Olin CHLOR ALKALI PRODUCTS

MATERIAL SAFETY DATA

Product Name: Chlorine
Revision Date: 4/14/06
Revision No. 7

OCEAN NETWORK EMERGENCY PHONE 1-888-2891-911

THIS MATERIAL SAFETY DATA SHEET (MSDS) HAS BEEN PREPARED IN COMPLIANCE WITH THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200. THIS PRODUCT MAY BE CONSIDERED TO BE A HAZARDOUS CHEMICAL UNDER THAT STANDARD. (REFER TO THE OSHA CLASSIFICATION IN SEC.I.) THIS INFORMATION IS REQUIRED TO BE DISCLOSED FOR SAFETY IN THE WORKPLACE. THE EXPOSURE TO THE COMMUNITY, IF ANY, IS QUITE DIFFERENT.

I – Product Identification

Product Name:	**Chlorine**
Synonyms:	None
Chemical Family:	Halogen
Formula:	Cl_2
Use Description:	Chlorinating and oxidizing agent, disinfectant, organic synthesis, water and wastewater treatment, plastics, pharmaceuticals
Hazard Classification:	Irritant or corrosive; skin, eye and lung hazard; toxic by inhalation; compressed gas; oxidizer
Product Codes:	105015, 105189
File No.:	MSDS0100

II – Component Data

This Product Composition information presented here describes the major components and their concentrations found in this product and other information as required by OSHA. This is not, and should not be interpreted, or used as, a Product Specification or a detailed chemical analysis.

Established Federal OSHA PEL is provided. OSHA Agreement State PEL may be different.

Product Composition

CAS or Chemical Name:	Chlorine				
CAS Number:	7782-50-5				
Percentage Range:	98-100 Volume percent				
Hazardous Per 29 CFR 1910.1200:	Yes				
Exposure Standards:		OSHA (PEL)		ACGIH(TLV)	
		ppm	mg/m^3	ppm	mg/m^3
	TWA:	None	None	0.5	1.5
	CEILING:	1	3	None	None
	STEL:	None	None	1	2.9

III – Precautions for Safe Handling and Storage

DO NOT TAKE INTERNALLY. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. UPON CONTACT WITH SKIN OR EYES, WASH OFF WITH WATER. DO NOT BREATHE GAS OR VAPOR.

STORAGE CONDITIONS:

Store in a cool, dry, well-ventilated place. DO NOT STORE AT TEMPERATURES ABOVE: 59 Deg.C (140 Deg.F)

PRODUCT STABILITY AND COMPATIBILITY:

SHELF LIFE LIMITATIONS:	Indefinite
INCOMPATIBLE MATERIALS FOR PACKAGING:	NOTICE - Should not be repackaged except by qualified and trained personnel.
INCOMPATIBLE MATERIALS FOR STORAGE OR TRANSPORT:	Alkalis, reducing agents, organic materials

IV – Physical Data

Appearance:	Greenish liquid or gas
Melting Point:	-101 Deg.C (-149 Deg.F)
Freezing Point:	
Boiling Point:	-34 Deg.C (-29 Deg.F)
Decomposition Temperature:	None
Specific Gravity:	Not applicable
Bulk Density:	88.4 lb. per cubic feet at 63 Deg.F
pH @ 25° C:	Not applicable
Vapor Pressure @ 25° C:	114 psi
Solubility in Water:	Miscible
Volatiles, Percent by Volume:	100
Evaporation Rate:	Heat of Vaporization: 123.67 BTU per pound
Vapor Density:	Approximately 2.5 (0.7537 lb. per cubic feet at 32 Deg.F)
Molecular Weight:	71
Product is:	A compressed gas
Odor:	Acrid
Coefficient of Oil/Water Distribution:	No Data

V – Personal Protective Equipment Requirements

Personal Protection for Routine Use of Product:

Respiratory Protection:	If air concentrations above the TLV are possible, wear a NIOSH approved respirator
Ventilation:	Use local exhaust ventilation to maintain levels to below the TLV.
Skin and Eye Protection:	Wear gloves, boots, apron and a face shield with safety glasses. A full impermeable suit is recommended if exposure is possible to large portion of body.
Other:	Emergency eye wash and safety showers must be provided in the immediate work area.

