Chemical Emergency Medical Guideline

Information and recommendations for first responders and patients

Hydrogen sulfide

CAS No.: 7783-06-4

GHS symbols:

GHS06
Acute toxicity

Signal word: Danger

Hazard statements:

H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.

Overview

- Before the first aider approaches a patient, who has been or is exposed to hydrogen sulfide, they must ensure that there is no danger to themselves from hydrogen sulfide.
- There is no danger from contact with patients who have only been exposed to hydrogen sulfide gas. However, a patient who is wet with liquid hydrogen sulfide (boiling point –60°C) or whose clothing is wet with it may endanger other people through direct contact or through hydrogen sulfide gas emissions.
- Hydrogen sulfide irritates moist skin, the eyes and the upper respiratory tract and causes headaches, nausea, dizziness, weakness, a drop in blood pressure and confusion. Swelling of the larynx, accumulation of fluid in the lungs (shortness of breath, blue-red discoloration of the skin, lips and mucous membranes, sputum, coughing), loss of consciousness and respiratory arrest may occur. A collapse with loss of consciousness at high concentrations is characteristic.
- The most urgent measure in the event of actual or suspected hydrogen sulfide poisoning is the immediate administration of oxygen and, if necessary, ventilation.

Table of Contents

1. Information about the substance

Hydrogen sulfide (H_2S), CAS 7783-06-4
Synonyms: Hydrogen sulfide
At room temperature, hydrogen sulfide is a colorless, flammable and highly combustible gas with a rotten egg smell. Under pressure or at temperatures below -60°C, it is a clear, colorless liquid. It is only moderately soluble in water. Hydrogen sulfide is used in agriculture (as a disinfectant), the brewing industry, leather tanning, adhesive production, rubber vulcanization, metal recovery, oil and gas extraction and processing, synthetic fiber production, the printing industry, fur processing, fertilizer production, the sugar industry, paint production and analytical chemistry.

2. Exposition

2.1. Inhalation

Inhalation is the main route of exposure to hydrogen sulfide. The smell of hydrogen sulfide and its irritating effect serve as a clear warning, but do not provide adequate protection against harmful concentrations. Chronic exposure to low concentrations can lead to a dulling of the sense of smell and the irritating effects. As hydrogen sulfide is heavier than air, there is a risk of suffocation in poorly ventilated, low-lying or enclosed spaces.

2.2. Skin/eye contact

Exposure to liquid hydrogen sulfide or gas on wet or damp skin or eyes causes irritation.

2.3. Ingestion

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

3. Acute health effects

Hydrogen sulfide gas causes headaches, nausea, dizziness, weakness, confusion, restlessness, drop in blood pressure and respiratory irritation. Breathing difficulties may increase over time. Hydrogen sulfide can lead to unconsciousness and respiratory and cardiovascular failure. A sudden collapse with loss of consciousness at high concentrations is characteristic.

If the skin is wet or damp, contact with gaseous hydrogen sulfide can cause skin irritation or redness. Skin contact with pressurized liquid hydrogen sulfide may result in frostbite.

Low gas concentrations can cause eye irritation with burning, redness, tearing and eyelid closure. Eye contact with liquid hydrogen sulfide or high concentrations can cause clouding of the eye surface and subsequent permanent damage.

A single, short-term exposure to low concentrations of hydrogen sulfide gas, from which the affected person recovers quickly, does not normally cause delayed or lasting damage to health. After inhaling relevant amounts of hydrogen sulfide gas, permanent respiratory disorders and increased susceptibility to lung infections have been reported.

4. Measures

4.1. Self-protection of first aiders

If there is a suspicion that the area the helper must enter contains hydrogen sulfide, a self-contained breathing apparatus and a chemical protection suit must be worn. Contaminated equipment should not be used.
There is no danger from contact with patients who have only been exposed to hydrogen sulfide gas. A patient who is wet with liquid hydrogen sulfide or whose clothing is wet with liquid hydrogen sulfide may endanger other people through direct contact or through hydrogen sulfide gas emissions.

4.2. Rescue

Patients should be removed from the danger zone immediately. If they are unable to walk unaided, they should be removed from the danger zone quickly using appropriate means, taking care to protect yourself. The "A, B, C procedure" then takes absolute priority.

