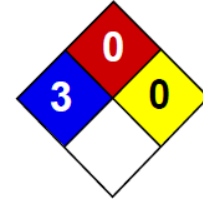




Material Safety Data Sheet

Liquid Chlorine



Section 1: Chemical Product and Company Identification

Product Name: Liquid Chlorine
CAS Number: 7782-50-5
Synonym: -
Chemical Name: Chlorine
Chemical Formula: CL₂

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS Number	% by Weight
Chlorine	7782-50-5	99.5

Section 3: Hazards Identification

Section 4: First Aid Measures

Inhalation:

Remove victim from area of exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. If patient finds breathing difficult and develops a bluish discoloration of the skin (which suggests a lack of oxygen in the blood - cyanosis), ensure airways are clear of any obstruction and have a qualified person give oxygen through a face mask. Apply artificial respiration if patient is not breathing. Seek immediate medical advice.

Skin Contact:

If skin or hair contact occurs, immediately remove any contaminated clothing and wash skin and hair thoroughly with running water. If swelling, redness, blistering or irritation occurs seek medical assistance. For skin burns, cover with a clean, dry dressing until medical help is available. Launder contaminated clothing before reuse.

Eye Contact:

If in eyes, hold eyelids apart and flush the eye continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre or a doctor, or for at least 15 minutes.

Ingestion:

Immediately rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water. Seek immediate medical assistance.

Indication of immediate medical attention and special treatment needed:

Treat symptomatically. Effects may be delayed. Delayed pulmonary oedema may result. May be fatal if inhaled.

Administration of 5% carbon dioxide/oxygen medical gas mixture to patients with chronic respiratory disease or drug induced respiratory depression is potentially dangerous. 5% carbon dioxide/oxygen medical gas mixture should not be given to acidotic patients.

Section 5: Fire and Explosion Data

Suitable Extinguishing Media:

Not combustible, however, if material is involved in a fire use: Fine water spray, normal foam, dry agent (carbon dioxide, dry chemical powder).

Hazchem or Emergency Action Code: 2XE**Specific hazards arising from the chemical:**

Non combustible, but will support combustion of other materials. Oxidizing substance. Gas/vapour is heavier than air; may accumulate in confined spaces. Environmentally hazardous.

Special protective equipment and precautions for fire-fighters:

Not combustible, however will support the combustion of other materials. Keep containers cool with water spray. Heating can cause expansion or decomposition of the material, which can lead to the containers exploding. If safe to do so, remove containers from the path of fire. Only move cool cylinders. Do not approach cylinders suspected to be hot. Fire fighters to wear self-contained breathing apparatus and suitable protective clothing if risk of exposure. If unable to keep cylinders cool, evacuate area.

Section 6: Accidental Release Measures

Emergency procedures/Environmental precautions:

Clear area of all unprotected personnel. Evacuate personnel from downwind areas. Wear protective equipment to prevent skin and eye contact and inhalation of vapours/dusts. Avoid breathing in vapours. Work up wind or increase ventilation. Wear self contained breathing apparatus. Shut off leak if possible without risk. Work up wind. Use water spray to disperse vapour. DO NOT spray water directly on the leak, liquid chlorine or chlorine container. If safe to do so, rotate container so that gas and not liquid escapes. SMALL SPILLS: Allow liquid to evaporate.

Seek specialist advice. For large spills notify the Emergency Services. Do not allow container or product to get into drains, sewers, streams or ponds.

Chlorine gas only becomes visible at high concentrations.

Personal precautions/Protective equipment/Methods and materials for containment and cleaning up:

Clear area of all unprotected personnel. Wear protective equipment to prevent skin and eye contact and breathing in vapours. Avoid breathing in vapours. Work up wind or increase ventilation. Air-supplied masks are recommended to avoid inhalation of toxic material. For gas leak, DO NOT spray water directly on the leak or chlorine container. Use fire hoses equipped with fog nozzles to disperse gas downwind. For liquid: Contain - prevent run off into drains and waterways. Use fog nozzles as before. Do NOT allow any water to fall onto a pool of liquid chlorine as this will increase gas cloud. If safe to do so, cover with large plastic sheet. Where possible vapour knock down water should be contained.

Section 7: Handling and Storage

This material is a Scheduled Poison S7 and must be stored, maintained and used in accordance with the relevant regulations.

