufacturer	<b>Mabuhay Vinyl Corporation</b> 3 <sup>rd</sup> Floor Philamlife, 126 L.P. Leviste St. Salcedo Village, Makati City For Assistance Call : (02) 817-8971 to 76 loc 214; Direct line (02) 817-1830
Iligan Plant	Assumption Heights, Iligan City Tel: (063) 221-9466, 221-1190
Mabuhay Premium Bleach Plant	LTAI, Brgy. Biñan, Biñan, Laguna Tel: (049) 541-1923
Batangas Depot	BBTI Compound, Bauan, Batangas Tel: (043) 980-5869
Cebu Depot	Ceniza St., Ouano, Mandaue City Tel: (032) 344-5259, 345-0639
Davao Depot	Bunawan, Davao City Tel: (082) 236-0015

### Precautionary statements:

#### Prevention

P220: Keep/Store away from clothing/combustible materials.  
P244: Keep reduction valves free from grease and oil.  
P261: Avoid breathing dust/fume/gas/mist/vapours/spray.  
P264: Wash thoroughly after handling.  
P280: Wear protective gloves/protective clothing/eye protection/face protection.  
P284: Wear respiratory protection.  
P271: Use only outdoors or in a well-ventilated area  
P273: Avoid release to the environment.

#### Response:

P370+P376: In case of fire: Stop leak if safe to do so  
P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting  
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P337+P313: If eye irritation persists: Get medical advice/attention.  
P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower  
P363: Wash contaminated clothing before reuse  
P310: Immediately call a POISON CENTER or doctor/physician.  
P312: Call a POISON CENTER or doctor/physician if you feel unwell.  
P320: Specific treatment is urgent (see MSDS).  
P391 Collect spillage.

#### Storage:

P403: Store in a well ventilated place.  
P410: Protect from sunlight  
P233: Keep container tightly closed.  
P405: Store locked up.

#### Disposal:

P501: Dispose of contents/container in accordance with applicable local, regional, national, and/or international regulations

### II. HAZARDS IDENTIFICATION

#### Symbols



**Signal Word:** DANGER!

#### Hazard statements:

H280: Contains gas under pressure; may explode if heated.  
H270: May cause or intensify fire; oxidiser.  
H315: Causes skin irritation.  
H319: Causes serious eye irritation.  
H330: Fatal if inhaled.  
H335: May cause respiratory irritation.  
H400: Very toxic to aquatic life.  
H314: Causes severe skin burns and eye damage  
H370: Causes damage to the respiratory and nervous systems

### III. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Identity	Chlorine
Trade Names/ Synonyms	Liquid chlorine, liquefied chlorine gas, chlorine gas, chlor, molecular chlorine, diatomic chlorine
CAS Number	7782-50-5
Minimum Percentage	99.5%



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### IV. FIRST AID MEASURES

**Description of first-aid measures:** In all instances, seek immediate medical attention. Show this safety data sheet to the physician in attendance.

*In case of frostbite place the frostbitten part in warm water. Do not use hot water! If warm water is not available wrap the affected parts gently in blankets. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention.*

**Inhalation:** Remove to fresh air. Give artificial respiration if not breathing, preferably mouth-to-mouth. If breathing is difficult, administer oxygen. Keep the affected person warm at rest. In mild cases, give milk to relieve throat irritation.

**Ingestion:** Not a likely route of exposure.

**Skin contact:** Wash with plenty of soap and water while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Destroy contaminated shoes. Do not apply greases unless ordered by a physician.

**Eye contact:** Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. Do not attempt chemical neutralization of any kind.

#### Most important symptoms/effects, both acute and delayed

Toxic and irritating, with Inhalation as the major potential route of exposure. May cause severe irritation of mucous membranes of the nose, throat and respiratory tract followed by severe coughing, burning, chest pain, vomiting, headache, anxiety and feeling of suffocation. Severe breathing difficulties may occur which may be delayed in onset. Severe exposure may lead to chemical pneumonitis and pulmonary edema and may be fatal. Repeated or prolonged exposure may result in reduced pulmonary capacity and dental erosion.

Skin contact with liquid chlorine may cause serious burns, blistering and tissue destruction. Chlorine vapors can cause irritation, burning and blisters. Contact with rapidly expanding gas poses a frostbite hazard.

#### Indication of any immediate medical attention and special treatment needed:

No known antidote. Treatment for inhalation is symptomatic and supportive. Keep patient at rest until respiratory symptoms subside. Sedation for apprehension or restlessness may be considered as well as diuretics and antibiotics to alleviate edema and protect against secondary infection. Administer oxygen under exhalation pressure not exceeding 4 cm water for 15 minutes each hour until symptoms subside (except in presence of impending or existing cardiovascular failure). Steroid therapy, if given early, has been reported effective in preventing pulmonary edema. It is recommended that anyone exposed to chlorine gas by inhalation obtain a chest x-ray to check for pulmonary edema.

