

## Safety Data Sheet P-4580

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

Date of issue: 01/01/1979 Revision date: 11/30/2016 Supersedes: 10/17/2016

### SECTION: 1. Product and company identification

1.1. Product identifier

Product form : Substance
Name : Chlorine
CAS No : 7782-50-5
Formula : Cl2

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Industrial use. Use as directed.

### 1.3. Details of the supplier of the safety data sheet

Praxair, Inc. 10 Riverview Drive

Danbury, CT 06810-6268 - USA

T 1-800-772-9247 (1-800-PRAXAIR) - F 1-716-879-2146

www.praxair.com

#### 1.4. Emergency telephone number

Emergency number : Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7days/week

- Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887

(collect calls accepted, Contract 17729)

### **SECTION 2: Hazard identification**

#### 2.1. Classification of the substance or mixture

#### **GHS-US** classification

 Ox. Gas 1
 H270

 Liquefied gas
 H280

 Acute Tox. 2 (Inhalation: gas)
 H330

 Skin Corr. 1A
 H314

 Eye Dam. 1
 H318

 STOT SE 3
 H335

 Aquatic Acute 1
 H400

### 2.2. Label elements

#### **GHS-US** labeling

Hazard pictograms (GHS-US)



GHS03

 $\Diamond$ 

GHS04







GHS07



Signal word (GHS-US) : DANGER

Hazard statements (GHS-US) : H270 - MAY CAUSE OR INTENSIFY FIRE; OXIDIZER

H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED

H314 - CAUSES SEVERE SKIN BURNS AND EYE DAMAGE

H330 - FATAL IF INHALED

H400 - VERY TOXIC TO AQUATIC LIFE

CGA-HG22 - CORROSIVE TO THE RESPIRATORY TRACT

Precautionary statements (GHS-US) : P202 - Do not handle until all safety precautions have been read and understood

P244 - Keep reduction valves/valves and fittings free from oil and grease

P260 - Do not breathe gas

P264 - Wash hands thoroughly after handling

P271+P403 - Use and store only outdoors or in a well-ventilated place

P273 - Avoid release to the environment



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P280+P284 - Wear protective gloves, protective clothing, eye protection, respiratory protection,

and/or face protection

P370+P376 - In case of fire: Stop leak if safe to do so

P405 - Store locked up

P501 - Dispose of contents/container Dispose in a safe manner in accordance with

local/national regulations

CGA-PG05 - Use a back flow preventive device in the piping

CGA-PG20+CGA-PG10 - Use only with equipment of compatible materials of construction and

rated for cylinder pressure

CGA-PG12 - Do not open valve until connected to equipment prepared for use CGA-PG18 - When returning cylinder, install leak tight valve outlet cap or plug

CGA-PG06 - Close valve after each use and when empty

CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)

#### 2.3. Other hazards

Other hazards not contributing to the classification

: None.

### 2.4. Unknown acute toxicity (GHS US)

No data available

### **SECTION 3: Composition/Information on ingredients**

#### 3.1. Substance

Name	Product identifier	%
Chlorine (Main constituent)	(CAS No) 7782-50-5	100

#### 3.2. Mixture

Not applicable

### **SECTION 4: First aid measures**

### 4.1. Description of first aid measures

First-aid measures after inhalation

: Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician. WARNING: To avoid possible chemical burns, the rescuer should avoid breathing any exhaled air from the victim.

First-aid measures after skin contact

Avoid breathing vapors. In case of contact, immediately flush affected areas with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

First-aid measures after eye contact

Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.

: Ingestion is not considered a potential route of exposure.

#### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation

First-aid measures after ingestion

: Overexposure to concentrations moderately above the TLV of 1 ppm irritates the eyes and respiratory tract. Very brief exposure to a concentration of 1000 ppm may be fatal. Acts as an asphyxiant at high concentrations. Inhalation of high concentrations (e.g, greater than 15 ppm) causes choking, coughing, burning of the throat, and severe irritation of the upper respiratory tract; additionally, pulmonary edema, bronchitis, and pneumonitis may result.

