

Poison Facts:

Low Chemicals: Bromine

Properties of the Chemical

Bromine is a dark, reddish-brown, volatile, diatomic liquid with a suffocating odor at room temperature. It is the only liquid non-metallic element. Bromine is capable of dissolving metals and non-metals. Tremendous heat is produced when bromine reacts with inorganic matter such as wood or sawdust, increasing the risk of combustion following bromine spills. Because the vapor pressure is so high, the red vapors are immediately detectable when a container is opened. Bromine is slightly soluble in water, producing hydrogen bromide. Hydrogen bromide is a corrosive colorless gas with a pungent odor. It is extremely soluble in water, forming hydrobromic acid.

Uses of the Chemical

Bromine is used in the form of methyl bromide and ethylene dibromide as a fumigant. Bromine is also used in flame retardants, cleaning agents, dyestuffs, photography, water sanitation and pharmaceuticals, as well as in the bleaching of fibers and silk.

Absorption, Distribution, Metabolism and Excretion (ADME)

The reactivity of bromine in biological systems makes it difficult to determine its pharmacokinetics and to separate the effects of bromine from those of the bromine compounds and metabolites. The absorption of bromine vapors by routes other than inhalation is usually minimal. Due to its reactivity, bromine does not persist as an element in living tissue but quickly forms bromide.

Clinical Effects of Acute Exposure

- **Ocular exposures:** Low concentrations of bromine vapor produce irritation of the eye with lacrimation. Photophobia and blepharospasm are seen in higher concentrations.
- **Dermal exposures:** Both the liquid and vapor forms are extremely irritating to the skin. There is no immediate visible skin reaction with contact. Any delay in treatment before the initial signs of injury become apparent often results in more extensive damage. The most common local effects are blister formation, a brownish discoloration of the skin and slow-healing ulcers.
- **Inhalation exposures:** Inhalation symptoms progress from coughing, choking, dyspnea and wheezing to either immediate or delayed bronchoconstriction. Other symptoms include the development of laryngeal spasm, glottal edema, asthma and tracheobronchitis. With increased parenchymal penetration, it is likely that there will be peribronchiolar abscesses, pulmonary infiltrates consistent with chemical pneumonitis, bronchiolitis and pulmonary edema. Severe respiratory symptoms may be delayed for several hours after exposure.

- **Ingestion exposures:** Although ingestion is unlikely, a brownish discoloration of the tongue and buccal mucosa may occur and be accompanied by the characteristic bromine breath odor.

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

- **Ocular exposures:** Irrigate the eye(s) with copious amounts of tepid water for at least 15 minutes.
- **Dermal exposures:** Remove contaminated clothing, and thoroughly wash the affected area with copious amounts of water for 20 minutes.
- **Inhalation exposures:** Remove the patient from the source of bromine contamination. Supply oxygen if available.
- **Ingestion exposures:** Rinse out mouth with large amounts of water. Small amounts of water – 240 ml for adults or 120 ml for children should be ingested to dilute the chemical.

Special note to first responders:

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

Treatment of Exposures in a Health Care Facility

- **Ocular exposures:** Initiate or continue eye irrigation using 0.9 percent saline solution. If irritation, pain, swelling, lacrimation or photophobia persists, further medical evaluation is recommended.
- **Dermal exposures:** Remove contaminated clothing, and thoroughly wash the affected area in a shower of water for 20 minutes. Since the effects may be delayed, close observation for blistering and discoloration of the skin is required for the next 24 hours.
- **Inhalation exposures:** Begin respiratory support based on patient symptoms. Maintain an adequate airway, oxygen and inhaled beta adrenergic agonist as needed. The delayed onset of severe respiratory symptoms justifies hospitalization for 24 hours. Initial chest x-ray and spirometry are recommended. Repeat chest radiograph and spirometry are recommended to determine the progression or resolution of residual effects. The course and prognosis of a bromine exposure depends on the concentration and duration of the exposure. Effects may vary from mild irritation of the mucous membranes to severe damage of the skin and lung parenchyma. Death is secondary to severe hypoxemia with metabolic acidosis due to acute obstructive ventilatory impairment.
- **Ingestion exposures:** Irrigate the oral mucosa with copious amounts of water. Give the patient small amounts of water – 240 ml for adults or 120 ml for children. Look for brownish discoloration of the tongue and buccal mucosa. Observe the patient for blistering for 24 hours.

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
