



SAFETY DATA SHEET

OLIN CORPORATION

Product name: Chlorine

Issue Date: 03/15/2017

Print Date: 03/21/2017

OLIN CORPORATION encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. IDENTIFICATION

Product name: Chlorine

Recommended use of the chemical and restrictions on use

Identified uses: Water treatment chemicals Pharmaceutical intermediate. Pharmaceuticals. Synthesis intermediate. Disinfectants Industrial biocidal product Manufacture of plastics products

COMPANY IDENTIFICATION

OLIN CORPORATION
190 CARONDELET PLAZA
CLAYTON MO 63105
UNITED STATES

Customer Information Number:

+1 844-238-3445
INFO@OLINBC.com

EMERGENCY TELEPHONE NUMBER

Local Emergency Contact: 1 800-424-9300

2. HAZARDS IDENTIFICATION

Hazard classification

This material is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

Oxidizing gases - Category 1

Gases under pressure - Liquefied gas

Acute toxicity - Category 2 - Inhalation

Skin irritation - Category 2

Eye irritation - Category 2A

Specific target organ toxicity - single exposure - Category 3

Label elements

Hazard pictograms



Signal word: **DANGER!**

Hazards

May cause or intensify fire; oxidizer.
Contains gas under pressure; may explode if heated.
Causes skin irritation.
Causes serious eye irritation.
Fatal if inhaled.
May cause respiratory irritation.

Precautionary statements

Prevention

Keep/Store away from clothing/ combustible materials.
Keep reduction valves free from grease and oil.
Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
Wash skin thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/ eye protection/ face protection.
Wear respiratory protection.

Response

IF ON SKIN: Wash with plenty of soap and water.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin irritation occurs: Get medical advice/ attention.
If eye irritation persists: Get medical advice/ attention.
Take off contaminated clothing and wash before reuse.
In case of fire: Stop leak if safe to do so.

Storage

Store in a well-ventilated place. Keep container tightly closed.
Store locked up.
Protect from sunlight. Store in a well-ventilated place.

Disposal

Dispose of contents/ container to an approved waste disposal plant.

Other hazards

Water Reactive

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Chlorine

This product is a substance.

Component	CASRN	Concentration
Chlorine	7782-50-5	> 98.0 - < 100.0 %

4. FIRST AID MEASURES

Description of first aid measures

General advice: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Skin contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Seek medical attention if symptoms occur or irritation persists. Wash clothing before reuse. Suitable emergency safety shower facility should be immediately available.

Eye contact: - Wash eyes with plenty of water for 15 minutes at least. Do not forget to remove contact lenses. Suitable emergency eye wash facility should be immediately available.

Ingestion: No emergency medical treatment necessary.

Most important symptoms and effects, both acute and delayed: Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed

Notes to physician: Maintain adequate ventilation and oxygenation of the patient. Chemical eye burns may require extended irrigation. Obtain prompt consultation, preferably from an ophthalmologist. Material may cause severe pulmonary edema. For persons receiving significant exposure to this material, consider chest x-ray and keep under observation for 48 - 72 hr. for delayed onset of pulmonary edema. Humidified oxygen, intermittent positive pressure breathing, assisted respiration/CPAP and steroid therapy should be considered in treatment. Physical exertion may potentiate exposure effects during the first 24 - 72 hours. May cause asthma-like (reactive airways) symptoms. Bronchodilators, expectorants, antitussives and corticosteroids may be of help. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Excessive exposure may aggravate preexisting asthma and other respiratory disorders (e.g. emphysema, bronchitis, reactive airways dysfunction syndrome).

5. FIREFIGHTING MEASURES

Suitable extinguishing media: Stop flow of oxidizer (ex. chlorine, oxygen, etc). Once oxidizer has been consumed, use suitable extinguishing agent for material that is burning.

Unsuitable extinguishing media: Water spray

Special hazards arising from the substance or mixture

Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Chlorine. Hydrogen chloride.

Unusual Fire and Explosion Hazards: Container may vent and/or rupture due to fire. This material is a gaseous oxidizer. Product may cause many materials to burn in the absence of oxygen. It may intensify the fire. Chlorine may react to cause a fire and/or explosion upon contact with many organic compounds, ammonia, hydrogen, and many metals at normal temperatures, and with steel at elevated temperatures. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Water is effective only as a cooling media to reduce the reaction rate and should not be applied directly to a chlorine leak. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Move container from fire area if this is possible without hazard. For spills of liquefied gas, apply appropriate foam or vapor suppressing agent. Warning! Contact of water with liquefied gas can result in boiling, frothing, and rapid generation of vapor. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Evacuate area. Refer to section 7, Handling, for additional precautionary measures. Only trained and properly protected personnel must be involved in clean-up operations. Keep personnel out of low areas. Keep upwind of spill. Ventilate area of leak or spill. Spills of this liquefied gas may form ice, which can plug drains and can make valves inoperable. Contact of water with liquefied gas can result in boiling, frothing, and rapid generation of vapor. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information. Spills or discharge to natural waterways is likely to kill aquatic organisms.

