



DETECTING HYDROGEN SULPHIDE

FORMULA: H_2S | CAS: 7783-06-4

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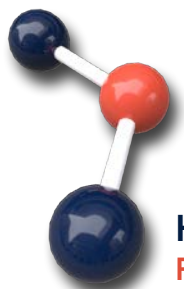
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Hydrogen Sulphide

Formula: H₂S | CAS: 7783-06-4

Hydrogen Sulphide (H₂S) is a gas commonly found during the drilling and production of crude oil and natural gas, plus in wastewater treatment and utility facilities and sewers. The gas is produced as a result of the microbial breakdown of organic materials in the absence of oxygen. Colourless, flammable, poisonous and corrosive, H₂S gas is noticeable by its rotten egg smell. With toxicity similar to carbon monoxide, which prevents cellular respiration, monitoring and early detection of H₂S could mean the difference between life and death.

It is also used or is a by-product in many industrial processes such as:

- Petroleum production and refining
- Sewer and wastewater treatment
- Agricultural silos and pits
- Textile manufacturing
- Pulp and paper processing
- Food processing
- Hot asphalt paving
- Mining

Many workers are at risk of exposure to hydrogen sulphide, especially when working in confined spaces. For example,

- Sanitation workers can be exposed when cleaning or maintaining municipal sewers and septic tanks.
- Farm workers can be exposed when cleaning manure storage tanks or working in manure pits.
- Workers in oil and natural gas drilling and refining may be exposed because hydrogen sulphide may be present in oil and gas deposits and is a by-product of the desulfurisation process of these fuels.

[See OSHA Oil and Gas Well Drilling and Servicing eTool.](#)

In general, working in the following areas and conditions increases a worker's risk of overexposure to hydrogen sulphide:

- Confined spaces (for example pits, manholes, tunnels, wells) where hydrogen sulphide can build up to dangerous levels.
- Windless or low-lying areas that increase the potential for pockets of hydrogen sulphide to form.
- Marshy landscapes where bacteria break down organic matter to form hydrogen sulphide.
- Hot weather that speeds up rotting of manure and other organic materials, and increases the hydrogen sulphide vapour pressure.





Health & Safety Impacts Of Hydrogen Sulphide (SHORT-TERM)

Gas is a silent threat, often invisible to the body's senses. Inhalation is the primary route of exposure to hydrogen sulphide. Though it may be easily smelled by some people at small concentrations, continuous exposure to even low levels of H₂S quickly deadens the sense of smell (olfactory desensitisation). Exposure to high levels of the gas can deaden the sense of smell instantly. Although the scent of H₂S is a characteristic, smell is not a dependable indicator of H₂S gas presence or for indicating increasing concentrations of the gas.

H₂S irritates the mucous membranes of the body and the respiratory tract, among other things. Following exposure, short-term, or acute, symptoms may include a headache, nausea, convulsions, and eye and skin irritation. Injury to the central nervous system can be immediate and serious after exposure. At high concentrations, only a few breaths are needed to induce unconsciousness, coma, respiratory paralysis, seizures, and even death.

Health & Safety Impacts Of Hydrogen Sulphide (LONG-TERM)

Those having prolonged exposure to high enough levels of H₂S gas to cause unconsciousness may continue to experience headaches, reduced attention span and motor functions. Pulmonary effects of H₂S gas exposure may not be apparent for up to 72 hours following removal from the affected environment. Delayed pulmonary edema and a build-up of excess fluid in the lungs may also occur following exposure to high concentrations.

H₂S does not accumulate in the body, but repeated/prolonged exposure to moderate levels can cause low blood pressure, headache, loss of appetite and weight loss. Prolonged exposure to low levels may cause painful skin rashes and irritated eyes. Repeated exposure over time to high levels of H₂S may cause convulsions, coma, brain and heart damage and even death.

Heavier than air, H₂S gas accumulates in low-lying areas of poorly ventilated spaces. In oil and gas applications, sour gas (products containing H₂S gas) in the presence of air and moisture may form sulfuric acid, capable of corroding metals. Facility equipment, including the internal surfaces of various components, faces reduced durability and impact strength, potentially leading to premature failure.

Detection Of Hydrogen Sulphide Gas

Hydrogen sulphide is a fast-acting poison, impacting many systems within the body. Wearable gas sensors are necessary for early detection and alerting, as the body's senses are not reliable indicators. Importantly, a personal gas detector such as the ION Science ARA H₂S Single Gas detector should be considered as it alerts the worker to H₂S gas exposure providing an instantaneous alarm within a life-critical safety scenario. The device features a fast response time and sturdy construction, both important for use within harsh environments where H₂S may occur. Additionally, as H₂S may desensitise and render the body unconscious in no time at high concentrations, connected personal monitoring equipment is crucial.

The ARA H₂S Gas Detector is a low cost, low maintenance, disposable Single Gas Detector for compliance monitoring and worker safety and is available from ION Science.

Visit ionscience.com/products/ara-h2s-single-gas-detector/ for more information.



Hydrogen Sulphide Exposure Limits

The Occupational Safety and Health Administration (OSHA) defines Permissible Exposure Limits (PELs) to H₂S gas as follows:

- General Industry Ceiling Limit: 20 ppm
- General Industry Peak Limit: 50 ppm
(up to 10 minutes if no other exposure during shift)
- Construction 8-hour Limit: 10 ppm
- Shipyard 8-hour limit: 10 ppm

The explosive range of hydrogen sulfide in air is 4.5 to 45.5 percent. This range is much higher than the PEL.



References

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<https://www.blacklinesafety.com/blog/h2s-gas-need-know>

2. United States Department Of Labor - H₂S Hazards

<https://www.osha.gov/SLTC/hydrogensulfide/hazards.html>

3. ATSDR - Managing Hazardous Materials Incidents

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