



GRASIM INDUSTRIES LIMITED

CHEMICAL DIVISION

BIRLAGRAM, NAGDA (M.P.)

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: CHLORINE

1. Chemical Product and Company Identification

GRASIM INDUSTRIES LIMITED
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PRODUCT NAME: CHLORINE
CHEMICAL NAME: Chlorine
TDG (Canada) CLASSIFICATION: 2.3

2. Composition, Information on Ingredients

INGREDIENT %	VOLUME	PEL-OSHA ¹	TLV-ACGIH ²	LD ₅₀ or LC ₅₀ Route/Species
Chlorine FORMULA: Cl ₂ CAS: 7782-50-5 RTECS #: FO2100000	100.0	1 ppm Ceiling	0.5 ppm TWA 1 ppm STEL	LC ₅₀ 293 ppm/1H (rat)

¹ As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

² As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

Corrosive and irritating to the eyes, skin and mucous membranes. Inhalation may result in chemical pneumonitis and pulmonary edema. Nonflammable. Oxidizer, may explode or accelerate combustion if contacting reducing agents.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	No

HEALTH EFFECTS:

Exposure Limits Yes	Irritant Yes	Sensitization No
Teratogen Yes	Reproductive Hazard Yes	Mutagen Yes
Synergistic Effects Other agents that irritate the respiratory system		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:

Corrosive and irritating to the eyes. Contact with the liquid or vapor causes painful burns and ulcerations. Burns to the eyes result in lesions and possible loss of vision.

SKIN EFFECTS:

Corrosive and irritating to the skin and all living tissue. It hydrolyzes very rapidly yielding hydrochloric acid. Skin burns and mucosal irritation are like that from exposure to volatile inorganic acids. Chlorine burns exhibit severe pain, redness, possible swelling and early necrosis.

INGESTION EFFECTS:

Ingestion is unlikely.

INHALATION EFFECTS:

Corrosive and irritating to the upper and lower respiratory tract and all mucosal tissue. Symptoms include lacrimation, cough, labored breathing, and excessive salivary and sputum formation. Excessive irritation of the lungs causes acute pneumonitis and pulmonary edema, which could be fatal. Residual pulmonary malfunction may also occur. Chemical pneumonitis and pulmonary edema may result from exposure to the lower respiratory tract and deep lung.

Some experimental evidence indicates chlorine causes mutagenic, teratogenic, and reproductive effects in animal studies.

NFPA HAZARD CODES

Health: 4
Flammability: 0
Reactivity: 0
OXIDIZER

HMS HAZARD CODES

Health: 4
Flammability: 0
Reactivity: 0

RATINGS SYSTEM

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

4. First Aid Measures**EYES:**

PERSONS WITH POTENTIAL EXPOSURE SHOULD NOT WEAR CONTACT LENSES. Flush contaminated eye(s) with copious quantities of water. Part eyelids to assure complete flushing. Continue for a minimum of 15 minutes. Seek immediate medical attention.

SKIN:

Remove contaminated clothing as rapidly as possible. Flush affected area with copious quantities of water. Seek immediate medical attention.

INGESTION:

None required.

INHALATION:

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Unconscious persons should be moved to an uncontaminated area and given artificial resuscitation and supplemental oxygen. Assure that mucus or vomited material does not obstruct the airway by use of positional drainage. Delayed pulmonary edema may occur. Keep the patient under medical observation for at least 24 hours.

5. Fire Fighting Measures

Conditions of Flammability: Not flammable		
Flash point: None	Method: Not Applicable	Autoignition Temperature: None
LEL(%): None		UEL(%): None
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

FIRE AND EXPLOSION HAZARDS:

Combustible materials burn in chlorine as they do in oxygen.

EXTINGUISHING MEDIA:

None required. Use media suitable for surrounding materials.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or calls your closest BOC location.

7. Handling and Storage**Electrical classification:**

Nonhazardous.

