



R7DHRE Hazardous Materials Guideline: **Corrosive Bases**



REGION VII DISASTER HEALTH RESPONSE ECOSYSTEM (R7DHRE) CHEMICAL SPECIALTY TEAM

Call Your Poison Center for Immediate Assistance: 1-800-222-1222

Hazardous Materials Guideline: Corrosive Bases

This document is intended as a supplement for discussion with your local poison center or toxicologist.

1.0 BACKGROUND

1.1 Description: Corrosive bases (alkali) are rapidly irritating and destructive to exposed tissues. In addition to others, these compounds include sodium hydroxide, potassium hydroxide, calcium hydroxide; calcium carbide; potassium silicates, sodium silicates; potassium oxide, calcium oxide, sodium oxide.

1.2 Mechanism of Injury: Strong alkali are very corrosive and destroy tissue by the process of liquefactive necrosis in all tissues with which they come in contact. This liquefactive necrosis can penetrate deep into tissues and may result in full thickness burns. High concentration alkali can liberate heat when mixed with water or neutralized with acid. Systemic toxicity is rare.

1.3 Routes of Exposure: Dermal, Ingestion, Inhalation, Ocular.

2.0 PROVIDER SAFETY

2.1 Personal Protective Equipment (PPE) – Decontamination Team: Personnel decontaminating patients must wear **full-body chemical-resistant clothing and respiratory protection**. Respiratory protection may consist of either:

- 2.1.1** A positive pressure air or oxygen source, such as an air-line respirator or a Self-Contained Breathing Apparatus (SCBA) or
- 2.1.2** A filtered air respirator (including Powered Air Purifying Respirators (PAPRs)) with filters capable of adsorbing the alkali in question.
- 2.1.3** The use of a positive pressure air or oxygen source is preferred if there is doubt as to the use of a positive pressure air or oxygen source is preferred over a filtered air respirator if there is doubt as to the identity of the chemical in question, or there may be exposure to a level of acid vapors which can overwhelm the filter's ability to remove the chemical from the inspired air.

2.2 Personal Protective Equipment (PPE) – Treatment Team: Personnel treating patients who have been adequately decontaminated need no additional PPE other than **universal precautions** since there is no serious risk of secondary contamination.

2.2.1 The vomit from persons who have ingested corrosive bases is hazardous because it may off-gas acid vapors or contaminate those coming in contact with the vomit. Prepare treatment areas for rapid clean up in case the patient vomits.

2.3 Patient Decontamination:

2.3.1 All persons exposed to an alkaline corrosive should be decontaminated.

2.3.2 Persons contaminated with **alkaline corrosive liquid** do **pose a risk of secondary contamination** from direct contact with the chemical.

2.3.3 Brush any solid material from the patient's clothing, skin and hair.

2.3.4 Remove contact lenses if it can be done without additional trauma to the eye. **Irrigate eyes for a minimum of 15 minutes.** Continue irrigation until eye pH is neutral (7 to 8).

2.3.5 Remove ALL clothing and jewelry. Double bag clothing and jewelry to prevent off-gassing.

2.3.6 Further decontamination is best **accomplished by irrigation with copious amounts of water.** Wash skin and hair with plain water for a minimum of 5 minutes and then wash twice with soap & water after washing with plain water. Washing with water alone (for a longer period of time) is acceptable if soap is not available. **Neutralization with an acid is NOT recommended.** Skin pH can be checked to assure that all of the alkali has been removed.

2.3.6 Watch for hypothermia in children and the elderly, when decontamination is done with un-heated water, or during cold weather.

3.0 SIGNS & SYMPTOMS

3.1 Severity of symptoms will depend upon the concentration of the alkali to which the person is exposed and the duration of exposure.

3.2 Patients may be triaged as follows:

- Immediate: Respiration >30/min, hypoxemia, upper airway edema, or significant skin burns
- Delayed: Minor skin burns
- Minimal: Asymptomatic

3.3 Dermal: **Concentrated solutions cause pain and irritation within three minutes, while dilute solutions may not cause symptoms for several hours.** Severe exposures can cause full thickness skin burns.

3.4 Ocular: Irritation, pain, and ocular edema. Corneal damage and ulcerations may occur, and ulcerations may progress for several days. **Severe exposures can lead to blindness.**

3.5 Ingestion: **Severe corrosive burns** to the mouth, throat, esophagus, stomach. Nausea, vomiting, difficulty swallowing and abdominal pain. Spontaneous vomiting, chest and abdominal pain, difficulty swallowing with drooling, and stridor may be seen. Severe ingestions can lead to GI tract perforation, shock and death. The full extent of damage may not be evident until several hours after ingestion. Severe esophageal burns have occurred in cases where burns of the mouth or oropharynx were not seen.

3.6 Inhalation: Irritation of the nose, throat, and upper airways. Laryngeal spasm and edema can lead to upper-airway obstruction. Pulmonary edema is seen in severe inhalational exposures.

4.0 DIAGNOSTICS

4.1 Corrosive base (alkali) poisoning is a clinical diagnosis and there is no specific diagnostic testing. Any diagnostic evaluation should be based on signs and symptoms of irritation or corrosive effects.

5.0 TREATMENT

5.1 General: **Treatment is mainly decontamination and supportive care** including basic and advanced life support. There is no specific antidote for corrosive bases and neutralization with an acid is NOT recommended.

5.2 Inhalation: **Maintain the patient's airway as necessary.** Early intubation should be considered for upper airway swelling or severe pneumonitis with impaired oxygen exchange. Endotracheal intubation should be performed under direct visualization because of edema and potential damage to the oropharynx. Cricothyroidotomy may be considered. **Support oxygenation and ventilation as necessary.** Use standard treatments for pulmonary edema and bronchospasm. Consider the use of **PEEP and bronchodilators.** Corticosteroids can be considered.

5.3 Dermal: **Treatment is the same as that for thermal burns.** The full extent of the burn may not be apparent for 24 to 48 hours and may be underestimated initially.

5.4 Ocular: **Irrigate eyes to a neutral pH.** The pH of the conjunctiva should be checked every 30 minutes for 2 hours after irrigation is stopped to ensure that the measured pH is that of the tissue and not the irrigating fluid. Ensure that any particulate matter has been removed. Perform a thorough eye exam: test visual acuity and perform fluorescein and slit lamp examinations. Ophthalmology consultation is highly recommended. Immediately consult an ophthalmologist for patients who have corneal injuries.

5.5 Ingestion: **Do NOT give activated charcoal, induce emesis, or attempt to neutralize the ingested alkaline corrosive.** Consider dilution by giving 2 to 4 ounces of milk or water orally ONLY to patients who are conscious, able to swallow, and are able to protect their airway. Endoscopic evaluation will likely be necessary. Surgical consultation is necessary for patients who have suspected or documented GI tract perforation.

6.0 DISPOSITION CRITERIA

6.1 Patients with airway or lung irritation should be admitted to the hospital. Corrosive injuries that are circumferential around an extremity or the trunk, or involve greater than 10% body surface area, or involve the face, hands, feet or genitalia, should be discussed with a burn center and admitted to the hospital.

Disclaimer: This guideline is intended to be an informational reference only and should not be used as a substitute for consultation with a poison center or toxicologist, and/or the clinical judgement of the bedside team.

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DO NOT REVISE. Contact Kathy Jacobitz at the Nebraska Regional Poison Center (kjacobitz@nebraskamed.com) for permission to modify or to provide suggestions for updates. Check <https://www.regionviidhre.com/chemical-team> for the latest version.

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