**First Aid Facilities:** Eye wash station, safety shower and normal washroom facilities.

### V. FIRE FIGHTING MEASURES

#### Extinguishing media

**Suitable extinguishing media:** Water spray, fog or foam.

For large fires, flood with fine water spray. Use water to keep fire - exposed containers cool and continue until well after fire is out.

**Unsuitable extinguishing media:** Do not use carbon dioxide or halogenated extinguishing agents.

#### Special hazards arising from the substance or mixture:

Although non-flammable, chlorine is a strong oxidizer and may react to cause fire and/or explosion upon contact with turpentine, ether, ammonia, hydrocarbons, certain metal hydrides, carbides, nitrides, oxides, sulfides, phosphides, easily oxidized materials, organic materials or other flammables. It forms corrosive Hydrogen Chloride on contact with water. Chlorine gas is heavier than air and will collect in low-lying areas.

**Special protective actions for firefighters:** Self-contained breathing equipment, eye protection and full protective clothing is required. Move container from fire area if it can be done without risk. Stay away from the ends of tanks. Keep unnecessary people away, isolate hazard area and deny entry. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Evacuation radius: 800 meters (1/2 mile). Do not allow contaminated extinguishing water to enter the soil, groundwater or surface waters.

### VI. ACCIDENTAL RELEASE MEASURES

#### Personal precautions, protective equipment and emergency procedures:

Evacuate all unprotected personnel. Put on protective equipment (see Section 8). Avoid direct contact with skin, eyes and clothing. Ensure adequate ventilation/exhaust extraction. Avoid low-lying areas. Work upwind if possible.

**Environmental precautions:** Avoid entry of product into drains, sewers, surface/ground water system or soil. Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.

#### Methods and material for containment and cleaning up:

When possible, move leaking or damaged cylinders outdoors or to an isolated location. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air and repair the leak or allow the cylinder to empty through a reducing agent such as caustic soda, soda ash, or hydrated lime solutions. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Chlorine vapors are heavier than air, and pockets of chlorine are likely to be trapped in low lying areas. Use water fog to dampen a chlorine cloud and reduce vapours. Do not spray water directly on the leak or chlorine container. Liquid or solid residues must be disposed of in accordance with all applicable regulations.



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### VII. HANDLING AND STORAGE

**Precautions for safe handling:** Use protective equipment (see Section 8). Provide adequate ventilation. Avoid inhalation of vapors and skin and eye contact. Change contaminated or soaked clothing immediately. Wash hands after handling.

Provide special training to workers handling chlorine. Regularly test and inspect piping and containment used for chlorine service. Liquid levels should be less than 85% of tank or cylinder capacity.

Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinders movement. Protect cylinders and containers from physical damage. Keep containers tightly closed when not in use. Chlorine emergency equipment should be available near the point of use.

Keep away from foodstuffs, drinks and tobacco.

Keep away from incompatible products.

#### Conditions for safe storage, including any incompatibilities

**Store** chlorine containers and cylinders below 45°C in cool, dry, well ventilated areas of non-combustible construction away from sunlight, precipitation, heavily trafficked areas and emergency exit. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. *Full and empty cylinders should be segregated.* Full cylinders should not be stored for more than six months. Liquid levels should be less than 85 % of container or cylinder capacity.

**Non suitable packaging material:** Acetal , aluminum, brass, Bronze, carbon steel, cast iron, chrome, CPVC, epoxy, LDPE, natural rubber, neoprene, nitrile, nylon, polyether-ether ketone(PEEK) , polypropylene, polyurethane, PPS, PVC, silicone, titanium

**Keep away from** heat, sparks, open flames and incompatible substances(see Section X).

### VIII. EXPOSURE CONTROLS AND PROTECTION

#### Control parameters

<b>ACGIH</b>	0.5 ppm TWA 1 ppm STEL
<b>Europe</b>	0.5 ppm STEL; 1.5 mg/m3 STEL
<b>OSHA (Final)</b>	1 ppm Ceiling; 3 mg/m3 Ceiling
<b>OSHA (Vacated)</b>	0.5 ppm TWA; 1.5 mg/m3 TWA 1 ppm STEL; 3 mg/m3 STEL
<b>NIOSH</b>	0.5 ppm Ceiling (15 min); 1.45 mg/m3 Ceiling (15 min)
<b>Philippines</b>	3 mg/m3 (TWA) OEL 1 ppm (TWA) OEL

**Appropriate engineering controls:** A system of local and / or general exhaust is recommended to keep employee exposure as low as possible. Use enclosed, isolated processing and handling whenever possible.

