Safety Data Sheet
CHLORINE

Update: 11th January 2019

1. Identification

Product identifiers

Product name: CHLORINE**>99.5%**

Indication in other: **CAS #:**7782-50-5 **EC/EINECS:** 231-959-5 **RTECS#:** FO 2100000
UN#:1017 **EC Index #:**017-001-00-7

Manufacturer Info:

Aditya Birla Chemicals (Thailand) Co., Ltd (Chlor Alkali Division)
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- **Emergency contact numbers: +66-3868-7354 (Thailand)**

2. Hazards Identification

GHS Classification of the substance or mixture

Oxidising gases	Category 1
Gases under pressure	Compressed gas
Acute toxicity (Inhalation)	Category 2
Skin corrosion/irritation	Category 1
Serious eye damage/eye irritation	Category 1
Specific target organ toxicity - single exposure (respiratory system, nervous system)	Category 1
Specific target organ toxicity – repeat exposure (respiratory system, olfactus organ)	Category 1
Acute aquatic toxicity	Category 1

Label elements

Signal word DANGER

Hazard statement(s)

- **H270** May cause or intensify fire; oxidizer
- **H280** Contains gas under pressure; may explode if heated
- **H331** Toxic if inhaled.
- **H314** Causes severe skin burns and eye damage
- **H370** Cause damage to organs
- **H372** Cause damage to organs through prolonged or repeated exposure
- **H373** May cause damage to organs through prolonged or repeated exposure.
- **H400** Very toxic to aquatic life.

Precautionary statement(s)

- **P261** A void breathing vapours, gas
- **P280** Wear protective gloves, respiratory and eye protection/face protection.
- **P403+P233** Store in well-ventilated place. Keep container tightly closed.
- **P220** Keep/Store away from clothing/ combustible materials.
- **P273** Avoid release to the environment.

Other hazards which do not result in classification – none

3. Composition/Information on Ingredients

Substances

Product name: Liquid Chlorine, Chlorine
Common Name: Liq. Chlorine
Synonyms: Chlorine gas
Molecular Formula: Cl_2
Molecular Weight: 70.91 g/mol

Component	CAS No	Wt.%
Chlorine	7782-50-5	99.5
Inert Ingredient	-	0.5

4. First Aid Measures

Inhalation Move victim to fresh air. If not breathing, give artificial respiration. If there is difficulty in breathing, provide oxygen and get medical attention immediately.

Skin contact Wash off with soap and plenty of water. Get medical attention immediately.

Eye contact Rinse thoroughly with plenty of water for at least 15 minutes, keeping eyelids open. Get medical attention immediately.

Ingestion Give small amounts of water. Get medical attention immediately

Most important symptoms and effects, both acute and delayed

If inhaled : Cause severe irritation of mucous membranes of the nose throat, and respiratory tract followed by coughing and feeling of suffocation.

Skin contact: Cause serious burns, blistering and tissue destruction.

Eye contact: Cause severe eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.

Direct contact of the eyes with liquid chlorine will produce serious eye burns even blindness.

If swallowed : Ingestion of liquid chlorine may result in severe irritation or ulceration of the mouth, throat and digestive tract which may be displayed by nausea, pain, vomiting, and , in severe cases can collapse, get medical attention immediately.

Indication of any immediate medical attention and special treatment needed: Treat symptomatically.

5. Fire Fighting Measures

Suitable extinguishing media

Use extinguishing agent suitable for type of surrounding fire.

Unsuitable extinguishing media

None

Special protective equipment and precautions for fire-fighters

Wear full chemical resistant clothing with self-contained breathing apparatus for firefighting.

Use water to keep fire-exposed containers cool and continue until well after fire is out.

If it is necessary to stop the flow of gas, use water curtain to prevent gas escaping.

6. Accidental Release Measure

Personal precautions

- In event of leak or spill, keep upwind
- Evacuate personnel to safe areas.
- Avoid inhalation of vapors, gas
- Ensure adequate ventilation.

Protective equipment

- Wear a full-face respirator with respirator cartridges.
- Wear impervious protective clothing, including boots, gloves.

Environmental precautions

Do NOT let this chemical enter the environment.

Methods and materials for containment and cleaning up

- Wear chemical protection suit including self-contained breathing apparatus.
- Use water spray to reduce vapor but DO NOT apply water to point leak or spill area.
- 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.

7. Handling and Storage

Precautions for safe handling

- Avoid contact with skin and eyes.

- Provide adequate ventilation during use.
- Avoid breathing vapors or gas.
- Use a suitable hand truck for cylinder movement. Never attempt to lift a cylinder by its valve protection cap.
- Secure cylinders in place in an upright position at all times.
- Do not drop cylinders or permit them to strike each other.
- Never apply flame or localized heat directly to any part of the cylinder.

