



R7DHRE Hazardous Materials Guideline: **Sulfur Dioxide**



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

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

Hazardous Materials Guideline: Sulfur Dioxide (SO₂)

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

1.0 BACKGROUND

1.1 Description: Sulfur dioxide (SO₂) at room temperature is a nonflammable, colorless gas. Its strong, pungent odor and irritating properties usually provide adequate warning of its presence. Sulfur dioxide is heavier than air and may cause asphyxiation in poorly ventilated, enclosed, or low-lying areas. Sulfur dioxide is handled and transported as a liquefied compressed gas; contact with the liquefied sulfur dioxide may result in frostbite injury. Liquid sulfur dioxide corrodes iron, brass, copper, and some forms of plastic and rubber.

1.2 Mechanism of Injury: Sulfur dioxide dissolves easily in water or steam to form sulfurous acid. Inhaled sulfur dioxide readily reacts with the moisture of mucous membranes to form sulfurous acid (H₂SO₃) and sulfuric acid (H₂SO₄), which are severe irritants and will cause chemical burns. Dermal absorption is negligible, though burns may occur.

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

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 sulfur dioxide.
- 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 sulfur dioxide 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.

2.3 Patient Decontamination:

Persons exposed to only sulfur dioxide gas and have no skin or eye irritation AND dry skin & clothes, probably do not need decontamination since they do not pose a significant risk of secondary contamination. Those persons contaminated with liquid sulfur dioxide solutions do pose a risk of secondary contamination from off-gassing of sulfur dioxide vapors and direct contact with the liquid.

2.3.1 Brush any powder or solids from the skin, hair, and clothes of victims.

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

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

2.3.3.1 Wash skin and hair with plain water for a minimum of 5 minutes and then wash twice with soap after washing with plain water. Washing with water alone (for a longer period of time) is acceptable if soap is not available.

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 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 sulfur dioxide to which the person is exposed and the duration of exposure.

3.2 Inhalation: Sulfur dioxide is a potent respiratory tract irritant. Inhalation of very low concentrations of sulfur dioxide can aggravate chronic pulmonary diseases, such as asthma and emphysema. Certain highly sensitive asthmatics may develop bronchospasm when exposed to very low levels of sulfur dioxide.

3.2.1 Low concentrations of SO₂ can cause sneezing, coughing, sore throat, wheezing, bronchospasm, dyspnea, chest tightness, and a feeling of suffocation. Pulmonary injury might continue to evolve over 18 to 24 hours.

3.2.2 High concentrations can cause bronchospasm, pneumonitis, pulmonary edema, laryngospasm, laryngeal edema, and acute airway obstruction. Exposure to high concentrations of sulfur dioxide can lead to Reactive Airway Dysfunction Syndrome (RADS), an irritant-induced type of asthma. This non-specific bronchial hyperreactivity might diminish over a few weeks or persist for years.

3.3 Dermal: Sulfur dioxide is a severe skin irritant causing stinging pain, redness, and blisters, especially on mucous membranes. Dermal absorption is negligible. Skin contact with escaping compressed gas or liquid sulfur dioxide can cause frostbite and irritation injury.

3.4 Ocular: Sulfur dioxide is severely irritating to the eyes, and exposure to the vapor can cause conjunctivitis and corneal burns. Direct contact with escaping compressed gas or liquid sulfur dioxide can produce severe corneal damage and frostbite injury to the eye.

3.5 Ingestion: Ingestion of sulfur dioxide is unlikely because it is a gas at room temperature. Nausea, vomiting, and abdominal pain have been reported after inhalation exposure to moderate to high doses of sulfur dioxide.

4.0 DIAGNOSTICS

4.1 Sulfur dioxide poisoning is a clinical diagnosis and there is no specific diagnostic testing. Any diagnostic evaluation should be based on sign 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 sulfur dioxide poisoning.

5.2 Inhalation: Maintain the patient's airway, with endotracheal intubation or cricothyroidotomy if necessary. Endotracheal intubation should be performed only under direct visualization because of edema and potential damage to the oropharynx. 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.** If frostbite is present, rewarm the affected area in the same manner as for environmentally-induced frostbite.

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.

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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