Emergency Contact: Chemtrec (800) 424-9300
Or Norco (208) 336-1643

1125 West Amity Road
Boise, ID 83705
(208) 336-1643

Chlorine 0.0001% to 0.02% in Nitrogen

MATERIAL SAFETY DATA SHEET

Identification

Product Name: Chlorine 0.0001% to 0.02% in Nitrogen
Chemical Name: Chlorine in Nitrogen
Chemical Family: Gas Mixture
CAS Number: N/A
Common Names/Synonyms: N/A
MSDS Identification Code/Number: 2380
Prepared by: Quality Dept.

Revision Date: 12/10/00
Last Review Date: 03/04/13

Composition, Information on Ingredients, Exposure Limits

Exposure Limits[1]

Ingredient	% Volume	PEL-OSHA[2]	TLV-ACGIH[3]	LD_{50} or LC_{50} Route/Species
Chlorine Formula: Cl CAS: 7782-50-5 RTECS#: FO2100000	0.0001 to 0.02%	1PPM Ceiling	0.5 PPM TWA 1 PPM STEL	LC_{50}: 293 PPM inhalation/rat (1H)
Nitrogen Formula: N_2 CAS: 7727-37-9 RTECS#: QW9700000	99.98 to 99.9999%	None Established	Simple Asphyxiant	Not Available

[1] Refer to individual state or provincial regulations, as applicable, for limits that may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July1, 1993)
[3] As stated in the ACGIH 2007 Threshold Limit Values for Chemical Substances and Physical Agents

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

Hazards Identification

Emergency Overview:

This clear, pungent-smelling gas mixture is severely irritating. Persons who respond to releases of this product must protect themselves from inhalation of chlorine, the corrosive component of this gas mixture, especially in areas that are downwind of the release. Another significant health hazard associated with this gas mixture is the potential for exposure to oxygen deficient atmospheres. Extreme caution must be used when responding to spills.

Route of Entry:

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

Health Effects:

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

Hazards Identification Continued

Carcinogenicity: NTP: No IARC: No OSHA: No

Eye Effects:
Contact of this product with the eyes can cause pain, redness, and prolonged exposure could cause blindness. Contact with rapidly expanding gas near the point of release may cause frostbite.

Skin Effects:
Over exposures to this product may lead to burns or dermatitis (red, cracked, irritated skin). Contact with rapidly expanding gas near the point of release may cause frostbite with redness, skin color change to gray or white, and blistering.

Ingestion Effects:
None known. Ingestion is unlikely as product is a gas at room temperature.

Inhalation Effects:
Inhalation of chlorine, a component of this gas mixture, may lead to irritation of the nose and throat. Additionally, overexposures to chlorine can cause the following health effects: coughing, labored breathing, sore throat, and potentially fatal lung disorders (chemical pneumonitis and pulmonary edema). Repeated chlorine overexposures by inhalation can result in emphysema and erosion of teeth. The symptoms associated with specific chlorine concentrations are as follows:

0.06 PPM:	Odor threshold.
3 PPM:	Irritation of the eyes and mucous membranes.
15 PPM:	Immediate irritation of the throat.
50 PPM:	A dangerous health hazard, even for short periods of time. Prolonged exposure may result in death.
1000 PPM:	Potentially fatal after a short exposure.
NOTE:	This gas mixture contains 2 to 200 PPM chlorine.

Nitrogen is a simple asphyxiant. Oxygen levels should be maintained above 19.5% at normal atmospheric pressure, which is the equivalent to a partial pressure of 135 mm of Hg. Exposure to high concentrations of this gas mixture in a confined area may exclude an adequate supply of oxygen.

Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgment, depression of all sensations, emotional instability and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma and death.

Medical Conditions Aggravated by Exposure: Any preexisting dermatitis or respiratory conditions.

NFPA Hazard Codes		**HMIS Hazard Codes**		**Ratings System**
Health:	3	Health:	3	0: No Hazard
Flammability:	0	Flammability:	0	1: Slight Hazard
Instability:	0	Physical Hazard:	3	2: Moderate Hazard
				3: Serious Hazard
				4: Severe Hazard

Hazard ratings based on the recommendations in *CGA P-19 2004, CGA Recommended Hazard Ratings for Compressed Gases, Second Edition.*

First Aid Measures

Eyes:
If irritation of the eye develops after exposure to this mixture, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Seek medical assistance immediately, preferably an ophthalmologist. If frostbite is suspected, flush with cool water for 15 minutes and obtain immediate medical attention.

