



MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Occidental Chemical Corporation

5005 LBJ Freeway

P.O. Box 809050

Dallas, Texas 75380-9050

24 HOUR EMERGENCY TELEPHONE:

1-800-733-3665 or 1-972-404-3228 (U.S.);

32.3.575.55.55 (Europe);

1800-033-111 (Australia)

TO REQUEST AN MSDS:

MSDS@oxy.com or 1-972-404-3245

CUSTOMER SERVICE:

1-800-752-5151 or 1-972-404-3700

MSDS NUMBER: M35410

SUBSTANCE: CHLORINE, LIQUEFIED GAS

SYNONYMS:

Chlorine

PRODUCT USE: process chemical, water treatment chemicals, plastic manufacture

REVISION DATE: Jan 10 2006

2. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=4 FIRE=0 REACTIVITY=0

HMIS RATINGS (SCALE 0-4): HEALTH=3 FLAMMABILITY=0 REACTIVITY=0

EMERGENCY OVERVIEW:

COLOR: green to yellow gas, amber liquid

PHYSICAL FORM: liquefied gas

ODOR: irritating odor, pungent odor

SIGNAL WORD: DANGER

MAJOR HEALTH HAZARDS: HIGHLY TOXIC. MAY BE FATAL IF INHALED. CAUSES BURNS TO THE RESPIRATORY TRACT, SKIN AND EYES. MAY CAUSE CHEMICAL PNEUMONIA. MAY CAUSE PERMANENT EYE DAMAGE.

PHYSICAL HAZARDS: Oxidizer. Hazardous gas under pressure. May react explosively with organic materials. May ignite or explode on contact with combustible materials.
ECOLOGICAL HAZARDS: This material is highly toxic to aquatic organisms on an acute basis.
PRECAUTIONARY STATEMENTS: Do not breathe vapor or mist. Do not get in eyes, on skin, or on clothing. Store away from organic and combustible materials. Keep container tightly closed. Wash thoroughly after handling.

POTENTIAL HEALTH EFFECTS:**INHALATION:****SHORT TERM EXPOSURE:** irritation (possibly severe), chemical burns, pulmonary edema**LONG TERM EXPOSURE:** respiratory disorders**SKIN CONTACT:****SHORT TERM EXPOSURE:** chemical burns, thermal burns**LONG TERM EXPOSURE:** to our knowledge, no effects are known**EYE CONTACT:****SHORT TERM EXPOSURE:** chemical burns, thermal burns**LONG TERM EXPOSURE:** to our knowledge, no effects are known**INGESTION:****SHORT TERM EXPOSURE:** ingestion of harmful amounts is unlikely**LONG TERM EXPOSURE:** ingestion of harmful amounts is unlikely**CARCINOGEN STATUS:****OSHA:** No**NTP:** No**IARC:** No

3. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: CHLORINE**CAS NUMBER:** 7782-50-5**PERCENTAGE:** 99.5-100

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer Basic Life Support (Cardio-Pulmonary Resuscitation/Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY.

SKIN CONTACT: Immediately flush contaminated areas with water. Remove contaminated clothing, jewelry, and shoes immediately. Do not attempt to remove frozen clothing from frostbitten areas. Wash contaminated areas with soap and water. Thoroughly clean and dry contaminated clothing and shoes before reuse. GET MEDICAL ATTENTION IMMEDIATELY.

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. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION: Not a likely route of exposure.

NOTE TO PHYSICIAN: Steroid therapy, if given early, has been reported effective in preventing pulmonary edema. Development of pulmonary edema may be delayed 48-72 hours.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard. Oxidizer. May ignite or explode on contact with combustible materials. May react explosively with organic materials. Most combustibles will burn in this material causing toxic gases.

EXTINGUISHING MEDIA: Use extinguishing agents appropriate for surrounding fire.

FIRE FIGHTING: Wear NIOSH approved positive-pressure self-contained breathing apparatus. Firefighters should wear a one piece, total-encapsulating suit of Butyl coated nylon or equivalent. Keep unnecessary people away, isolate hazard area and deny entry. Move container from fire area if it can be done without risk. Do not apply water directly to a leak. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Flame impingement on steel chlorine container will result in iron/chlorine fire causing rupture of the container.

SENSITIVITY TO MECHANICAL IMPACT: Not sensitive

SENSITIVITY TO STATIC DISCHARGE: Not sensitive

FLASH POINT: not flammable

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:

Evacuate unprotected personnel upwind or crosswind for at least 100 feet (800 feet for large spills) out of danger area. Wear appropriate personal protective equipment recommended in Section 8 of the MSDS. Remove sources of ignition. Stop leak if possible without personal risk. If a chlorine container is leaking, try to position it so that gas rather than liquid leaks. Apply emergency kit device if possible. For other than minor leaks, immediately implement predetermined emergency plan. Do not apply water directly to a leak. Reacts with water to form corrosive, acidic solution (hydrochloric acid). Keep out of water supplies and sewers. Call supplier, CHLOREP team, or CHEMTREC when help is needed. Releases should be reported, if required, to appropriate agencies. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Do not attempt to store, handle or use without complete review of The Chlorine Institute Chlorine Manual (Phone: (202) 775-2790). Store and handle in accordance with all current regulations and standards. Keep container tightly closed. Store in a well-ventilated area. Protect from sunlight. Do not apply heat. Keep away from heat, sparks and flame. Keep separated from incompatible substances (see Section 10 of the MSDS). Avoid contact with water. Reacts with water to form a corrosive, acidic solution. The vapor is heavier than air. Store away from basements, pits or other confined spaces. Make daily inspections for leaks. Protect from

physical damage.

