

# Poison Facts:

## High Chemicals: Chlorine

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### **Properties of the Chemical**

Chlorine is a greenish-yellow, diatomic gas with a suffocating odor. It reacts with water, liberating hydrogen chloride (HCl) and an oxygen-free radical. Chlorine is a strong oxidizing agent. It is noncombustible in air and forms explosive mixtures with flammable gases and vapors.

### **Uses of the Chemical**

Chlorine is used in the manufacturing of organic and inorganic chemicals. It is used as an oxidizing and bleaching agent in the pulp and paper industry and for textiles. Chlorine is a disinfectant for water purification, industrial waste, sewage and swimming pools. It is shipped in steel cylinders as a compressed, liquefied gas.

### **Absorption, Distribution, Metabolism and Excretion (ADME)**

Chlorine reacts with tissue water to form hydrochloric and hypochlorous acids, making it a potent irritant of the eyes, skin, mucous membranes and respiratory tract. Injury is proportionate to the concentration of the gas, duration of contact and water content of the exposed tissues.

### **Clinical Effects of Acute Exposure**

- **Ocular exposures:** Exposure to the eyes – even at very low concentrations (3 to 6 ppm) – causes irritation. Exposure to all concentrations of chlorine gas will result in a burning and stinging sensation, blepharospasm, redness and lacrimation. A high concentration of chlorine gas is caustic to the eyes and can result in severe and permanent eye injury.
- **Dermal exposures:** Liquid chlorine and highly concentrated gaseous chlorine may cause cutaneous burns. Lower concentrations of chlorine gas will irritate the skin.
- **Inhalation exposures:** Inhalation is the main route of exposure to chlorine gas. Patients complain of burning and suffocation, coughing, choking and tightness of the chest. Exposures can lead to laryngeal edema, bronchospasm and hypoxia. High concentrations can lead to syncope and almost immediate death. Acute lung injury is common after severe exposure.
- **Oral exposures:** Chlorine only exists as a liquid under pressure. Once it is released from pressure, it becomes a gas. Oral exposure, therefore, would not be expected. However, all the mucous membranes of the mouth, nose and throat can be irritated from the gas. Severe exposures may produce burns of all exposed mucosa.

### **In-Field Treatment Prior to Arrival at a Health Care Facility**

- **Ocular exposures:** Remove patient to fresh air, and irrigate eyes with tepid, low-pressure water for 10 to 15 minutes.
- **Dermal exposures:** Remove patient to fresh air, and irrigate the skin with copious amounts of water for 10 to 15 minutes.
- **Inhalation exposures:** Remove patient to fresh air, and monitor for respiratory distress. If available, administer oxygen.
- **Oral exposures:** Remove patient to fresh air. Offer fluids in small amounts (120 ml in children/240 ml in adults). Examine mucosa for burns.

### **Special note to first responders:**

- Wear a positive-pressure Self-Contained Breathing Apparatus (SCBA).
- Wear chemical protective clothing specifically recommended by the manufacturer.

### **Treatment of Exposures in a Health Care Facility**

- **Ocular exposures:** Irrigate eyes with tepid water or normal saline for 15 minutes. Conjunctival irritation should be evaluated with fluorescein to determine if corneal defects are present.
- **Dermal exposures:** Wash thoroughly with running water for 15 to 20 minutes. Treat as a thermal burn if necessary.
- **Inhalation exposures:** Patients without immediate symptoms may require no treatment, but a full physical examination and a record of respiratory peak flow may be of use. Administer 100 percent humidified oxygen. Check lung function, and perform chest x-rays. Oxygen and bronchodilators are used for bronchospasm. Pulmonary edema may develop. Monitor arterial blood gases, and treat hyperchloremic acidosis if present. Respiratory monitoring is recommended until the patient is symptom-free.
- **Oral exposures:** Dilute and irrigate all mucosa with water. Examine the mouth, throat and nasal passages for caustic burns.

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**For more poison prevention and first aid information, call the**

Poison Control Center

Serving the Residents of Kansas

Toll-free Hotline

1-800-222-1222

THE UNIVERSITY OF KANSAS HOSPITAL

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