BASF Chemical Emergency Medical Guidelines

Chlorine (Cl_2) A 1

Information and recommendations for first responders

- **Before approaching the patient, the first responder must make sure that he does not risk exposing himself to chlorine.**
- **Patients exposed only to chlorine gas do not pose a significant risk of secondary contamination. Patients whose clothing or skin is contaminated with liquid chlorine (boiling point –34°C, -29°F, respectively) can secondarily contaminate rescue and medical personnel by direct contact or through off-gassing chlorine.**
- **Chlorine gas is rapidly corrosive when it comes in contacts with moist tissue such as the eyes, skin, and upper respiratory tract causing eye irritation, coughing, chest pain and dyspnea. Swelling of the throat and signs of accumulation of fluid in the lungs (shortness of breath, cyanosis, expectoration, cough) may occur.**
- **There is no antidote to be administered to counteract the effects of chlorine. Treatment consists of supportive measures.**

1. Substance information

Chlorine (Cl_2), CAS 7782-50-5
Chlorine is, at room temperature, a yellow-green, noncombustible gas with a sharp or pungent odor. Under pressure or at temperatures below -34°C (-29°F), it is a clear, amber-colored liquid. It is a strong oxidizing agent and can react explosively or form explosive compounds with many common substances. Chlorine is only slightly soluble in water, but on contact with moisture it forms hypochlorous acid (HClO) and hydrochloric acid (HCl); the unstable HClO readily decomposes, forming oxygen free radicals. Water enhances chlorine's oxidizing and corrosive effects. Chlorine is widely used as a chemical reagent in the synthesis and manufacture of metallic chlorides, chlorinated solvents, crop protection products, polymers and synthetic rubbers. It is used as a bleach in the manufacture of paper and cloth; it can be released from hypochlorite-containing household products when they come in contact with acids.

2. Routes of exposure

Inhalation

Most exposures occur by inhalation. Chlorine's odor and irritant properties generally provide adequate warning of hazardous concentrations. However, prolonged low-level exposure may result in olfactory fatigue and tolerance of its irritant effects. Chlorine is heavier than air and may cause asphyxiation in poorly ventilated, low-lying, or enclosed spaces.

Skin/eye contact

Direct contact with liquid chlorine or gas on wet or moist skin causes severe chemical burns, leading to cell death and ulceration.

Ingestion

Ingestion of chlorine is unlikely because it is a gas at room temperature. Solutions that are able to generate chlorine may cause corrosive injury if ingested.

3. Acute health effects

Chlorine exposure usually causes eye irritation, sore throat, and coughing. Rapid development of respiratory distress with chest pain, dyspnea, swelling of the throat and accumulation of fluid in the lungs may occur. Lung injury may progress over several hours. Chlorine poisoning may cause respiratory and cardiovascular failure.

If the skin is wet or moist, contact with chlorine gas can cause burning pain, inflammation, and blisters. Contact with liquid chlorine under pressure can result in frostbite.
Low gas concentrations cause burning discomfort, spasmodic blinking or involuntary closing of the eyelids, redness, and tearing. Corneal burns occur at high concentrations.

4. Actions

Rescuer self-protection

If the zone which has to be entered by the rescuer is suspected of containing chlorine, pressure-demand, self-contained breathing apparatus and chemical-protective clothing shall be worn; do not use equipment that is contaminated itself.
Patients exposed only to chlorine gas do not pose a significant risk of secondary contamination. Patients whose clothing or skin is contaminated with liquid chlorine may secondarily contaminate rescue and medical personnel by direct contact or through off-gassing chlorine.

Patient recovery

Patients should be removed from the contaminated zone immediately. Patients who are unable to walk may be removed on backboards or stretchers; if these are not available, carefully remove/transport patients with appropriate action to a safe zone, taking into account your self-protection.
Immediate priorities must follow the "**A, B, C's**" of resuscitation:

A) **Airway** (make sure the airway is not blocked by the tongue or by a foreign body)
B) **Breathing** (check to see if the patient is breathing, provide ventilations with use of appropriate barrier devices, e.g. with a pocket face mask, if breathing is absent)
C) **) Circulation** (start CPR in any unresponsive person with absent or abnormal breathing)

Decontamination

Patients exposed only to chlorine gas who have no evidence of skin or eye irritation do not need decontamination. All others require decontamination.
Patients who are able and cooperative may assist with their own decontamination. If the exposure involved liquid chlorine and if clothing is contaminated, remove and double-bag the clothing.
Flush exposed skin and hair with plain water for at least 15 minutes. Protect eyes during flushing of skin and hair. Continue other basic care during flushing.
Irrigate exposed or irritated eyes with plain water or saline for at least 15 minutes. Remove contact lenses if present and easily removable without additional trauma to the eye. Continue other basic care during flushing.

Further actions

Each potentially exposed person should seek immediate medical advice and treatment.

BASF SE
Corporate Health Management
Carl-Bosch-Straße 38
67056 Ludwigshafen
Germany

BASF Corporation
Medical Department
100 Campus Drive, M/S F 221
Florham Park, NJ 07932
USA