Methods and materials for containment and cleaning up: Isolate area until gas has dispersed. Stop flow of gas. Apply vapor suppression foams until spill can be cleaned up. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: Do not breathe vapour. Do not get in eyes, on skin, on clothing. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. Contents under pressure. Do not puncture or incinerate container. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Conditions for safe storage: Avoid moisture.

Storage stability

Maximum storage

temperature

300 °C (572 °F)

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure limits are listed below, if they exist.

Component	Regulation	Type of listing	Value/Notation
Chlorine	ACGIH	TWA	0.5 ppm
	ACGIH	STEL	1 ppm
	OSHA Z-1	C	3 mg/m ³ 1 ppm
	CAL PEL	STEL	3 mg/m ³ 1 ppm
	CAL PEL	PEL	1.5 mg/m ³ 0.5 ppm
	OSHA P0	STEL	3 mg/m ³ 1 ppm
	OSHA P0	TWA	1.5 mg/m ³ 0.5 ppm

Exposure controls

Engineering controls: Use engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only in enclosed systems or with local exhaust ventilation. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. Lethal concentrations may exist in areas with poor ventilation.

Individual protection measures

Eye/face protection: Use chemical goggles. If exposure causes eye discomfort, use a full-face respirator.

Skin protection

Hand protection: Use gloves chemically resistant to this material. Use an insulated glove for protection from liquid contact of the skin that may cause frostbite due to rapid cooling. Examples of preferred glove barrier materials include: Chlorinated polyethylene. Natural rubber ("latex"). Neoprene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl chloride ("PVC" or "vinyl"). Styrene/butadiene rubber.

Viton. Examples of acceptable glove barrier materials include: Butyl rubber. Nitrile/butadiene rubber ("nitrile" or "NBR"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use an approved respirator. When respiratory protection is required, use an approved positive-pressure self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus or positive pressure air line with auxiliary self-contained air supply.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	Liquefied gas
Color	yellow
Odor	Sharp
Odor Threshold	No data available
pH	No test data available
Melting point/range	Not applicable
Freezing point	-101 °C (-150 °F) <i>Literature</i>
Boiling point (760 mmHg)	-34.04 °C (-29.27 °F) <i>Literature</i>
Flash point	closed cup Not applicable open cup Not applicable
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	No data available
Lower explosion limit	Not applicable
Upper explosion limit	Not applicable
Vapor Pressure	4,800 mmHg at 20 °C (68 °F) <i>Literature</i>
Relative Vapor Density (air = 1)	2.49 at 0 °C (32 °F) <i>Literature</i>
Relative Density (water = 1)	1.47 at 0 °C (32 °F) <i>Literature</i>
Water solubility	1 % at 20 °C (68 °F) <i>Literature</i>
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No test data available
Decomposition temperature	No test data available
Kinematic Viscosity	No test data available
Explosive properties	Not explosive

Oxidizing properties May cause or intensify fire; oxidizer.
Molecular weight 70.9 g/mol *Literature*

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: No data available

Chemical stability: Stable.

Possibility of hazardous reactions: Polymerization will not occur.

Conditions to avoid: Avoid proximity to chemicals and flammable materials. Avoid moisture.

Incompatible materials: Contact with combustible material may cause fire. May react explosively with some organics under confinement. Avoid contact with: Ammonia. Acetylene. Combustible materials. Hydrogen. Organic compounds. Phosphorous compounds. Reducing agents. Corrosive when wet. Water contamination may cause corrosion of metals due to formation of hydrochloric acid. Avoid contact with metals such as: Moist or hot steel or their alloys. Most metals. Finely divided metals.

Hazardous decomposition products: Chlorine.

11. TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

Acute toxicity

Acute oral toxicity

Swallowing is unlikely because of the physical state.

As product: Single dose oral LD50 has not been determined.

Acute dermal toxicity

Not likely to be absorbed through skin in harmful amounts.

As product: The dermal LD50 has not been determined.

