



R7DHRE
Hazardous
Materials
Guideline:
Methyl
Bromide



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

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

Hazardous Materials Guideline: Methyl Bromide

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

1.0 BACKGROUND

1.1 Description: Methyl bromide is a colorless gas at room temperature and a liquid below 38.5°F or when compressed. At low concentrations, it is odorless and nonirritating; at concentrations > 500 ppm it causes eye and throat irritation; and at concentrations > 1,000 ppm it has a musty or fruity odor. Because methyl bromide lacks adequate warning properties and significant exposure can occur before symptoms are evident, a lacrimator (2% chloropicrin) is usually added. Methyl bromide is heavier than air and may collect in low-lying areas.

1.2 Mechanism of Injury: Methyl bromide is a highly toxic systemic poison that is well absorbed by the lungs and, to some degree, through intact skin. Exposure by any route can cause systemic effects. Methyl bromide disrupts enzymatic activity and causes progressive cellular or organ dysfunction, primarily in the CNS. In sublethal poisoning, a latency period of 2 to 48 hours can occur between exposure and onset of symptoms. Methyl bromide is frequently transported in cylinders as a liquefied compressed gas; contact with liquid methyl bromine may result in frostbite injury.

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

2.0 PROVIDER SAFETY

2.1 Personal Protective Equipment (PPE) – Decontamination Team: Methyl bromide is a highly toxic systemic poison that is well absorbed by inhalation and through the skin. 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 A positive pressure air or oxygen source is preferred if there is doubt as to the identity of the chemical in question or if there may be exposure to a level of methyl bromide which would overwhelm the filter.

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 Methyl bromide can penetrate, and persist in, cloth, rubber, and leather. Appropriate PPE that can resist methyl bromide should be worn and checked frequently for penetration of the chemical.

2.2.2 The vomitus from persons who have ingested methyl bromide is hazardous because it may off-gas methyl bromide 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 methyl bromide gas and have no skin or eye irritation, dry skin, and dry clothes generally do not need decontamination since they do not pose a significant risk of secondary contamination. However, methyl bromide readily penetrates skin, clothing, and other protective materials such as rubber and leather. Those persons contaminated with liquid methyl bromide solutions (temperatures less than 38.5°F) do pose a risk of secondary contamination from off-gassing of methyl bromide vapors and direct contact with the liquid.

2.3.2 If there is concern for a presence of solid (non-methyl bromide) substances, brush any powder or solids from the skin, hair, and clothes of victims.

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

2.3.4 Decontamination is best accomplished by irrigation with copious amounts of water.

2.3.4.1 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.

2.3.5 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).

2.3.6 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 methyl bromide to which the person is exposed and the duration of exposure.

3.2 Inhalation: Irritation of the eyes, nose, throat, and airways; chemical pneumonitis; pulmonary edema; chest pain; dyspnea. Pulmonary edema may be delayed 24 hours or longer after exposure. Methyl bromide can lead to reactive airways dysfunction syndrome (RADS), a chemical irritant-induced type of asthma.

3.3 Dermal: Methyl bromide gas easily penetrates skin and most protective clothing, including rubber and leather. Retention in clothing may lead to chemical dermatitis, erythema, stinging pain, blistering, and severe burns. Dermal absorption may contribute to systemic toxicity.

3.4 Ocular: High concentrations of methyl bromide may cause corneal irritation and burns.

3.5 Ingestion: Oral exposure is rare because methyl bromide is a gas at room temperature, but methyl bromide may be absorbed by the gastrointestinal tract and lead to systemic toxicity.

3.6 Systemic: Methyl bromide is neurotoxic and can cause seizures, coma, and long-term neuromuscular and cognitive deficits.

3.6.1 CNS Effects: Depending upon concentration, neurologic effects may be delayed for 2 or more hours after exposure.

3.6.1.1 Symptoms: headache, nausea, vomiting, dizziness, malaise, visual disturbances, involuntary eye movements, dilated pupils, slurred speech, tremors, impaired touch sensation, ataxia and other cerebellar abnormalities, motor deficits, decreased reflexes, seizures, and coma.

3.6.1.2 Delayed CNS Symptoms: A wide range of neuropsychiatric abnormalities can occur, the onset of which can be delayed for days to weeks. These effects may persist indefinitely.

3.6.2 Cardiovascular Effects: Inhalation of high concentrations can cause tachyarrhythmias or ventricular fibrillation.

3.6.3 Renal Effects: Acute tubular necrosis (ATN) leading to proteinuria, hematuria, oliguria, or anuria. Complete recovery is usual.

4.0 DIAGNOSTICS

4.1 Methyl bromide poisoning is a clinical diagnosis, but standard diagnostic tests may be helpful in a symptomatic patient.

5.0 TREATMENT

5.1 Follow standard Basic and Advanced Life Support Guidelines. There is no specific antidote for methyl bromide poisoning.

5.1.1 Since the onset of pulmonary edema and other systemic symptoms may be delayed for hours to days, these patients should be observed for 24 hours using repeated chest examinations and other appropriate tests.

5.2 Inhalation: Maintain the patient's airway, with endotracheal intubation or cricothyroidotomy if necessary. Support oxygenation and ventilation as necessary. Use standard treatments for pulmonary edema (diuretics, PEEP, etc.) and bronchospasm (inhaled bronchodilators; consider corticosteroids).

5.3 Dermal: Treatment is the same as that for thermal burns. Onset of burns may be delayed.

5.4 Ocular: Irrigate eyes to a neutral pH. Perform a thorough eye exam: test visual acuity and perform fluorescein and slit lamp examinations. Ophthalmology consultation may be necessary. Immediately consult an ophthalmologist for patients who have corneal injuries.

5.5 Ingestion: Do **NOT** give activated charcoal or induce emesis. *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.

5.6 Systemic: As there is no specific antidote, treatment for neurological, renal, and cardiovascular systemic effects is symptomatic and supportive.

5.7 Delayed Effects: Because of the possibility of delayed onset of neuropsychiatric symptoms, patients should be evaluated periodically by their physician for several weeks.

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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