### 4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance.

Reactivity

### **SECTION 5: Firefighting measures**

#### 5.1. Extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

#### 5.2. Special hazards arising from the substance or mixture

Fire hazard : Oxidizer. May acce

Oxidizer. May accelerate the burning of other combustible materials.
No reactivity hazard other than the effects described in sub-sections below.

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#### 5.3. Advice for firefighters

Firefighting instructions

: Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

Protection during firefighting

: DANGER! Toxic, corrosive, high-pressure gas..

Special protective equipment for fire fighters

Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

Specific methods

: Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas containers to rupture. Cool endangered containers with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems

Stop flow of product if safe to do so

Use water spray or fog to knock down fire fumes if possible.

Other information

: Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.).

#### **SECTION 6: Accidental release measures**

### 6.1. Personal precautions, protective equipment and emergency procedures

General measures

: DANGER: Oxidizing gas. Corrosive. Evacuate personnel to a safe area. Wear a self-contained breathing apparatus and appropriate personal protective equipment (PPE). (gas tight, chemical-protective) Approach suspected leak area with caution. Remove all sources of ignition. Toxic, corrosive vapor can spread from spill. Contact with flammable materials may cause fire or explosion. Ventilate area or move container to a well-ventilated area. Before entering the area, especially a confined area, check the atmosphere with an appropriate device. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.



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### **SECTION 7: Handling and storage**

### 7.1. Precautions for safe handling

Precautions for safe handling

: Do not breathe gas/vapor. Avoid all contact with skin, eyes, or clothing. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g, wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

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

Storage conditions

: Avoid oil, grease and all other combustible materials

Store only where temperature will not exceed 125°F (52°C). Post "No Smoking/No Open Flames" signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g, NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

### 7.3. Specific end use(s)

None.

#### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

Chlorine (7782-50-5)		
ACGIH	ACGIH TLV-TWA (ppm)	0.5 ppm
ACGIH	ACGIH TLV-STEL (ppm)	1 ppm
USA OSHA	OSHA PEL (Ceiling) (mg/m³)	3 mg/m³
USA OSHA	OSHA PEL (Ceiling) (ppm)	1 ppm
USA IDLH	US IDLH (ppm)	10 ppm

### 8.2. Exposure controls

Appropriate engineering controls

: Use only in a closed system. A corrosion-resistant, forced-draft fume hood is preferred. LOCAL EXHAUST: A corrosion-resistant system is acceptable.

Eye protection

: Wear safety glasses with side shields. Wear goggles and a face shield when transfilling or breaking transfer connections. Provide readily accessible eye wash stations and safety showers. Wear safety glasses with side shields or goggles when transfilling or breaking transfer connections.

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Skin and body protection

: Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Respiratory protection

When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Thermal hazard protection : W

: Wear cold insulating gloves when transfilling or breaking transfer connections.

## **SECTION 9: Physical and chemical properties**

#### 9.1. Information on basic physical and chemical properties

Physical state : Gas

Appearance : Greenish-yellow gas. Amber liquid (under pressure).

Molecular mass : 71 g/mol
Color : Greenish gas.
Odor : Pungent.

Odor threshold : Odor threshold is subjective and inadequate to warn for overexposure.

0.23 mg/m3 (Dixon and Ikels)

pH : Not applicable.

Relative evaporation rate (butyl acetate=1) : No data available

Relative evaporation rate (ether=1) : Not applicable.

Melting point : -101 °C (-149.85°F)

Freezing point : No data available

Boiling point : -34.05 °C (-29.25°F)

Flash point : Not applicable.

Critical temperature : 144 °C

Auto-ignition temperature : Not applicable.