A) Clear the airways (check for blockages caused by the tongue or foreign objects)
B) Ventilation (check the patient's breathing, if necessary, begin ventilation with adequate self-protection, e.g. breathing mask)
C) Circulation (begin resuscitation for any person who does not respond to verbal commands and is not breathing normally)

4.3. Cleaning

Patients who have only been exposed to gaseous hydrogen sulfide and show no signs of skin or eye irritation do not require any special cleaning measures, unlike all others.
If possible, patients should assist with their own decontamination. If liquid hydrogen sulfide has been present and clothing is contaminated, it must be removed and securely wrapped.
If the eyes have been exposed to hydrogen sulfide or if there is eye irritation, they must be rinsed with water or a neutral saline solution for 15 minutes. Contact lenses must be removed, if possible, without causing additional danger to the eye. Other important emergency measures must be continued during this time.
Rinse affected skin and hair with water for at least 15 minutes. Protect eyes while rinsing. Continue other important first aid measures during this time.

4.4. Further measures

Anyone who may have been exposed to hydrogen sulfide should seek medical attention immediately.

4.5. Instructions for further rules of conduct

Consult your family doctor or the emergency department of the nearest hospital if any abnormalities or symptoms occur within the next 24 hours, in particular:

- Coughing, wheezing or whistling breath
- Breathing difficulties or shortness of breath
- Increased pain or abnormalities in the affected skin areas or eyes
- Pain or tightness in the chest

5. References

Berufsgenossenschaft der chemischen Industrie, Hrsg. Schwefelwasserstoff. Heidelberg: Jedermann-Verlag, 1990. (Merkblätter für gefährliche Arbeitsstoffe; M 041.)

Berufsgenossenschaft der chemischen Industrie, Hrsg. Warngeräte für Schwefelwasserstoff. Heidelberg: Jedermann-Verlag, 1996. (Technische Merkblätter; T 017.)

Buttgereit F, Dimmeler S, Neugebauer E, Burmester GR. Wirkungsmechanismen der hochdosierten Glucocorticoidtherapie. Dtsch Med Wschr 1996; 121: 248-252.

Diller WF. Anmerkungen zum Unglück in Bhopal. Dtsch Med Wschr 1985; 110: 1749-1751.

Ellenhorn MJ, Schonwald S, Ordog G, Wasserberger J. Ellenhorn's Medical Toxicology: Diagnosis and Treatment of Human Poisoning. 2nd ed. Baltimore: Williams & Wilkins, 1997: 1489-1493.

Goldfrank LR, Flomenbaum NE, Lewin NA, Weisman RS, Howland MA, Hoffman RS. Toxicologic Emergencies. 6th ed. Norwalk: Appleton & Lange, 1998: 1526, 1528, 1529, 1540, 1572, 1576-1579.

Guidotti TL. Hydrogen sulfide. Occup Med 1996; 46: 367-371.

Hauptverband der gewerblichen Berufsgenossenschaften (HVBG), Hrsg. Merkblatt für die Erste Hilfe bei Einwirkungen gefährlicher chemischer Stoffe. Köln: Carl Heymanns Verlag, 1989; ZH 1/175.

Milby TH, Baselt RC. Hydrogen Sulfide Poisoning: Clarification of Some Controversial Issues. Am J Ind Med 1999; 35: 192–195.

Thiess AM. Kasuistischer Beitrag über eine Schwefelwasserstoff-Intoxikation mit tödlichem Ausgang. Zbl Arbeitsmed 1968; 18: 366-368.

Thiess AM, Kleinsorge H. Neurotoxisch wirkende Substanzen und Unfallgeschehen in der chemischen Industrie. Zbl Arbeitsmed 1977; 27: 77-80.

Thiess AM, Schmitz T. Gesundheitsschädigungen und Vergiftungen durch Einwirkung von Reizstoffen auf die oberen und mittleren Atemwege. Sichere Arbeit 1969; 3/69: 11-18.

Foncerrada G et al, Safety of Nebulized Epinephrine in Smoke Inhalation Injury, J Burn Care Res 2017;38:396–402

Walker PGF et al, Diagnosis and management of inhalation injury: an updated review, Critical Care (2015) 19:351

Olasveengen TM, Semeraro F, et. Al: European Resuscitation Council Guidelines 2021: Basic Life Support. Resuscitation 2021, 161: 98-114

Administrative Information

Document Type	Chemical Emergency Medical Guideline
Number of Version	DE.1.0.0
Initial Publication	01.01.2026
Next Revision	2029
Responsible Unit (Author)	ESG/CH ESG/AS
Contact	ESG/CH: Dr. M. Conzelmann, T. Schröck ESG/AS: Dr. D. Frambach

BASF SE
Corporate Health Management
Carl-Bosch-Straße 38
67056 Ludwigshafen
Germany