#### Personal protective equipment

Maintain eye wash fountain and quick-drench facilities in work area. Final choice of appropriate protection will vary according to methods of handling, engineering controls and risk assessments undertaken.

**Respiratory protection** NIOSH-approved full- or half -face piece (with goggles) respiratory protective equipment

##### Up to 5 ppm:

Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern  
Any supplied-air respirator

##### Up to 10 ppm:

Any supplied-air respirator operated in a continuous-flow mode

Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern

Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern

Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

Any self-contained breathing apparatus with a full facepiece

Any supplied-air respirator with a full facepiece

#### Emergency or planned entry into unknown concentrations or IDLH conditions:

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

#### Escape:

Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

Any appropriate escape-type, self-contained breathing apparatus

**Hand protection:** PVC, rubber or neoprene gloves

**Eye / face protection:** splash-proof safety goggles with side shields or face shield

**Skin protection:** Appropriate impermeable protective clothing(made of Viton, butyl rubber, Teflon, chlorinated polyethylene material ) to protect against possible skin contact. When responding to accidental release of unknown concentrations, wear one-piece, total encapsulating suit of Butyl coated nylon or equivalent.



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### IX. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Greenish-yellow to amber gas
Odor	Irritating, pungent odor
Odor threshold	0.2ppm
pH	Not applicable
Freezing point	-101°C
Boiling point /range	-34°C
Flash point	Not applicable
Evaporation rate	Not applicable
Flammability	Non flammable
Flammability/explosive limits	Not applicable
Vapor pressure	5168 mm Hg at 21°C
Vapor density	2.49 (air = 1.0)
Relative density(water = 1)	1.41 at 20°C(liquid)
Solubility(in water)	14.6gpl at 0°C; 6.9gpl at 20°C
Partition coefficient: n-octanol/water	Not available
Auto-ignition temperature	Not applicable
Decomposition temperature	Not available
Viscosity	14 Pa.s at 20°C

### X. STABILITY AND REACTIVITY

**Reactivity:** May react violently with combustible materials. Reacts with water to form corrosive acids. May react violently with alkalis. With water causes rapid corrosion of some metals. May react violently with reducing agents. Violently oxidises organic material.

**Stability:** Stable under recommended storage conditions.

**Possibility of hazardous reactions or polymerization:** Will not polymerize. Reacts violently with a variety of substances over a broad range of conditions including reducing agents and combustible materials.

**Conditions to avoid:** Heat, sparks, sunlight, moisture and incompatible substances.

**Incompatible materials:** Hydrocarbons, combustible materials, bases, acids, metals, metal salts, carbides, oxides, phosphides, nitrides, sulfides, reducing agents, oxidizing materials, halogens, halo carbons, amines, ammonia, arsenic, calcium, iodine, ethers, fluorine

**Hazardous decomposition products:** Does not decompose but reacts violently to form hydrochloric acid and other potentially toxic and/ or corrosive substances.

### XI. TOXICOLOGICAL INFORMATION

**Routes of exposure:** inhalation, ingestion, skin and eye contact

**Symptoms related to the physical, chemical and toxicological characteristics:** causes severe irritation of the eyes and respiratory tract with eye injury, restlessness, shortness of breath, cough, choking sensation, sneezing, running nose, chest pain, dizziness, headache, nausea, cyanosis (lack of oxygen in the blood) and respiratory failure. Following respiratory tract injury, onset of severe breathing difficulties, including bronchitis, lung edema (accumulation of fluid in the lungs) and pneumonia, may be delayed and life threatening.

**Delayed and immediate effects and also chronic effects from short and long term exposure:** High concentrations of chlorine over a short period of time may aggravate pre-existing heart conditions, and cause congestive heart failure. At high concentrations, chlorine gas irritates the skin and can produce sensations of burning and pricking of the skin, with inflammation and blister formation. Exposure to concentrations as low as 5-10 ppm is reported to cause severe irritation of the eyes, nose and respiratory tract which is intolerable after a few minutes.