Conditions for safe storage, including any incompatibilities

- Store chlorine containers in well ventilated areas of low fire potential, away from incompatible materials and away from sources of heat and ignition. Store in cool place.
- Store cylinders upright on a level floor secured in position and protected from physical damage.

8. Exposure Controls/Personal Protection

Control parameters

IDLH:	10 ppm	(NIOSH 2012)
REL-ST	0.5 ppm	(NIOSH 2012)
PEL – Ceiling	1 ppm	(OSHA 2012)
TLV – TWA	0.5 ppm	(ACGIH 2012).
TLV – STEL	1 ppm	(ACGIH 2012).

Appropriate engineering controls

- Ensure ventilation is adequate.
- Use enclosed, isolated processing and handling whenever possible.

Personal protective equipment

		
Hand Protection	Respiratory Protection	Eye Protection

Work / Hygienic Practices:

- Wash contaminated clothing prior to reuse.
- Always wash hands before smoking, eating, drinking or using the toilet.
- Do not eat, drink, or smoke during work

9. Physical and Chemical Properties

1.)	Appearance	Green to yellow compressed liquefied gas
2.)	Odour	Pungent
3.)	Odour Threshold	0.2-0.4 ppm
4.)	pH	5.5 @ 0.7% Solution
5.)	Melting point/freezing point	-101 °C
6.)	Boiling point	-34 °C
7.)	Flash point	Not Applicable
8.)	Evaporation rate	No data available
9.)	Flammability (solid, gas)	No data available
10.)	Upper/lower flammability or explosive limits	No data available
11.)	Vapour pressure	678kPa at 20 °C
12.)	Vapour density (Air =1)	2.5
13.)	Relative density	1.5 g/cm^3 at 15 °C
14.)	Water solubility	0.7 g/100ml (20°C)
15.)	Partition coefficient: n-octanol/water log Pow	No data available
16.)	Auto ignition temperature	Not Applicable
17.)	Decomposition temperature	No data available
18.)	Viscosity	0.34 cP @ 20°C

10. Stability and Reactivity

Reactivity
Reacts with hydrogen sulfide and water forming hydrochloric acid. It combines with carbon monoxide and sulfur dioxide to form phosgene and sulfonyl chloride, respectively, which are toxic and corrosive substances.
Reacts violently with bases, combustible, reducing materials, organic and inorganic compounds
Chemical stability
Stable under normal ambient handling conditions.
Possibility of hazardous reactions
Hazardous polymerization will not occur.
Conditions to avoid
Moisture, Heat, Sunlight
Incompatible materials
Acetylene, turpentine and other hydrocarbons, ammonias, hydrogen, ether, powered metals, sulfur, and aluminum.
Hazardous decomposition products
Hydrogen chloride may form from chlorine in the presence of water vapor.

11. Toxicological Information

Inhalation: Cough, Sore throat, Shortness of breath, Wheezing and Labored breathing.
Skin contact: Redness, Burning sensation, Pain, Skin burns.
Eye contact: Causes watering of the eyes, Redness, Pain and Burns.
Ingestion: Ingestion of liquid chlorine may result in severe irritation or ulceration of the mouth, throat and digestive tract which may be displayed by nausea, pain, vomiting, cyanosis (lack of oxygen in the blood), and, in severe cases, collapse, shock and death.
Symptoms related to the physical, chemical and toxicological characteristics:
Rapid evaporation of the liquid may cause frostbite. Inhalation may cause asthma-like reactions. Inhalation may cause pneumonitis. Inhalation may cause lung edema, but only after initial corrosive effects on eyes and/or airways have become manifest.
Immediate effects:

- Corrosive to eyes, skin and respiratory tract.
- Corrosive on ingestion, inflammation and edema of the bronchi, pneumonitis, pulmonary edema.

Chronic effects
The substance may have effects on the respiratory tract and lungs, resulting in chronic inflammation and impaired functions. The substance may have effects on the teeth, resulting in dental erosion.
Numerical measures of toxicity
Acute toxicity
LC50 Oral – rat: 293 mg/kg
LC50 Inhalation – rat: 300 ppm
Skin Corrosion/Irritation:
Causes severe skin burn and eye damage.
Serious eye damage/irritation:
Causes severe eye burns and can cause serious eye damage.
Specific target organs/systemic toxicity following single exposure
It was classified into Category 1 (respiratory systems, nervous systems) based on the description that it causes pneumonia, pulmonary edema, bronchitis, tracheal ulcer, decrease of lung function, asthma and asthmatic symptoms and it causes vomiting, headache, sense of uneasiness, syncope, fatigue, etc. and also causes photosensitivity enhancement and direct effect to the cerebral cortex in humans .
Specific target organs/systemic toxicity following repeat exposure
It was classified in Category 1 (respiratory systems ,olfactus organ) based on the description that it causes bronchus disease and pulmonary hemorrhage in humans and biochemical changes which indicates the effects on kidney function. It was classified into Category 2 based on that a disorder is done to a tooth.

