

Chemical Profiles

Chlorine

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What are other names or identifying information for chlorine?

CAS Registry No.: 7782-50-5

Other Names: Liquefied chlorine gas, Chlorine gas

Main Uses: Manufacture of other chemicals, bleaching agent, water purification.

Appearance: Green - yellow gas. Clear yellow or amber liquid (under pressure).

Odour: Pungent, irritating

Canadian TDG: UN1017

What is the WHMIS classification?

According to the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST), [chlorine](#) can be classified as:

Oxidizing gases - Category 1



Acute toxicity - inhalation - Category 2



Skin corrosion/irritation - Category 1



Serious eye damage/eye irritation - Category 1



The signal word is danger.

The hazard statements are:

- May cause or intensify fire; oxidizer
- Corrosive to the respiratory tract; Fatal if inhaled
- Causes severe skin burns and eye damage

Please note that this classification was retrieved from the [CNESST](#) site on February 21, 2023 and was established by CNESST personnel to the best of their knowledge based on data obtained from scientific literature and it incorporates the criteria contained in the *Hazardous Products Regulations* (SOR/2015-17). It does not replace the supplier's classification which can be found on its Safety Data Sheet.

Note: For compressed gases: According to the *Hazardous Products Regulations*, gas under pressure means a product that consists of a gas contained in a receptacle at a gauge pressure of 200 kPa or more at 20°C, or that is liquefied, or liquefied and refrigerated, but excludes any gas that has an absolute vapour pressure of not more than 300 kPa at 50°C or that is not completely gaseous at 20°C and the standard pressure of 101.3 kPa.

Gases under pressure - Compressed gas

The signal word is warning.

Hazard statements for Gases under pressure include:

- Contains gas under pressure; may explode if heated
- Contains refrigerated gas; may cause cryogenic burns or injury

What are the most important things to know about chlorine in an emergency?

Emergency Overview: Green - yellow gas. Pungent odour. Will not burn. COMPRESSED GAS. Contains gas under pressure. May explode if heated. OXIDIZER. May cause or intensify fire. Highly Reactive. Incompatible with many common chemicals. VERY TOXIC. Fatal if inhaled. Corrosive to the respiratory tract. A severe, short-term exposure may cause long-term respiratory effects (e.g., Reactive Airways Dysfunction (RADS)). CORROSIVE. Causes severe skin burns and eye damage. May cause frostbite.

What are the most important things to know about chlorine in an emergency?

Emergency Overview: Inhalation. Skin contact. Eye contact.

- **Inhalation:** VERY TOXIC, can cause death. Can cause severe irritation of the nose and throat. Can cause severe lung injury. Can cause life-threatening accumulation of fluid in the lungs (pulmonary edema). Symptoms may include coughing, shortness of breath, difficulty breathing and tightness in the chest. Symptoms may develop hours after exposure and are made worse by physical effort. Long-term damage may result from a severe short-term exposure. A single exposure to a high concentration can cause a long-lasting condition like asthma. If this occurs, many things like other chemicals or cold temperatures can easily irritate the airways. Symptoms may include shortness of breath, tightness in the chest and wheezing. {Reactive Airways Dysfunction Syndrome (RADS)}.
- **Skin Contact:** CORROSIVE. The gas irritates or burns the skin. Permanent scarring can result. Direct contact with the liquefied gas can chill or freeze the skin (frostbite). Symptoms of mild frostbite include numbness, prickling and itching. Symptoms of more severe frostbite include a burning sensation and stiffness. The skin may become waxy white or yellow. Blistering, tissue death and infection may develop in severe cases.
- **Eye Contact:** CORROSIVE. The gas irritates or burns the eyes. Permanent damage including blindness can result. Direct contact with the liquefied gas can freeze the eye. Permanent eye damage or blindness can result.
- **Ingestion:** Not a relevant route of exposure (gas).
- **Effects of Long-Term (Chronic) Exposure:** May harm the respiratory system. Can irritate and inflame the airways.
- **Carcinogenicity:** Not known to cause cancer.
 - International Agency for Research on Cancer (IARC): Not specifically evaluated.
 - American Conference for Governmental Industrial Hygienists (ACGIH): A4 - Not classifiable as a human carcinogen.
- **Teratogenicity / Embryotoxicity:** Not known to harm the unborn child.
- **Reproductive Toxicity:** Not known to be a reproductive hazard.
- **Mutagenicity:** Not known to be a mutagen.