HANDLING: Do not breathe vapor or mist. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. Liquefied gas under pressure. Piping and equipment must be thoroughly cleaned of organics and moisture before use. Corrosive to most metals in the presence of moisture. Liquid lines must have suitable expansion chambers between block valves due to the high coefficient of expansion.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:

CHLORINE:

1 ppm (3 mg/m³) OSHA ceiling

0.5 ppm (1.5 mg/m³) OSHA TWA (vacated by 58 FR 35338, June 30, 1993)

1 ppm (3 mg/m³) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)

0.5 ppm ACGIH TWA

1 ppm ACGIH STEL

VENTILATION: Do not use in poorly ventilated or confined spaces. Use closed systems when possible. Provide local exhaust ventilation where vapor may be generated. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear safety glasses with side shields. Wear chemical safety goggles with a faceshield to protect against skin contact when appropriate. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing. When responding to accidental release of unknown concentrations, wear one-piece, total encapsulating suit of Butyl coated nylon or equivalent.

GLOVES: Wear chemical resistant, insulated gloves such as Perfect Fit NL-56(TM) or Best 6781R(TM).

PROTECTIVE MATERIAL TYPES: Perfect Fit NL-56(TM), Best 6781R(TM), Best Nitri Solve 727(TM), Tychem 10000 (TM)

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: 10 ppm

RESPIRATOR: Where vapor concentration exceeds or is likely to exceed applicable exposure limits, a NIOSH approved respirator is required. When an air-purifying respirator is not adequate or for spills and/or emergencies of unknown concentrations, a NIOSH approved self-contained breathing apparatus or airline respirator with full-face piece is required. A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid

COLOR: green to yellow gas, amber liquid

PHYSICAL FORM: liquefied gas

ODOR: irritating odor, pungent odor

MOLECULAR WEIGHT: 70.91

MOLECULAR FORMULA: Cl₂

BOILING POINT: -29.27 F (-34.04 C)
FREEZING POINT: -150 F (-101 C)
VAPOR PRESSURE: 5830 mmHg @ 25 C
VAPOR DENSITY (air=1): 2.4
SPECIFIC GRAVITY (water=1): 1.4 @ 15.6 C
DENSITY: 11.7 lbs/gal @ 15.6 C
WATER SOLUBILITY: 0.7% @ 20 C
PH: Not applicable
VOLATILITY: 100%
ODOR THRESHOLD: 0.31 ppm approximate
EVAPORATION RATE: Not available
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Dry material is highly reactive with titanium and tin. Reacts with most metals at high temperatures or in the presence of moisture. Avoid contact with water. Reacts with water to form corrosive, acidic solution (hydrochloric acid). May react explosively with organic materials.

INCOMPATIBILITIES: ammonia, elemental metals, metal hydrides, carbides, nitrides, oxides, phosphides, sulfides, easily oxidized materials, organic materials, (e.g. petrochemicals, oils, greases), unstable and reactive compounds

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: None known.

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

CHLORINE, LIQUEFIED GAS:

TOXICITY DATA:

293 ppm/1 hour(s) inhalation-rat LC50; 137 ppm/1 hour(s) inhalation-mouse LC50

LOCAL EFFECTS:

Corrosive: inhalation, skin, eye

ACUTE TOXICITY LEVEL:

Toxic: inhalation

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: skin disorders, respiratory system (including asthma and other breathing disorders)

ADDITIONAL DATA: This material has tested positive in one or more in vitro mutagenicity assays.

HEALTH EFFECTS:

INHALATION:

ACUTE EXPOSURE:

Brief exposure may cause serious adverse effects, even death. Excessive exposure may produce severe irritation of the nose, throat and lungs. May cause pulmonary edema. The hazard at different concentration is reported to be as follows: 0.2 - 0.5 ppm (No immediate toxic effects); 1-3 ppm (Definite odor with irritation of eye 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 may cause upper respiratory irritation, pulmonary edema, or bronchopneumonia); 100 ppm (May be lethal after 50 minutes exposure (estimated)); 430 ppm (Lowest concentration known to cause lethality after 30 minutes of exposure); 1000 ppm (May be fatal within a few deep breaths). Odor does not provide an adequate warning of exposure. It is not known whether humans develop tolerance.

CHRONIC EXPOSURE:

Long term overexposure may produce upper airway changes leading to an increased prevalence of colds, shortness of breath, and reactive airway dysfunction syndrome.

SKIN CONTACT:**ACUTE EXPOSURE:**

Brief contact may cause skin burns and permanent skin damage. Skin contact with compressed liquid or escaping gas can cause frostbite.