12. Ecological Information

Eco toxicity

Fish : Oncorhynchus mykiss (rainbow trout) LC50	0,014 mg/l - 96 h
Crustacea: Daphnia magnaEC 50 :	0.085 mg/l – 48 h
Persistence and degradability	Rapid degradability
Bio-accumulative potential	Not Bio-accumulative
Mobility in soil	No data available
Other adverse effects	highly toxic to water bodies, kills bacteria

13. Disposal Considerations

Waste treatment methods

Waste treatment should be managed in an appropriate and approved waste facility. Dispose of all contained and contaminated spill residue in accordance with local/regional/national/international regulations.

Contaminated packaging

Dispose of as unused product

14. Transport Information

UN number	1017
UN proper shipping name	CHLORINE
Transport hazard class (es)	2.3 **Sub risk:** 5.1,8
Packaging group	none

ADR

14.1 UN Number:	1017
14.2 UN Proper Shipping Name:	CHLORINE
14.3 Transport Hazard Class (es)	
Class:	2
Label(s):	2.3, 5.1, 8
Hazard No. (ADR):	265
Tunnel restriction code:	(C/D)
Emergency Action Code:	2XE
14.4 Packing Group:	–
14.5 Environmental hazards:	Environmentally Hazardous
14.6 Special precautions for user:	–

RID

14.1 UN Number:	1017
14.2 UN Proper Shipping Name	CHLORINE
14.3 Transport Hazard Class (es)	
Class:	2
Label(s):	2.3, 5.1, 8
14.4 Packing Group:	–
14.5 Environmental hazards:	Environmentally Hazardous
14.6 Special precautions for user:	–

IMDG

14.1 UN Number:	1017
14.2 UN Proper Shipping Name:	CHLORINE
14.3 Transport Hazard Class (es)	
Class:	2.3
Label(s):	2.3, 5.1, 8
EmS No.:	F-C, S-U
14.3 Packing Group:	–
14.5 Environmental hazards:	P
14.6 Special precautions for user:	–

IATA

14.1 UN Number:	1017
14.2 Proper Shipping Name:	Chlorine
14.3 Transport Hazard Class (es):	
Class:	2.3
Label(s):	–
14.4 Packing Group:	–
14.5 Environmental hazards:	Environmentally Hazardous
14.6 Special precautions for user:	–

Other information
Passenger and cargo aircraft: Forbidden.
Cargo aircraft only: Forbidden.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: not applicable

Additional identification: Avoid transport on vehicles where the load space is not separated from the driver's compartment. 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. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

15. Regulatory Information

Thailand Regulations:

- Act Armament Control, 1987, announced by the Ministry of Defense. Ammunition Type 2.3
- Hazardous Substances Act: Class of Hazardous Substance: Type 3 and List 5.1
- Hazardous Substances: (Ministry of Labor)
- Quantities of dangerous concentrations of chemicals (Ministry of Labor)

International Laws/Regulations:

- CLP: Annex VI (CLP Regulation)

U.S. Regulations:

SARA TITLE III of the Emergency Planning and Community Right-To Know Act (EPCRA) of 1986 and of 40 CFR 372:

Section 302 Extremely Hazardous Substance (EHS): CAS # 7782-50-5 100 Lbs. (45.4 Kilograms) (8.77Gals.) Threshold Planning Quantity (TPQ)

Section 304 Extremely Hazardous Substance (EHS): CAS # 7782-50-5 10 Lbs. (4.54 Kilograms) (0.877Gals.) Reportable Quantity (RQ).

OSHA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

29 CFR Parts 1910.119: Process Safety Management of Highly Hazardous Chemicals. Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals, listed on Appendix A of the standard

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T, N

Risk Phrases:

- **R23** Toxic by inhalation.
- **R36/37/38** Irritating to eyes, respiratory system and skin.
- **R50** Very toxic to aquatic organisms.

Safety Phrases:

- **S1/2** Keep locked up Keep out of the reach of children.
- **S 9** Keep container in a well-ventilated place.
- **S45** In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
- **S61** Avoid release to the environment. Refer to special instructions/ Safety data sheets.

Label:
NFPA 704:

GHS:

16. Other Information

The information in this SDS 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 SDS prior to use of the product.

1. The National Institute for Occupational Safety and Health(NIOSH):NIOSH Pocket Guide to Chemical Hazardshttp://www.cdc.gov/niosh/npg/npgdcas.html
2. United Nations Recommendations on the Transport of Dangerous Goods (UNRTDG): http://www.unece.org/trans/danger/publi/unrec/rev14/English/05E_Index.pdf
3. Department of industrial work; Thailand : http://ghs.diw.go.th:8080/GHSThaiUser/servlet/ChemServlet?action=QCL