



R7DHRE
Hazardous
Materials
Guideline:
**Corrosive
Acids**

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 Acids

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

1.0 BACKGROUND

1.1 Description: Corrosive acids are rapidly irritating and destructive to exposed tissues. In addition to others, these compounds include hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid, acetic acid. Hydrofluoric acid is also a corrosive but has unique properties (please see separate management guideline).

1.2 Mechanism of Injury: Corrosive acids destroy tissue by the process of coagulative necrosis. High concentration acids can liberate heat when mixed with water or neutralized with an alkali. Vapors from many of these acids dissolve readily in water to yield the liquid form of these strongly corrosive acids. These acid vapors can dissolve in the moisture of the mucous membranes and in sweat on the skin.

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 acid 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 acids 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 Persons exposed to only a **corrosive gas** and have **no skin irritation, no eye irritation, dry skin, AND dry clothes generally do not need decontamination.** These patients do not pose a significant risk of secondary contamination.

2.3.2 Persons contaminated with the **liquid form of the acid** do **pose a risk of secondary** contamination from off-gassing of acid vapors and direct contact with the chemical.

2.3.3 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).

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

2.3.5 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 a base is NOT recommended. Skin pH can be checked to assure that all of the acid 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 acid to which the person is exposed and the duration of exposure. Patients exposed to acids with systemic effects (e.g., anions of arsenic, fluoride, and cyanide), may require cardiovascular monitoring and additional laboratory evaluation.

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 Inhalation: **Intense irritation of the eyes, nose, throat, and respiratory tract;** lacrimation and rhinorrhea; coughing, bronchoconstriction; shortness of breath; laryngospasm. **Severe exposures can cause burns to the upper airway leading to upper airway obstructions and damage to the alveoli leading to pulmonary edema, decreased oxygenation and systemic hypoxia.**

3.4 Dermal: Irritation and burns to the mucous membranes and skin. Severe exposures can cause full thickness skin burns. Distal circulation should be repeatedly assessed in patients with circumferential burns.

3.5 Ocular: Irritation and burns to the eyes. **Severe exposures** can cause ulcerations of the cornea and eye and **can lead to blindness**.

3.5 Ingestion: Severe corrosive burns to the mouth, throat, esophagus, stomach. Nausea, vomiting, difficulty swallowing and abdominal pain. Severe exposures can cause bleeding and perforation of the GI tract. Metabolic acidosis can be caused by burns, bleeding, hypotension and perforation. Rarely, the acid itself has added to the metabolic acidosis caused by the burns, bleeding, etc.

4.0 DIAGNOSTICS

4.1 Corrosive acid 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 acids and neutralization with a base 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.

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 acid 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.

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.

Initial author: Edward Bottei, MD, FACMT; revised by Dan McCabe, MD and the R7DHRE Chemical Specialty Team

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.

© [Region VII Disaster Health Response Ecosystem](#), 2023. All rights reserved.