Decomposition temperature : No data available

Flammability (solid, gas) : No data available

Vapor pressure : 6.9 bar (100 psia) (@20°C [68°F])

Critical pressure : 77.11 bar (1118.4 psia)
Relative vapor density at 20 °C : No data available

Relative density : 1.6

Density : 2.7 kg/m³ (at 50 °C)

Relative gas density : 2.5

Solubility : Water: 8620 mg/l Log Pow Not applicable. Log Kow : Not applicable. Viscosity, kinematic Not applicable. : Not applicable. Viscosity, dynamic : Not applicable. Explosive properties Oxidizing properties Oxidizer. **Explosion limits** : Non flammable.

9.2. Other information

Gas group : Liquefied gas

Additional information : Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground

level



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SECT	ION 10: Stability and reactivity	
10.1.	Reactivity	
	,	No reactivity hazard other than the effects described in sub-sections below.
10.2.	Chemical stability	
		Stable under normal conditions.
10.3.	Possibility of hazardous reactions	
		May occur.
10.4.	Conditions to avoid	
		Air contact. High temperature. Moisture. Incompatible materials.
10.5.	Incompatible materials	
		Chlorine reacts with most materials, especially flammable materials, other reducing agents, and nearly all metals. At temperatures below 250°F (121°C) certain common metals (e.g, iron, copper, steel, lead, nickel) resist reaction with dry chlorine, but others (e.g, aluminum, arsenic, gold, mercury, tin, titanium) react. Moist chlorine is highly corrosive except to glass, stoneware, porcelain, and certain alloys and only at low pressure. Titanium ignites spontaneously on contact with dry chlorine. Carbon steel ignites in chlorine at temperatures near 483°F (251°C).
10.6.	Hazardous decomposition products	
		Toxic fumes. Chlorides.

### **SECTION 11: Toxicological information**

#### 11.1. Information on toxicological effects

Acute toxicity : Inhalation:gas: FATAL IF INHALED.

Chlorine ( \f )7782-50-5	
LC50 inhalation rat (ppm)	146.5 ppm/4h
ATE US (gases)	146.500 ppmV/4h

Skin corrosion/irritation : CAUSES SEVERE SKIN BURNS AND EYE DAMAGE.

pH: Not applicable.

Serious eye damage/irritation : CAUSES SERIOUS EYE DAMAGE.

pH: Not applicable.

Respiratory or skin sensitization : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified
Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : MAY CAUSE RESPIRATORY IRRITATION.

Specific target organ toxicity (repeated

exposure)

: Not classified

Aspiration hazard : Not classified

Symptoms/injuries after inhalation : Overexposure to concentrations moderately above the TLV of 1 ppm irritates the eyes and

respiratory tract. Very brief exposure to a concentration of 1000 ppm may be fatal. Acts as an asphyxiant at high concentrations. Inhalation of high concentrations (e.g, greater than 15 ppm) causes choking, coughing, burning of the throat, and severe irritation of the upper respiratory

tract; additionally, pulmonary edema, bronchitis, and pneumonitis may result.

## **SECTION 12: Ecological information**

#### 12.1. Toxicity

Ecology - general : VERY TOXIC TO AQUATIC LIFE.

Chlorine (7782-50-5)	
LC50 fish 1	0.44 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [flow-through])
EC50 Daphnia 1	0.017 mg/l (Exposure time: 48 h - Species: Daphnia magna)

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Chlorine (7782-50-5)	
LC50 fish 2	0.014 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [flow-through])

#### 12.2. Persistence and degradability

Chlorine (7782-50-5)	
Persistence and degradability	Not applicable for inorganic gases.

#### 12.3. Bioaccumulative potential

Chlorine (7782-50-5)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	Not applicable.
Log Kow	Not applicable.
Bioaccumulative potential	No data available.

#### 12.4. Mobility in soil

Chlorine (7782-50-5)	
Mobility in soil	No data available.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

#### 12.5. Other adverse effects

Other adverse effects : May cause pH changes in aqueous ecological systems.

Effect on ozone layer : None

## **SECTION 13: Disposal considerations**

#### 13.1. Waste treatment methods

Waste disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.