Precautions for safe handling:

Avoid all contact. When using do not eat, drink or smoke. Only experienced and properly instructed persons should handle gases under pressure. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Do not drag, drop, slide or roll cylinders. The uncontrolled release of a gas under pressure may cause physical harm. Use a suitable hand truck for cylinder movement. Never attempt to transfer gases from one container to another.

Conditions for safe storage, including any incompatibilities:

Store in a well ventilated area. Store below 50°C. Store away from foodstuffs. Store away from combustible materials. Store away from incompatible materials described in Section 10. Keep dry - reacts with water. Cylinders should be securely restrained so that they are kept upright at all times. Drums should be stored horizontally. Keep containers closed when not in use - check regularly for leaks.

Section 8: Exposure Controls/Personal Protection

Chlorine: Peak Limitation = 3 mg/m³ (1 ppm)

As published by Safe Work Australia Workplace Exposure Standards for Airborne Contaminants.

Peak Limitation - a maximum or peak airborne concentration of a particular substance determined over the shortest analytically practicable period of time which does not exceed 15 minutes.

These Workplace Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These

workplace exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

Appropriate engineering controls:

Ensure ventilation is adequate to maintain air concentrations below Workplace Exposure Standards. Vapour heavier than air - prevent concentration in hollows or sumps. DO NOT enter confined spaces where vapour may have collected.

If in the handling and application of this material, safe exposure levels could be exceeded, the use of engineering controls such as local exhaust ventilation must be considered and the results documented. If achieving safe exposure levels does not require engineering controls, then a detailed and documented risk assessment using the relevant Personal Protective Equipment (PPE) (refer to PPE section below) as a basis must be carried out to determine the minimum PPE requirements.

Individual protection measures, such as Personal Protective Equipment (PPE):

The selection of PPE is dependent on a detailed risk assessment. The risk assessment should consider the work situation, the physical form of the chemical, the handling methods, and environmental factors.

OVERALLS, CHEMICAL GOGGLES, SAFETY SHOES, FACE SHIELD OR AIR MASK, GLOVES (Long).

* Not required if wearing air supplied mask.

Wear overalls, chemical goggles, full face shield, elbow-length impervious gloves. Use with adequate ventilation. If determined by a risk assessment an inhalation risk exists, wear an air-supplied mask meeting the requirements of AS/NZS 1715 and AS/NZS 1716. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storage or re-use.

Section 9: Physical and Chemical Properties

Physical state:	Gas / Liquefied gas
Colour:	Greenish - Yellow (high concentrations) ; Clear/invisible (low concentrations)
Odour:	Pungent , Irritating
Odour Threshold:	1 ppm (approx)
Molecular Formula:	Cl ₂
Specific Gravity:	1.468 (liquid); 1.56 (@ -35°C).
Relative Vapour Density (air=1):	2.4
Vapour Pressure (20 °C):	666 kPa
Flash Point (°C):	Not applicable.
% Volatile by Volume:	ca. 100
Solubility in water (g/L):	5.1 @30°C
Boiling Point/Range (°C):	-34
Freezing Point/Range (°C):	-101

Section 10: Stability and Reactivity Data

Reactivity:

Reacts violently with many organic chemicals (e.g. mineral oils, greases), hydrocarbons, silicones, and finely divided metals. Forms explosive mixtures with alcohols, glycols, ammonia and its compounds, and hydrogen over a wide range of concentrations.

Chemical stability:

Reactive chemical. Corrosive in the presence of moisture.

Possibility of hazardous reactions:

Oxidizing agent. Supports combustion of other materials and increases intensity of a fire. Corrosive to some metals in the presence of moisture. (brass, copper, lead, nickel, steel and stainless steel) Heating can cause expansion or decomposition of the material, which can lead to the containers exploding. Can react with acids and some nitrogen or phosphorous compounds. Hazardous polymerisation will not occur.

Conditions to avoid:

Avoid exposure to heat, sources of ignition, and open flame. Avoid contact with combustible chemicals. Do not allow water to come into contact with liquid chlorine.

Incompatible materials:

Incompatible with combustible materials. Incompatible with heat and hot surfaces. Incompatible with reducing agents. Incompatible with glass.

Hazardous decomposition products:

Oxides of chlorine. Chlorine compounds.