CHRONIC EXPOSURE:

No known chronic effects.

EYE CONTACT:**ACUTE EXPOSURE:**

May cause burns and permanent injury to eye tissue. May cause permanent impairment of vision or blindness. Eye contact with compressed liquid or escaping gas can cause frostbite.

CHRONIC EXPOSURE:

No known chronic effects.

INGESTION:**ACUTE EXPOSURE:**

Not applicable.

CHRONIC EXPOSURE:

Not applicable.

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

FISH TOXICITY: 0.07-0.15 ppm 96 hour(s) LC50 Fathead Minnow; 0.44 mg/L 96 hour(s) LC50 Bluegill. This material is highly toxic to aquatic organisms on an acute basis.

INVERTEBRATE TOXICITY: 30-150 ug/L 48 hour(s) LC50 Daphnia

FATE AND TRANSPORT:

BIODEGRADATION: This material is an element and not subject to biodegradation.

PERSISTENCE: The atmospheric half-life and lifetime of this material due to photolysis is estimated at 10 and 14 minutes, respectively. The half-life of free residual material in fresh water has been estimated at 1.3 to 5 hours.

BIOCONCENTRATION: This material is believed not to bioaccumulate.

OTHER ECOLOGICAL INFORMATION: This material has exhibited toxicity to terrestrial organisms.

13. DISPOSAL CONSIDERATIONS

Use or process if possible. Chlorine may be absorbed into an alkaline solution such as caustic soda, soda ash or hydrated lime. Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Chlorine

ID NUMBER: UN1017

HAZARD CLASS OR DIVISION: 2.3

LABELING REQUIREMENTS: 2.3; 8

ADDITIONAL SHIPPING DESCRIPTION: Toxic-Inhalation Hazard Zone B

MARINE POLLUTANT: CHLORINE

DOT HAZARDOUS SUBSTANCE(S):

Chlorine 10 lb(s) (4.54 kg(s))

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

SHIPPING NAME: Chlorine

UN NUMBER: UN1017

CLASS: 2.3; 8

OTHER INFORMATION: Emergency Response Assistance Plan (ERAP) may be required.

15. REGULATORY INFORMATION

U.S. REGULATIONS:

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):

CHLORINE: 10 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):

CHLORINE: 100 LBS TPQ

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):

ACUTE: Yes

CHRONIC: No

FIRE: Yes

REACTIVE: No

SUDDEN RELEASE: Yes

SARA TITLE III SECTION 313 (40 CFR 372.65):

CHLORINE

This product contains a toxic chemical or chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372. Refer to Section 3.

OSHA PROCESS SAFETY (29CFR1910.119):**CHLORINE:** 1500 LBS TQ**STATE REGULATIONS:**

California Proposition 65: This product may contain contaminants known to the State of California to cause cancer or reproductive toxicity as listed under Proposition 65 State Drinking Water and Toxic Enforcement Act. For additional information, contact Customer Service.

NEW JERSEY WORKER AND COMMUNITY RIGHT TO KNOW:**REPORTING REQUIREMENT:**

CHLORINE 7782-50-5 99.5-100%

RIGHT TO KNOW HAZARDOUS SUBSTANCE LIST:

CHLORINE 7782-50-5 99.5-100%

SPECIAL HEALTH HAZARD SUBSTANCE LIST:

Not regulated.

PENNSYLVANIA RIGHT TO KNOW:**REPORTING REQUIREMENT:**

CHLORINE 7782-50-5 99.5-100%

HAZARDOUS SUBSTANCE LIST:

CHLORINE 7782-50-5 99.5-100%

ENVIRONMENTAL HAZARDOUS SUBSTANCE LIST:

CHLORINE 7782-50-5 99.5-100%

SPECIAL HAZARDOUS SUBSTANCE LIST:

Not regulated.

CANADIAN REGULATIONS:

CONTROLLED PRODUCTS REGULATIONS (CPR): This product has been classified in accordance with the criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

WHMIS CLASSIFICATION: A, C, D1A, E.**NATIONAL INVENTORY STATUS:**

U.S. INVENTORY (TSCA): All the components of this substance are listed on or are exempt from the inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.**CANADA INVENTORY (DSL/NDSL):** All components of this product are listed on the DSL.

16. OTHER INFORMATION

IMPORTANT: The information presented herein, while not guaranteed, was prepared by competent

technical personnel and is true and accurate to the best of our knowledge. NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTY OR GUARANTY OF ANY OTHER KIND, EXPRESS OR IMPLIED, IS MADE REGARDING PERFORMANCE, SUITABILITY, STABILITY OR OTHERWISE. The information included herein is not intended to be all-inclusive as to the appropriate manner and/or conditions of use, handling and/or storage. Factors pertaining to certain conditions of storage, handling, or use of this product may involve other or additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, safe handling and use remains the responsibility of the customer. No suggestions for use are intended to, and nothing herein shall be construed as a recommendation to, infringe any existing patents or violate any laws, rules, regulations or ordinances of any governmental entity.