Equipment Specifications (When Applicable):

Respirator Type:	Wear NIOSH approved full-face respirator equipped with chemical cartridges for chlorine gas.
Protective Clothing Type: (This includes: gloves, boots, apron, protective suit.)	GLOVE TYPE: Neoprene, or butyl rubber BOOT TYPE: Neoprene, or butyl rubber APRON TYPE: Neoprene, or butyl rubber PROTECTIVE SUIT: see Section XI. for additional information

VI – Fire and Explosion Hazard Information

Flammability Data:

Explosive:	N/A
Flammable:	No
Combustible:	No
Pyrophoric:	No
Flash Point:	Not Applicable
Autoignition Temperature:	Not Applicable
Flammable Limits at Normal Atmospheric Temperature and Pressure (Percent Volume in Air):	LEL - Not Applicable UEL - Not Applicable

NFPA Ratings:

Health:	4
Flammability:	0
Reactivity:	0
Special Hazard Warning	OXIDIZER

HMIS Ratings:

Health:	3
Flammability:	0
Reactivity:	0

Extinguishing Media:

Use extinguishing media compatible to surrounding materials.

Fire Fighting Techniques and Comments:

Use water to cool containers exposed to fire, however, direct spray between fire and containers. DO NOT spray directly on container unless absolutely necessary. Water reactive material; DO NOT spray with water. Contact with reactive metals e.g., aluminum may result in the generation of flammable hydrogen gas. See Section 11 for protective equipment for fire fighting.

VII – Reactivity Information

Conditions Under Which This Product May Be Unstable:

Temperatures Above:	None
Mechanical Shock or Impact:	No
Electrical (Static) Discharge:	No
Other:	Reacts vigorously with titanium, zinc, tin
Hazardous Polymerization:	Will not occur
Incompatible Materials:	Alkalies, reducing agents, organic materials
Hazardous Decomposition:	Hydrochloric acid, hypochlorous acid
Other:	Titanium will react vigorously, resulting in spontaneous ignition, when contacted by DRY Chlorine. Combustion will be supported in carbon steel systems and equipment containing a Chlorine environment at temperatures greater than 480 Deg. F. Properly purge systems and equipment PRIOR to conducting Hot Work.

Summary of Reactivity:

Explosive:	N/A
Oxidizer:	Yes
Pyrophoric:	No
Organic Peroxide:	No
Water Reactive:	No (See Precautions under XI, Spill & Leakage Mitigation Procedures)
Corrosive:	Yes

VIII – First Aid

Eyes

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

Skin

- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

Ingestion

- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by the poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

Inhalation

- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible.
- Call a poison control center or doctor for further treatment advice.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

NOTE TO PHYSICIAN – Probable mucosal damage may contraindicate the use of gastric lavage.

IX – Toxicology and Health Information

Routes of Absorption

Inhalation, skin, eye, ingestion

Warning Statements and Warning Properties

HARMFUL IF INHALED. CAUSES EYE, SKIN AND RESPIRATORY TRACT BURNS. CAN CAUSE LUNG DAMAGE.

Human Threshold Response Data

Odor Threshold:	Approximately 1.7 mg/m3 (0.3 ppm).
Irritation Threshold:	The irritation threshold is approximately 0.5 ppm.
Immediately Dangerous to Life or Health:	10.0 ppm

Signs, Symptoms and Effects of Exposure

Inhalation

Acute:	Toxic if inhaled. Inhalation of this material is irritating to the nose, mouth, throat and lungs. It may cause inflammation to the respiratory tract with the production of lung edema, which can result in shortness of breath, wheezing, choking, chest pain, and impairment of lung function. The inflammation of the respiratory tract is most evident in the upper portions, but bronchioles, alveolar ducts, and alveoli may also be affected. There is no evidence that acute inhalation of chlorine at low to moderate levels will cause permanent lung damage. At high levels, chlorine is corrosive to the respiratory tract and may cause lung damage.
Chronic:	Repeated inhalation exposure may cause impairment of lung function and permanent lung damage. It may contribute to the development of bronchitis.