Skin:
For skin exposure, immediately begin decontamination with running water. Minimum flushing time is 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention. For frostbite, immerse skin in lukewarm water. DO NOT USE HOT WATER. Obtain medical attention.

First Aid Measures Continued

Ingestion:
None required.

Inhalation:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, and if breathing has stopped, administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

Fire Fighting Measures

Conditions of Flammability: Non flammable		
Flash Point: Not Available	Method: Not Available	Autoignition Temperature: Not Available
LEL % None	UEL % None	
Hazardous Combustion Products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

Fire and Explosion Hazards:
Chlorine, a minor component of this mixture, can produce severe irritation and health effects at low concentrations; therefore, this gas mixture presents significant health hazards to firefighters. This gas mixture is non flammable; however, containers when involved in fire may rupture or burst in the heat of the fire.

Extinguishing Media:
None. Use as appropriate for surrounding materials.

Fire Fighting Instructions:
If possible, stop the flow of gas supply. Use water spray to cool adjacent cylinders and areas. Fire fighters should wear a full-facepiece NIOSH/MSHA approved self-contained breathing apparatus (SCBA) operated in positive pressure mode and full turnout gear.

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 valve, contact the appropriate emergency telephone number listed in section 1or call your closest Norco/NorLab location.

Handling and Storage

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 the cylinder 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 regulator when connecting cylinder to lower pressure (<3000 PSIG) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in a cool, dry, well ventilated area of non-combustible construction away from heavy traffic areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125^{O}F (52^{0}C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and 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. Post "NO SMOKING OR OPEN FLAMES" sign in the storage or use area.

Handling and Storage Continued

For additional recommendations, consult Compressed Gas Association Pamphlets P-1, P-9, and Safety Bulletin SB-2.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid from 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.

Exposure Controls, Personal Protection

Engineering Controls:
Local exhaust to prevent accumulation of high concentrations and maintain atmospheric oxygen at or above 19.5%.

Eye/Face Protection:
Safety goggles or glasses as appropriate for the job.

Skin Protection:
Protective gloves of material appropriate for the job.

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.

Physical and Chemical Properties

Parameter	Value	Units
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Not Available	
Vapor density (Air = 1)	: 0.906	
Evaporation point	: Not Available	
Boiling point	: Not Available	
Freezing point	: Not Available	
pH	: Not Applicable	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H_2O)	: Very soluble	(chlorine)
Odor threshold	: 0.06 PPM	
Odor and appearance	: Slightly greenish-yellow gas with a pungent odor.	

Stability and Reactivity

Stability:
Stable

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

Hazardous Polymerization:
Does not occur.

Toxicological Information

Inhalation:
Inhalation of chlorine concentrations as low as 1 PPM may cause nose, throat and conjunctiva irritation. Irritation becomes more pronounced at concentrations of 1.3 PPM and above with coughing and labored breathing. Death may occur after a few breaths at 1000 PPM. Delayed effects following high exposure may include bronchitis, edema and pneumonia.

Skin and Eye:
Extremely irritating to the skin, eyes and mucous membranes. Can cause corrosive burns. May cause corrosion of teeth. Prolonged exposure to low concentrations may cause chloracne. Repeated contact with low concentrations may cause dermatitis.

Ecological Information

Product does not contain Class I or Class II ozone depleting substances. Chlorine is highly toxic to all forms of aquatic life and has no potential for bioaccumulation or bioconcentration.

Disposal Considerations

Do not attempt to dispose of waste or unused quantities in returnable cylinders. Return in the shipping container, properly labeled, with any valve outlet plugs or caps secure and valve protection cap in place, to Norco or NorLab for proper disposal. Non-refillable containers should be vented in a well-ventilated area then disposed of in accordance with local regulations, or returned to NorLab.

Transport Information

Parameter	United States DOT	Canada TDG
Proper Shipping Name:	Compressed gases, N.O.S., (Chlorine in Nitrogen)	Compressed gases, N.O. S.,
Hazard Class:	2.2	2.2
Identification Number:	UN 1956	UN 1956
Shipping Label:	Nonflammable Gas	Nonflammable Gas

Regulatory Information

SARA Title III Notifications and 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.

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-Section 313 Supplier Notification:
This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planing 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	< 0.02%

SARA Title III – Hazard Classes:
Acute Health Hazard
Sudden Release of Pressure Hazard
Chronic Health Hazard

California Proposition 65: This product does not contain ingredient(s) known to the State of California to cause cancer or reproductive toxicity.

Other Information

ACGIH	American Conference of Governmental Industrial Hygienists
DOT	Department of Transportation
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
STEL	Short Term Exposure Limit
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value

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:

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).