BASF Chemical Emergency Medical Guidelines

Hydrogen sulfide (H_2S) A 1

Information and recommendations for first responders

- **Before approaching the patient, the first responder must make sure that he does not risk exposing himself to hydrogen sulfide.**
- **Patients exposed only to hydrogen sulfide gas do not pose a significant risk of secondary contamination. Patients whose clothing or skin is contaminated with liquid hydrogen sulfide (boiling point –60°C, -76°F, respectively) can secondarily contaminate rescue and medical personnel by direct contact or through off-gassing hydrogen sulfide.**
- **Hydrogen sulfide gas is irritating when it comes in contact with moist tissue such as the eyes, skin, and upper respiratory tract and causes headache, nausea, vertigo, dizziness, weakness, hypotension, and disorientation. Swelling of the throat, signs of accumulation of fluid in the lungs (shortness of breath, cyanosis, expectoration, cough), unconsciousness, and apnea may occur. Rapid onset of unconsciousness, "knock-down", of severely exposed individuals is characteristic.**
- **In case of suspected hydrogen sulfide poisoning, immediate ventilation and oxygenation is crucial.**

1. Substance information

Hydrogen sulfide (H_2S), CAS 7783-06-4
Synonyms: dihydrogen monosulfide, sewer gas
Hydrogen sulfide is, at room temperature, a colorless, flammable gas with a rotten-egg odor. Under pressure or at temperatures below –60°C (-76°F), it is a clear, colorless liquid. It is moderately water-soluble. Hydrogen sulfide is used or encountered in farming (usually as agricultural disinfectant), brewing, tanning, glue making, rubber vulcanizing, metal recovery processes, mineral oil and gas exploration and processing, in rayon or artificial silk manufacture, lithography and photoengraving, fur-dressing and felt-making plants, fertilizer cookers, beet sugar factories, analytical chemistry, and dye production.

2. Routes of exposure

Inhalation

Most exposures occur by inhalation. Hydrogen sulfide's odor and irritant properties may be well perceived; however, they do not provide warning of hazardous concentrations. Moderate levels of exposure result in loss of smell (olfactory loss). Hydrogen sulfide is heavier than air and may cause asphyxiation in poorly ventilated, low-lying, or enclosed spaces.

Skin/eye contact

Direct contact with liquid hydrogen sulfide or gas on wet or moist skin or mucous membranes of the eyes causes irritation.

Ingestion

Ingestion of hydrogen sulfide is unlikely because it is a gas at room temperature.

3. Acute health effects

Hydrogen sulfide exposure usually causes headache, nausea, vertigo, dizziness, weakness, disorientation, hypotension, and respiratory irritation. Lung injury may progress over several hours. Hydrogen sulfide poisoning may cause unconsciousness, respiratory and cardiovascular failure. **Rapid onset of unconsciousness followed by immediate recovery, "knock-down", of severely exposed individuals is characteristic. Reawakening patients may be agitated and confused for a while.**

If the skin is wet or moist, contact with hydrogen sulfide gas can cause irritation. Contact with liquid hydrogen sulfide under pressure can result in frostbite.

Exposure to low concentrations of hydrogen sulfide gas causes burning discomfort, spasmodic blinking or involuntary closing of the eyelids, redness, and tearing. Corneal opacities occur at high concentrations or repetitive exposure.

4. Actions

Rescuer self-protection

If the zone which has to be entered by the rescuer is suspected of containing hydrogen sulfide, pressure-demand, self-contained breathing apparatus and chemical-protective clothing shall be worn; do not use equipment that is contaminated itself.
Patients exposed only to hydrogen sulfide gas do not pose a significant risk of secondary contamination. Patients whose clothing or skin is contaminated with liquid hydrogen sulfide may secondarily contaminate rescue and medical personnel by direct contact or through off-gassing hydrogen sulfide.

Patient recovery

Patients should be removed from the contaminated zone immediately. Patients who are unable to walk may be removed on backboards or stretchers; if these are not available, carefully remove/transport patients with appropriate action to a safe zone, taking into account your self-protection.
Immediate priorities must follow the "**A, B, C's**" of resuscitation:

A) **Airway** (make sure the airway is not blocked by the tongue or by a foreign body)
B) **Breathing** (check to see if the patient is breathing, provide ventilation with use of appropriate barrier devices, e.g. with a pocket facemask, if breathing is absent)
C) **Circulation** (start CPR in any unresponsive person with absent or abnormal breathing)

Decontamination

Patients exposed only to hydrogen sulfide gas who have no evidence of skin or eye irritation do not need decontamination. All others require decontamination.
Patients who are able and cooperative may assist with their own decontamination. If the exposure involved liquid hydrogen sulfide and if clothing is contaminated, remove and double-bag the clothing.
Irrigate exposed or irritated eyes with plain water or saline for at least 20 minutes. Remove contact lenses if present and easily removable without additional trauma to the eye. Continue other basic care during flushing.
Flush exposed skin and hair with plain water for at least 15 minutes. Protect eyes during flushing of skin and hair. Continue other basic care during flushing.

Further actions

Each potentially exposed person should seek immediate medical advice and treatment.

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