Skin

Acute:	Dermal exposure can cause irritation characterized by redness, swelling and scab formation. Contact with liquid chlorine may cause burns with prolonged contact causing destruction of the dermis with impairment of the skin at site of contact to regenerate.
Chronic:	Effects from chronic skin exposure would be similar to those from single exposure except for effects secondary to tissue destruction

Eye

Irritation can occur following eye exposure to the gas with redness, pain, blurred vision, and tearing. Contact with liquid chlorine may cause burns with impairment of vision and corneal damage.

Ingestion

Acute:	If liquid is swallowed ,irritation and/or burns can occur to the entire gastrointestinal tract, including the stomach and intestines, characterized by nausea, vomiting, diarrhea, abdominal pain, bleeding, and/or tissue ulceration. Ingestion is not a major route of exposure because chlorine is a gas at room temperature.
Chronic:	There are no known or reported effects from chronic exposure.

Medical Conditions Aggravated by Exposure

Asthma, respiratory and cardiovascular disease.

Interactions With Other Chemicals Which Enhance Toxicity

None know or reported.

Animal Toxicology

Acute Target Organ Toxicity

Inhalation LC 50: 293 ppm (1 hour, rat)
Oral LD 50: No not applicable. Product is a gas at room temperature.
Dermal LD 50: Not applicable. Product is a gas at room temperature.
Severe irritant to eyes and skin. Contact with the liquid chlorine may cause burns to eyes and skin. Contact with chlorine vapor may cause severe eye irritation.

Reproductive and Developmental Toxicity

There are no know or reported effects on reproductive function or fetal development.

Carcinogenicity

This product is not know or reported to be carcinogenic by any reference source including IARC, OSHA, NTP, or EPA.

Mutagenicity

This product is not know or reported to be mutagenic.

Aquatic Toxicity

LC 50 Bluegill: 0.44 mg/l/96 hours
LC 50 Yellow perch" 0.88 mg/l/1 hr.
LC 50 Channel catfish (fingerling): 0.07 mg/l/96 hrs
LC 50 Daphnia magna: 0.017 mg/l/46 hrs

CHRONIC TARGET ORGAN EFFECTS IN LABORATORY ANIMALS

Inhalation exposure has produced pathological change in the lungs and nasal passages of monkeys and rats characterized by inflammation, epithelial hyperplasia of loss of cilia. In addition, damage was observed in liver and kidneys from treated rats. These effects were seen at concentrations much higher than those expected from occupational exposure.

X – Transportation Information

THIS MATERIAL IS REGULATED AS A DOT HAZARDOUS MATERIAL.

DOT Description from the Hazardous Materials Table 49 CFR 172.101:

Land (U.S. DOT):	Chlorine, 2.3, UN1017, Poison Inhalation Hazard – Hazard Zone B – Marine Pollutant
Water (IMO):	Same as LAND above
Air (IATA/ICAO):	FORBIDDEN
Hazard Label/Placard:	Poison Gas, Corrosive
Reportable Quantity:	10 lbs. (Per 49 CFR 172.101, Appendix)
Emergency Guide:	124

XI – Spill and Leakage Procedures

FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC AT 800-424-9300.	
Reportable Quantity:	This product is subject to a Reportable Quantity with respect to chlorine. RQs are subject to change and reference should be made to 40 CFR 302.4 for the current requirements.