What are first aid measures for chlorine?

Inhalation: Take precautions to ensure your own safety before attempting rescue (e.g., wear appropriate protective equipment). Move victim to fresh air. Keep at rest in a position comfortable for breathing. If breathing is difficult, trained personnel should administer emergency oxygen. DO NOT allow victim to move about unnecessarily. Symptoms of pulmonary edema may be delayed. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

Skin Contact: Gas: Flush with gently flowing water for 5 minutes. If irritation or pain persists, see a medical professional. Liquefied gas: quickly remove victim from source of contamination. DO NOT attempt to rewarm the affected area on site. DO NOT rub area, flush with water, or apply direct heat. Gently remove clothing or jewelry that may restrict circulation. Carefully cut around clothing that sticks to the skin and remove the rest of the garment. Loosely cover the affected area with a sterile dressing. Do not remove frozen clothing from frostbitten areas. If frostbite has NOT occurred, immediately and thoroughly wash contaminated skin with soap and water. DO NOT allow victim to drink alcohol or smoke. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

Eye Contact: Gas: immediately flush the contaminated eye(s) with gently flowing water for 5 minutes, while holding the eyelid(s) open. If irritation or pain persists, see a medical professional. Liquefied gas: avoid direct contact. Wear chemical protective gloves if necessary. Immediately and flush with gently flowing water for at least 15 minutes, occasionally lifting the upper and lower eyelids. DO NOT attempt to rewarm. Cover both eyes with a sterile dressing. DO NOT allow victim to drink alcohol or smoke. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

Ingestion: Not applicable (gas).

First Aid Comments: All first aid procedures should be periodically reviewed by a medical professional familiar with the chemical and its conditions of use in the workplace.

What are fire hazards and extinguishing media first aid measures for chlorine?

Inhalation: Does not burn. Strong OXIDIZER. May intensify fire.

Suitable Extinguishing Media: Not combustible. Use extinguishing agent suitable for surrounding fire.

Specific Hazards Arising from the Chemical: Heat from fire can cause a rapid build-up of pressure inside cylinders. Explosive rupture and a sudden release of large amounts of gas may result. Cylinder may rocket. In a fire, the following hazardous materials may be generated: corrosive hydrogen chloride.

What are the stability and reactivity hazards of chlorine?

- **Chemical Stability:** Normally stable.
- **Conditions to Avoid:** High temperatures. Temperatures above 52°C.

- **Incompatible Materials:** Highly reactive. Reacts explosively with: many chemicals, including, alcohols (e.g., ethanol), ammonia, saturated hydrocarbons (e.g., butane), aldehydes (e.g. acetaldehyde), metals (e.g., aluminum), ethers (e.g., diethyl ether). Corrosive to: aluminum alloys, carbon steel, and other metals.
 - **Hazardous Decomposition Products:** None known.
 - **Possibility of Hazardous Reactions:** Strong OXIDIZER. May cause or intensify fire.
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What are incidental release measures for chlorine?

Personal Precautions: Evacuate the area immediately. Isolate the hazard area. Keep out unnecessary and unprotected personnel. Vapour or gas may accumulate in hazardous amounts in low-lying areas especially inside confined spaces, if ventilation is not sufficient. Remove or isolate incompatible materials as well as other hazardous materials.

Methods for Containment and Clean-up: Small spills or leaks: stop or reduce leak if safe to do so. Ventilate the area to prevent the gas from accumulating, especially in confined spaces. Large spills or leaks: stop or reduce leak if safe to do so. Ventilate the area to prevent the gas from accumulating, especially in confined spaces. If possible, turn leaking container so that gas escapes rather than liquefied gas. Knock down gas with fog or fine water spray. Do not direct water at spill or source.