Acute inhalation toxicity

Brief exposure (minutes) to easily attainable concentrations may cause serious adverse effects, even death. Vapor may cause severe irritation of the upper respiratory tract (nose and throat). May cause severe pulmonary edema (fluid in the lungs). Excessive exposure may cause lung injury. In humans, symptoms may include: Dizziness. Shortness of breath. Headache. Fever. Drowsiness. Anesthetic or narcotic effects.

LC50, Rat, male and female, 1 Hour, vapour, 1.321 mg/l

Skin corrosion/irritation

Brief contact may cause skin burns. Symptoms may include pain, severe local redness and tissue damage.

Liquid may cause frostbite upon skin contact.

Serious eye damage/eye irritation

May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Vapor may cause severe eye irritation and corneal injury.

Sensitization

Did not cause allergic skin reactions when tested in guinea pigs.

No signs of respiratory sensitization have been reported.

Specific Target Organ Systemic Toxicity (Single Exposure)

May cause respiratory irritation.

Route of Exposure: Inhalation

Target Organs: Respiratory Tract

Specific Target Organ Systemic Toxicity (Repeated Exposure)

In humans, symptoms may include:

Respiratory effects.

In animals, effects have been reported on the following organs:

Kidney.

Liver.

Lung.

Observations in animals include:

Can cause erosion of the teeth.

Carcinogenicity

Did not cause cancer in laboratory animals.

Teratogenicity

Limited data suggests that chlorine is not teratogenic but may be slightly embryotoxic when administered at high doses in drinking water to pregnant rats.

Reproductive toxicity

In animal studies, did not interfere with reproduction.

Mutagenicity

Has been shown to have mutagenic activity in bacteria. Animal genetic toxicity studies were negative.

Aspiration Hazard

Based on physical properties, not likely to be an aspiration hazard.

COMPONENTS INFLUENCING TOXICOLOGY:

Chlorine

Acute oral toxicity

Single dose oral LD50 has not been determined.

Acute dermal toxicity

The dermal LD50 has not been determined.

12. ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

Toxicity**Chlorine****Acute toxicity to fish**

Material is very highly toxic to aquatic organisms on an acute basis (LC50/EC50 <0.1 mg/L in the most sensitive species).

LC50, Oncorhynchus mykiss (rainbow trout), flow-through test, 96 Hour, 0.060 mg/l

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), flow-through test, 48 Hour, 0.141 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants

NOEC, Algae, flow-through test, 7 d, 0.0021 mg/l

Chronic toxicity to fish

NOEC, Fish, 0.04 mg/l

Persistence and degradability**Chlorine**

Biodegradability: Biodegradation is not applicable.

Theoretical Oxygen Demand: 0.23 mg/mg

Bioaccumulative potential

Bioaccumulation: Partitioning from water to n-octanol is not applicable.

Mobility in soil

Mobility of chlorine in soil is assumed to be of little relevance as chlorine in an aqueous solution reacts with organic matter.

13. DISPOSAL CONSIDERATIONS

Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR

UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Recycler. Reclaimer. Incinerator or other thermal destruction device. Waste water treatment system. Landfill.

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Chlorine
UN number	UN 1017
Class	2.3 (5.1, 8)
Packing group	
Marine pollutant	Chlorine
Reportable Quantity	Chlorine

Toxic-Inhalation Hazard, Zone B

Classification for SEA transport (IMO-IMDG):

Proper shipping name	CHLORINE
UN number	UN 1017
Class	2.3 (5.1, 8)
Packing group	
Marine pollutant	Chlorine
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Transport forbidden by regulation

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Sudden Release of Pressure Hazard
Acute Health Hazard
Fire Hazard

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Section 103

Components	CASRN	RQ (RCRA Code)
Chlorine	7782-50-5	10 lbs RQ

Pennsylvania Worker and Community Right-To-Know Act:

The following chemicals are listed because of the additional requirements of Pennsylvania law:

Components	CASRN
Chlorine	7782-50-5

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

This product is not listed, but it may contain elements known to the State of California to cause cancer or reproductive toxicity as listed under Proposition 65 Safe Drinking Water and Toxic Enforcement Act. For additional information, contact Olin.

United States TSCA Inventory (TSCA)

All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

16. OTHER INFORMATION

Hazard Rating System**NFPA**

Health	Fire	Reactivity
4	0	0

Revision

Identification Number: 10000001217 / A619 / Issue Date: 03/15/2017 / Version: 3.1

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

ACGIH	USA. American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV)
C	Ceiling
CAL PEL	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
OSHA P0	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
OSHA Z-1	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
PEL	Permissible exposure limit
STEL	Short-term exposure limit
TWA	8-hour time weighted average

Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

OLIN CORPORATION urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.