Section 11: Toxicological Information

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

Ingestion:

Not a likely route of exposure, however, swallowing liquid will result in freeze burns of the mouth, throat and stomach. Swallowing can result in chemical burns to the mouth, throat and abdomen; perforation of the gastrointestinal tract and vomiting of blood and eroded tissue.

Eye contact:

A severe eye irritant. Corrosive to eyes; contact can cause corneal burns. Contamination of eyes can result in permanent injury. Liquid splashes or spray may cause freeze burns to the eye.

Skin contact:

Liquid chlorine is corrosive to skin. Contact with skin will result in irritation. Liquid splashes or spray may cause freeze burns.

Inhalation:

Material is irritant to the mucous membranes of the respiratory tract (airways). May cause coughing and shortness of breath. May cause adverse lung effects if high concentrations are inhaled. Inhalation of vapours may cause severe breathing difficulties and lung oedema. Delayed (up to 48 hours) fluid

build up in the lungs may occur. Severe exposure may cause lung damage. Overexposure may result in death.

Acute toxicity:

Inhalation LC50 (rat): 146.5 ppm/4hr.

Skin corrosion/irritation: Corrosive (rabbit).

Serious eye damage/irritation: Severe irritant (rabbit).

Respiratory or skin: Not classified.

sensitisation:

Chronic effects: Not listed as carcinogenic according to the International Agency for Research on Cancer (IARC).

Mutagenicity: Not classified.

Carcinogenicity: Not classified.

Reproductive toxicity: Not classified.

Specific Target Organ Toxicity (STOT) - single exposure: Severe corrosion to the respiratory tract at high concentrations.

Specific Target Organ Toxicity (STOT) - repeated exposure: Not classified.

Aspiration hazard: Not applicable.

Section 12: Ecological Information

Ecotoxicity: Avoid contaminating waterways.

Persistence/degradability: Not readily biodegradable.

Bioaccumulative potential: Does not bioaccumulate.

Mobility in soil: Low mobility in soil.

Aquatic toxicity: Very toxic to aquatic organisms.

48hr LC50 (Daphnia magna): 0.15 mg/L (Static) Remarks: Mortality.

96hr LC50 (fish): 0.014 mg/L

Terrestrial toxicity: Very ecotoxic in the soil environment.

Section 13: Disposal Considerations

Disposal methods:

Refer to Waste Management Authority. Dispose of material through a licensed waste contractor. Contact supplier for advice.

Section 14: Transport Information

Road and Rail Transport:

AU07 UN 1017 CHLORINE has a subsidiary risk 5.1, as well as 8. Despite this, when transported in cylinders, pressure drums, MEGCs or tanks, chlorine gas is not considered incompatible with dangerous goods of Class 8 or 9, or Division 6.1, or combustible liquids.

UN No: 1017
 Transport Hazard Class: 2.3 Toxic Gas
 Subrisk 1: 5.1 Oxidising Agent
 Subrisk 2: 8 Corrosive
 Proper Shipping Name or Technical Name: CHLORINE
 Hazchem or Emergency Action Code: 2XE

Marine Transport

Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; DANGEROUS GOODS.

UN No: 1017
 Transport Hazard Class: 2.3 Toxic Gas
 Subrisk 1: 5.1 Oxidising Agent
 Subrisk 2: 8 Corrosive
 Proper Shipping Name or Technical Name: CHLORINE

IMDG EMS Fire: F-C
 IMDG EMS Spill: S-U
 Marine Pollutant: Yes

Air Transport

TRANSPORT PROHIBITED under the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air in Passenger and Cargo Aircraft, and Cargo Aircraft Only.

Section 15: Other Regulatory Information

NFPA® 704

National Fire Protection Association: Standard System for the Identification of the Hazards of Materials for Emergency Response (United States).

Category	Degree of hazard	Description
Flammability	0	material that will not burn under typical fire conditions
Health	3	material that, under emergency conditions, can cause serious or permanent injury
Instability	0	material that is normally stable, even under fire conditions
Special hazard	OX	oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock and

		that causes a severe increase in the burning rate of combustible materials with which they come into contact.
--	--	---

Section 16: Other Information

The information in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, expressed or implied, regarding its accuracy and/or completeness. User should consult experts in their review of this MSDS prior to use of the product.

