

Poison Facts:

High Chemicals: Nitric Acid

Properties of the Chemical

Nitric acid is a colorless, yellow or red, fuming liquid with an acrid, suffocating odor. (Note: Nitric acid is often used in an aqueous solution. Fuming nitric acid is concentrated nitric acid that contains dissolved nitrogen dioxide.) It decomposes on warming, producing nitrogen oxides. Nitric acid is a strong oxidant and reacts violently with combustible and reducing materials (turpentine, charcoal, alcohol). It is a strong acid, reacts violently with bases and is corrosive to metals. It also reacts very violently with organic chemicals (acetone, acetic acid, acetic anhydride), causing fire and explosion hazards.

Uses of the Chemical

Nitric acid is used in the manufacture of ammonium nitrate for fertilizer and explosives, organic synthesis, metallurgy, photoengraving, etching steel, urethanes, rubber chemicals, reprocessing spent nuclear fuel and ore flotation. Production of nitric acid is the sixth-largest chemical industry in the United States.

Absorption, Distribution, Metabolism and Excretion (ADME)

Nitric acid can produce injury following ingestion, inhalation of vapors or dermal exposure to skin and eyes. Nitric acid is highly corrosive to all parts of the body.

Clinical Effects of Acute Exposure

- **Ocular exposures:** Liquid splashes may cause severe pain, corneal ulcers or severe burns of the corneal epithelium. Permanent damage and visual impairment can occur. Nitric acid vapor is a strong irritant at lower concentrations and can cause conjunctivitis and even necrosis of the conjunctiva.
- **Dermal exposures:** Nitric acid is corrosive to the skin, producing severe burns, ulceration, scarring, dermatitis and yellow staining of the skin.
- **Inhalation exposures:** Fumes are corrosive to the respiratory tract and will cause severe coughing, respiratory tract irritation, delayed effects, pulmonary function changes, pneumonitis, pulmonary edema and dyspnea. Laryngeal spasm or edema can also occur.
- **Ingestion exposures:** Gastritis, hemorrhagic gastritis, and esophageal and gastric burns can occur. Ingestion can cause esophageal corrosion or stricture, necrosis and perforation of the stomach.

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

- **Ocular exposures:** Irrigation with water for at least 30 minutes is required. Try to prevent victim from rubbing eyes or keeping eyes closed.
- **Dermal exposures:** Immediately flush skin with copious amounts of water for at least 15 minutes. Remove all contaminated clothing and shoes.
- **Inhalation exposures:** Move victim from the toxic environment to fresh air at once. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation. If breathing has ceased, apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
- **Ingestion exposures:** If victim is conscious and alert, dilute with any available nontoxic, cool liquid. The maximum amount of dilutions should be no more than 8 ounces (240ml) for adults or 4 ounces (120ml) for children. Do not attempt to give anything by mouth to an unconscious person.

Special notes to first responders:

- Wear a positive-pressure Self-Contained Breathing Apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.

Treatment of Exposures in a Health Care Facility

- **Ocular exposures:** Irrigate exposed eyes with copious amounts of room-temperature water or 0.9 percent saline. A local anesthetic may be instilled to improve patient comfort. Continue irrigation for at least an hour or until the superior and inferior cul-de-sacs have returned to neutrality and remain so for 30 minutes after irrigation has been discontinued. Because of the potential for severe eye injury, early ophthalmologic consultation is advisable.
- **Dermal exposures:** Remove any contaminated clothing, and wash thoroughly with soap and water. Treat dermal burns with standard topical therapy.
- **Inhalation exposures:** Administer 100 percent humidified oxygen, perform endotracheal intubation and provide assisted ventilation as required. If bronchospasm develops, administer inhaled beta-adrenergic agonists. Evaluate for hypoxia, respiratory tract irritation, bronchitis or pneumonitis. In some cases, onset of acute lung injury may be delayed 24 to 72 hours.
- **Ingestion exposures:** If no respiratory compromise is present, dilute patient with milk or water. Obtain consultation concerning endoscopy as soon as possible, and perform endoscopy within 24 hours when indicated. Burns of the oropharynx, esophagus, stomach and duodenum may occur.

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

KUMED