Spill Mitigation Procedures:

Hazardous concentrations in air may be found in local spill area and immediately downwind. Do not put water directly on this product as gas evolution may increase. Water should not be used directly on a chlorine leak. Chlorine and water react forming acids and the leak quickly will get worse. Water provides a heat source for vaporizing liquid Chlorine. Water should be prevented from coming into contact with a liquid Chlorine spill, and liquid chlorine should be prevented from flowing into water drains or bodies of water in the close proximity. This product may represent an explosion hazard, if in contact with incompatible materials. Remove all sources of ignition.	
Air Release:	This material is heavier than air and may concentrate in low areas. Ambient air and water temperature must be considered if a water fog is used to attempt absorption or dispersion. It must be understood that very little vapor may actually be absorbed and the gas may be dispersed to other areas. Contain all fog water for neutralization and treatment.
Water Release:	This material is heavier than water. Chlorine will sink and bubble into water to form a hypochlorous acid, which will later self-decompose to various materials. Stop flow of material and divert water to a holding area for treatment and neutralization.
Land Spill:	Dike area of spill and stop flow if safe to do so. Cover area of spill with foam to reduce air contamination. Begin treatment to neutralize material as soon as possible.

Spill Residues:

Dispose of per guidelines under Section 12, WASTE DISPOSAL. This material may be neutralized for disposal; you are requested to contact OCEAN at 888-289-1911 before beginning any such operation.

Personal Protection for Emergency Spill and Firefighting Situations:

In case of fire, use normal fire fighting equipment.

For response to Chlorine gas it is recommended to use as a minimum level "B" protection that is compatible to Chlorine and for Liquid spills it is recommended to utilize as a minimum enhanced level "B" (Enhanced level "B" is the addition of a splash hood). Responders can reference Chlorine Institute pamphlet #65 on PPE.

Additional protective clothing must be worn to prevent personal contact with this material. Those items include but are not limited to: boots, gloves, hard hat, splash-proof goggles, full face shield and impervious clothing, i.e., chemically impermeable suit.

Compatible materials for response to this material are neoprene and butyl rubber.

Protection concerns must also address the potential of the physical characteristics of this product as a compressed gas, corrosive and a poison.

XII – Waste Disposal

If this product becomes a waste, it meets the criteria of a hazardous waste as defined under 40 CFR 261 and would have the following EPA hazardous waste number: D003, D001.

If this product becomes a hazardous waste, it will be a hazardous waste which is subject to the Land Disposal Restrictions under 40 CFR 268 and must be managed accordingly.

As a hazardous liquid waste, it must be disposed of in accordance with local, state and federal regulations in a permitted hazardous waste treatment, storage and disposal facility by treatment.

Chlorine can exist in a gaseous state, and controlled evaporation may be warranted.

CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USER OF THIS MATERIAL HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NONHAZARDOUS WASTES.

XIII – Additional Regulatory Status Information

TOXIC SUBSTANCES CONTROL ACT:
This product is listed on the Toxic Substances Control Act inventory.

NSF/ANSI 60 LIMITS: NSF Maximum Drinking Water Use Concentration – 30 mg/l as chlorine

FEDERAL INSECTICIDE FUNGICIDE RODENTICIDE ACT (FIFRA): This substance is registered for use as a disinfectant or sanitizer. Re-formulators and re-packagers of this product must obtain their own registration from the Environmental Protection Agency. EPA Registration Number: 72315-1.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT TITLE III:
HAZARD CATEGORIES, PER 40 CFR 370.2:
HEALTH:
Immediate (Acute)
Delayed (Chronic)
PHYSICAL:
Sudden release of pressure
Reactivity

EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW, PER 40 CFR 355, APP.A:
EXTREMELY HAZARDOUS SUBSTANCE - THRESHOLD PLANNING QUANTITY:
100 lbs.
SUPPLIER NOTIFICATION REQUIREMENTS, PER 40 CFR 372.45:
This mixture or tradename 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.
CHEMICALS LISTED ARE: Chlorine

XIV – Additional Information

MSDS REVISION STATUS: The Chlor/Alkali MSDS Control Group updated this MSDS April 2006

First Aid Statements and Additional Regulatory Information updated Apri 2006

XV – Major References

Major References furnished upon request

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. OLIN BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF THIS MATERIAL SAFETY DATA SHEET IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT OLIN AT THE PHONE NUMBER LISTED BELOW TO MAKE CERTAIN THAT THIS SHEET IS CURRENT.

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