**Numerical measures of toxicity** The hazards via inhalation at different concentrations is reported to be as follows:

0.2-0.5 ppm	No toxic, long term effect
1-3 ppm	Definite odor: irritation of eyes and nose
5-8 ppm	Throat, eye, and mucous membrane irritation
30 ppm	Intense coughing fits
34-51 ppm	Lethal in 1 to 1.5 hours exposure
40-60 ppm	Exposure for 30-60 minutes without effective respiration may cause bronchitis, pulmonary edema or bronchopneumonia
100 ppm	May be lethal after 50 minutes of exposure (estimated)
430 ppm	Lowest concentration known to cause lethality after 30 minutes of exposure
1000 ppm	May be fatal with a few deep breaths

### XII. ECOLOGICAL INFORMATION

#### Ecotoxicity

FISH TOXICITY: 390 ug/L 96 hour(s) LC50 (Mortality) Orangethroat darter (*Etheostoma spectabile*)

INVERTEBRATE TOXICITY: 637.5 ug/L 1 hour(s) LC50 (Mortality) Pacific oyster (*Crassostrea gigas*)

ALGAL TOXICITY: 50-1000 ug/L 23 hour(s) (Population) Algae, phytoplankton, algal mat (Algae)

PHYTOTOXICITY: 20 ug/L 96 day(s) (Growth) Water-milfoil (*Myriophyllum spicatum*)



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### Persistence and degradability:

**Biodegradation (In water):** Half-life: 1.3 to 5 hours.

**Photodegradation (In air) :** Half-life: 10 minutes, lifetime: 14 minutes.

**Bioaccumulative potential :** An accumulation in aquatic organisms is not to be expected

### Mobility

In water, chlorine is transformed to free available chlorine (gaseous chlorine), hypochlorous acid and hypochlorite ions, whose relative amounts depend on the pH and other physicochemical properties of the water. At environmental pH, only hypochlorous acid and hypochlorite will be present.

In the atmosphere, Cl<sub>2</sub> will degrade during daylight, with half-lives ranging from minutes to several hours, depending on latitude, season, and time of day.

In soil, the high water solubility of chlorine can lead to a high mobility in soil, although chlorine as vapour or as aqueous solution is normally irreversibly bound to soil organics within the first few millimeters or centimeters of the soil surface.

### XIII. DISPOSAL CONSIDERATIONS

Dispose of in accordance with all Government and Local regulations. Container is returnable and must be properly identified with return tag and returned as promptly as possible to supplier, in accordance with all applicable DOT regulations. All valves must be closed tight and closures or caps secured. It is illegal to ship a leaking Chlorine container.

Chlorine gas will disperse to the atmosphere leaving no residue. When possible, move leaking container to an isolated area. Position to release gas, not liquid. Absorb in alkaline solution of caustic soda, soda ash, or hydrated lime.

### XIV. TRANSPORT INFORMATION

**UN Number** 1017  
**UN Proper Shipping Name** CHLORINE  
**Transport hazard class** 2.3(Toxic Gas, Corrosive, Oxidizing)  
**Packing group** Not applicable



### Label

**Environmental Hazards**  
Marine Pollutant : Yes  
Environmentally Hazardous : Yes  
No

IMDG  
ADR/RID  
IATA

### Special precautions

Transport in open ventilated vehicle, cylinders upright and secured, drum placed lengthwise in the truck tray, with the valve end facing away from the vehicle. Do not transport in confined spaces like refrigerated compartments of vehicles, truck cabs or in passenger compartments. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

### XV. REGULATORY INFORMATION

#### U.S. Regulations:

This material contains one or more of the following chemicals required to be identified under SARA Section 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

#### CHLORINE (7782-50-5)

**SARA 302:** 100 lb TQP  
**SARA 304:** 10 lb EPCRA RQ  
**SARA 313:** 1.0 % de minimis concentration  
**CERCLA:** 10 lb final RQ; 4.54 kg final RQ  
**OSHA:** 1500 lb TQ

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

Acute: Yes      Chronic: No      Fire: No  
Reactive: No      Sudden release: No

#### National Inventories

Australian Chemical Inventory(AICS) : Listed  
Canadian Chemical Inventory(DSL) : Listed  
China Chemical Inventory(IECS) : Listed  
European Union Inventory(EINECS) : 231-959-5  
Japan Chemical Inventory(ENCS) : Not listed  
Korean Chemical Inventory(KECL) : KE-05486  
New Zealand Chemical Inventory(NZIOC) : Listed  
Philippines - Priority Chemical List(PICCS) : Listed  
U.S. Inventory (TSCA) : Listed

### XVI. OTHER INFORMATION

The information herein is presented in good faith and believed to be correct as of the date of issue. However, no warranty, expressed or implied, is made by Mabuhay Vinyl Corporation regarding the product's merchantability, fitness for a particular purpose, performance, safety or stability. This information is not intended to be all-inclusive as to the manner and conditions of use, handling, storage, disposal and other factors that may involve other or additional legal, environmental, safety or performance considerations, and Mabuhay Vinyl Corporation assumes no liability whatsoever for the use of or reliance upon this information. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any existing laws or regulations.

End of Safety Data Sheet