

Hydrogen Sulfide

Hydrogen sulfide (H_2S) is a highly toxic colorless and flammable gas that is released from degrading protein waste such as manure and sewage, and accumulates in confined spaces and low-lying areas. Hydrogen sulfide is also a byproduct in the petroleum, natural gas, rubber, rayon and mining industries. Poisonings are not common but it is a leading cause of sudden death in the workplace. There are numerous case reports of rescuers without proper protection becoming victims when attempting to remove and treat patients.

Hydrogen sulfide has a strong sulfur or "rotten egg" odor, but because it rapidly paralyzes the sense of smell in concentrations greater than 50-150 ppm, the odor may not be detected. Low level exposures produce headache and mucus membrane, eye and upper respiratory tract irritation. Systemic toxicity occurs due to inhibition of cytochrome oxidase causing cellular hypoxia, similar to cyanide. Those exposed to concentrations greater than 200 ppm may also experience nausea, vomiting, diarrhea, confusion, dizziness, tachycardia or bradycardia, hypotension or hypertension, dysrhythmias, weakness, cyanosis, acute lung injury and coma. A "knock-down" effect occurs at concentrations greater than 750 ppm. The victim suddenly collapses with respiratory paralysis. Seizures can occur secondary to hypoxia. Arterial blood gas testing reveals a metabolic acidosis, elevated serum lactate, and often a normal oxygen saturation. Delayed respiratory and neurological effects (memory loss, delirium, dementia, vision loss, and more) may develop up to 72 hours after an acute exposure.

Unlike cyanide, the hydrogen sulfide binding to cytochrome oxidase reverses spontaneously; therefore, if the patient is promptly removed from the area, complete recovery might occur. Oxygen (100%) should be administered immediately. Antidotal treatment with sodium nitrite could have some effect if given soon after the exposure. Hyperbaric oxygen therapy may be considered for patients who do not respond to supportive care and nitrite administration.

Call the Maryland Poison Center (1-800-222-1222) for assistance in assessing and treating patients who have been exposed to hydrogen sulfide.

DID YOU KNOW THAT... there have been reports of suicides with hydrogen sulfide?

There are internet sites that give instructions on how to commit suicide by mixing sulfur-containing products (e.g. some insecticides, fungicides and paints) with strong acids (e.g. tile and toilet bowl cleaners), producing hydrogen sulfide. This is usually done in enclosed spaces such as cars. This trend has been popular in Japan for several years but only recently reported in the United States. First responders should consider the possibility of a hydrogen sulfide exposure when a rotten egg odor is detected, or product containers are found at the scene of a possible suicide. Although a less obvious clue, darkened or discolored silver and copper coins may be noticed on or near the patient.



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