### **SECTION 14: Transport information**

In accordance with DOT

Transport document description : UN1017 Chlorine, 2.3

UN-No.(DOT) : UN1017
Proper Shipping Name (DOT) : Chlorine

Class (DOT) : 2.3 - Class 2.3 - Poisonous gas 49 CFR 173.115

Hazard labels (DOT) : Poison Gas 2.3 - Poison gas



DOT Special Provisions (49 CFR 172.102)

: 2 - This material is poisonous by inhalation (see 171.8 of this subchapter) in Hazard Zone B (see 173.116(a) or 173.133(a) of this subchapter), and must be described as an inhalation hazard under the provisions of this subchapter

B9 - Bottom outlets are not authorized

B14 - Each bulk packaging, except a tank car or a multi-unit-tank car tank, must be insulated with an insulating material so that the overall thermal conductance at 15.5 C (60 F) is no more than 1.5333 kilojoules per hour per square meter per degree Celsius (0.075 Btu per hour per square foot per degree Fahrenheit) temperature differential. Insulating materials must not promote corrosion to steel when wet

N86 - UN pressure receptacles made of aluminum alloy are not authorized

T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter

TP19 - The calculated wall thickness must be increased by 3 mm at the time of construction. Wall thickness must be verified ultrasonically at intervals midway between periodic hydraulic tests (every 2.5 years). The portable tank must not be used if the wall thickness is less than that prescribed by the applicable T code in Column (7) of the Table for this material

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Marine pollutant :



### **Additional information**

Emergency Response Guide (ERG) Number : 124;173

Other information : No supplementary information available.

Special transport precautions : 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 there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided)

is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

#### Transport by sea

UN-No. (IMDG) : 1017
Proper Shipping Name (IMDG) : CHLORINE
Class (IMDG) : 2 - Gases
MFAG-No : 124

Air transport

UN-No. (IATA) : 1017
Proper Shipping Name (IATA) : Chlorine
Class (IATA) : 2

Civil Aeronautics Law : Gases under pressure/Gases toxic under pressure

## **SECTION 15: Regulatory information**

#### 15.1. US Federal regulations

Chlorine (7782-50-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on the United States SARA Section 302	
Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	10 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	100 lb
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Delayed (chronic) health hazard Sudden release of pressure hazard Fire hazard
SARA Section 313 - Emission Reporting	1.0 %

### 15.2. International regulations

#### **CANADA**

### Chlorine (7782-50-5)

Listed on the Canadian DSL (Domestic Substances List)

#### **EU-Regulations**



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#### Chlorine (7782-50-5)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

#### 15.2.2. National regulations

#### Chlorine (7782-50-5)

Listed on the AICS (Australian Inventory of Chemical Substances)

Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)

Listed on the Korean ECL (Existing Chemicals List)

Listed on NZIoC (New Zealand Inventory of Chemicals)

Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

Japanese Poisonous and Deleterious Substances Control Law

Listed on the Canadian IDL (Ingredient Disclosure List)

Listed on INSQ (Mexican National Inventory of Chemical Substances)

Listed on CICR (Turkish Inventory and Control of Chemicals)

#### 15.3. US State regulations

Chlorine(7782-50-5)	
U.S California - Proposition 65 - Carcinogens List	No
U.S California - Proposition 65 - Developmental Toxicity	No
U.S California - Proposition 65 - Reproductive Toxicity - Female	No
U.S California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S Massachusetts - Right To Know List U.S New Jersey - Right to Know Hazardous Substance List U.S Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S Pennsylvania - RTK (Right to Know) List

## **SECTION 16: Other information**

Other information

: When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product

Praxair asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Praxair, Inc, it is the user's obligation to determine the conditions of safe use of the product

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NFPA health hazard : 4 - Very short exposure could cause death or serious residual injury even though prompt medical attention was

given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions,

and are not reactive with water.

NFPA specific hazard : OX - This denotes an oxidizer, a chemical which can

greatly increase the rate of combustion/fire.



#### **HMIS III Rating**

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is

given

Flammability : 0 Minimal Hazard
Physical : 2 Moderate Hazard

SDS US (GHS HazCom 2012) - Praxair

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.