Most metals corrode rapidly with wet chlorine. Systems must be kept dry. Lead, gold, tantalum and Hastelloy are most resistant to wet chlorine.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<250 psig) piping or systems. Do not heat cylinder by any means to increase rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated areas of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full & empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

For additional storage recommendations, consult Compressed Gas Association's Pamphlet P-1.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection**EXPOSURE LIMITS¹:**

INGREDIENT %	VOLUME	PEL-OSHA ²	TLV-ACGIH ³	LD ₅₀ or LC ₅₀ Route/Species
Chlorine FORMULA: Cl ₂ CAS: 7782-50-5 RTECS #: FO2100000	100.0	1 ppm Ceiling	0.5 ppm TWA 1 ppm STEL	LC ₅₀ 293 ppm/1H (rat)

¹ Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.

² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

ENGINEERING CONTROLS:

Hood with forced ventilation. Use local ventilation to prevent accumulation above the exposure limit.

EYE/FACE PROTECTION:

Gas-tight safety goggles or full-face respirator.

SKIN PROTECTION:

PVC, Kel-F ® or Teflon ®.

RESPIRATORY PROTECTION:

Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:

Safety shoes, safety shower, eyewash "fountain", face shield.

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid) :	Gas	
Vapor pressure at 70°F :	100.2	psia
Vapor density at STP (Air = 1) :	2.47	
Evaporation point :	Not Available	
Boiling point :	-29.3	°F
: :	-34.1	°C
Freezing point :	-149.8	°F
: :	-101	°C

pH :	Not Available
Specific gravity :	Not Available
Oil/water partition coefficient :	Not Available
Solubility (H ₂ O) :	1% at 9.4°C
Odor threshold :	Not Available
Odor and appearance :	Greenish-yellow gas with sharp suffocating odor. Liquid is amber colored.

10. Stability and Reactivity

STABILITY: Stable

INCOMPATIBLE MATERIALS:

Hydrocarbons, ammonia, ether, hydrogen, acetylene, turpentine, powdered metals and other reducing agents.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. Toxicological Information

TUMORIGENIC:

Evidence of carcinogenic activity in experimental rats exposed orally.

REPRODUCTIVE:

Embryo and fetotoxicity observed after exposure of female rats exposed at 565 mg/kg prior to mating. Effects also observed from exposure of pregnant rats at same level.

MUTAGENIC:

Mutagenic effects seen in bacterial, mammalian and insect assay systems.

OTHER:

Toxic effects reported in renal system, blood and spleen from inhalation exposure of rats.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Chlorine	Chlorine
HAZARD CLASS:	2.3	2.3 (5.1)
IDENTIFICATION NUMBER:	UN 1017	UN 1017
SHIPPING LABEL:	POISON GAS, CORROSIVE	POISON GAS, OXIDIZER

Additional Marking Requirement: "Inhalation Hazard"

If net weight of product > 10 pounds, the container must be also marked with the letters "RQ".

Additional Shipping Paper Description Requirement: "Poison-Inhalation Hazard, Zone B"

If net weight of product > 10 pounds, the shipping papers must be also marked with the letters "RQ".

15. Regulatory Information

Chlorine is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 2,500 pounds.

SARA TITLE III NOTIFICATIONS AND INFORMATION

Chlorine is listed as an extremely hazardous substance (EHS) subject to state and local reporting under Section 304 of SARA Title III (EPCRA).

The presence of chlorine in quantities in excess of the threshold planning quantity (TPQ) of 100 pounds requires certain emergency planning activities to be conducted.

Releases of chlorine in quantities equal to or greater than the reportable quantity (RQ) of 10 pounds are subject to reporting to the National Response Center under CERCLA, Section 304 SARA Title III.

SARA TITLE III - HAZARD CLASSES:

Acute Health Hazard

Chronic Health Hazard

Fire Hazard

Sudden Release of Pressure Hazard

Reactivity Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT BY VOLUME
7782-50-5	CHLORINE	100.0

This information must be included on all MSDSs that are copied and distributed for this material.

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

Above "Material Safety Data Sheet" is for information only. GRASIM INDUSTRIES LIMITED, Chemical Division does not take any guarantee or legal liability under any circumstances for the same. The Physical data presented herein does not purport to be the specifications.