Other Information: Contact supplier, local fire and emergency services for help.

What handling and storage practices should be used when working with chlorine?

Handling: In the event of a spill or leak, immediately put on escape-type respirator and exit the area. Immediately report leaks, spills or failures of the safety equipment (e.g., ventilation system). Secure cylinder in an up-right position. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Use the pressure regulator appropriate for cylinder pressure and contents.

Storage: Store in an area that is: cool, dry, well-ventilated, out of direct sunlight and away from heat and ignition sources, secure and separate from work areas, separate from incompatible materials, on the ground floor or preferably, in an isolated, detached building. Always secure (e.g., chain) cylinders in an upright position to a wall, rack or other solid structure. Label container with date received, date opened and disposal date. Use a first-in, first-out inventory system. Empty containers may contain hazardous residue. Store separately. Keep closed. Comply with all applicable health and safety regulations, fire and building codes.

What is the American Conference of Governmental Industrial Hygienists (ACGIH®) recommended exposure limit for chlorine?

ACGIH® TLV® - TWA : 0.1 ppm A4

ACGIH® TLV® - STEL [C]: 0.4 ppm

Exposure Guideline Comments: TLV® = Threshold Limit Value. TWA = Time-Weighted Average. STEL = Short-term exposure Limit. C = Ceiling limit. A4 = Not classifiable as a human carcinogen.

Adapted from: 2022 TLVs® and BEIs® - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH)

NOTE: In many (but not all) Canadian jurisdictions, the exposure limits are similar to the ACGIH® TLVs®. Since legislation varies by jurisdiction, contact your local jurisdiction for exact details. A list is available in the OSH Answers on [Canadian Governmental Occupational Health & Safety Departments](#).

A list of which acts and regulations that cover [exposure limits to chemical and biological agents](#) is available on our website. Please note that while you can see the list of legislation for free, you will need a subscription to view the actual documentation.

What are the engineering controls for chlorine?

Engineering Controls: Use a local exhaust ventilation and enclosure, if necessary, to control amount in the air. Consider using a corrosion-resistant exhaust ventilation system separate from other ventilation systems. It may be necessary to use stringent control measures such as process enclosure to prevent product release into the workplace. Use backup controls (e.g., double mechanical pump seals) to prevent the release of this material due to equipment failure. Provide eyewash and safety shower if contact or splash hazard exists.

What Personal Protective Equipment (PPE) is needed when working with chlorine?

Eye/Face Protection: Wear chemical safety goggles. A face shield (with safety goggles) may also be necessary.

Skin Protection: Wear chemical protective clothing e.g., gloves, aprons, boots. Coveralls or long sleeve shirts and pants in some operations. Wear a chemical protective, full-body encapsulating suit and self-contained breathing apparatus (SCBA). [Suitable materials](#) include (8 hours): butyl rubber, neoprene rubber, Viton®, Viton®/butyl rubber, AlphaTec® (02-100, 4000, EVO, VPS), Silver Shield® - PE/EVAL/PE, ChemMAX® (3 and 4 Plus), Frontline® 500, Tychem® (6000, 6000 FR, 9000, Responder® CSM, 10000, 10000 FR) Zytron® (300, 500).

The following materials should NOT be used: natural rubber, polyvinyl chloride, Tychem® 5000. Recommendations are NOT valid for very thin neoprene rubber gloves (0.3 mm or less).

Respiratory Protection:

Up to 5 ppm:

(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against chlorine*; or Any supplied-air respirator*.

Up to 10 ppm:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*

(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

*Reported to cause eye irritation or damage; may require eye protection.

APF = Assigned Protection Factor

Recommendations apply only to National Institute for Occupational Safety and Health (NIOSH) approved respirators. Refer to the [NIOSH Pocket Guide to Chemical Hazards](#) for more information.

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