



HYDROGEN SULFIDE

SafetyNet #24

What is it?

Hydrogen sulfide (H_2S) is a colorless, extremely poisonous, flammable gas, with an ignition temperature of $260^{\circ}C$. Notable for its very pungent odor resembling rotten eggs, H_2S occurs naturally in coal pits, sulfur springs, sewers, gas wells, and as a product of decaying organic matter. It is also a commonly generated byproduct of many research, industrial, and manufacturing processes.

Hazards

H_2S is an extremely poisonous gas. Classified as a chemical asphyxiant, similar to carbon monoxide and the cyanides, H_2S interferes with cellular respiration (oxygen uptake) causing biochemical suffocation. At levels above 200 ppm, after only one or two inhalations, collapse, coma and death from respiratory failure may occur within seconds.. Concentrations between 50 - 200 ppm can cause severe eye and respiratory tract irritation, acute conjunctivitis, lacrimation, difficulty breathing and sudden loss of consciousness. At levels between 10 and 50 ppm, affected persons experience mild eye and respiratory tract irritation, headaches and dizziness. Low concentrations (less than 10 ppm) cause mild eyes, mucous membranes and upper respiratory system irritation. Prolonged exposures at the lower levels can lead to bronchitis, pneumonia, migraine headaches, pulmonary edema and loss of motor coordination.

Despite a low odor threshold for this gas (less than 1 ppm can be easily detected), one cannot rely on their nose as a warning device. H_2S is considered an insidious poison because the gas rapidly fatigues olfactory (nasal) receptors. Once the olfactory receptor has been fatigued, it is impossible to smell the hydrogen sulfide gas at any concentration. At high concentrations olfactory fatigue can occur almost instantaneously.

Exposure Pathways

The primary route of exposure to hydrogen sulfide is inhalation. The California Occupational Safety and Health Administration (Cal-OSHA) permissible exposure limit (PEL) for H_2S is 10 ppm. This level is 10 times lower than the "immediately dangerous to life or health" level of 100 ppm set by the National Institute for Occupational Safety and Health (NIOSH).

Recommended Protection

The best protection from overexposure to H_2S is regular monitoring to identify areas and operations likely to exceed Cal-OSHA's PEL. The use of direct reading instrumentation (e.g., gas detection meters) is required before entering confined spaces such as manholes, tanks, pits, and large reaction vessels that could contain or accumulate H_2S gas. Areas that routinely pose overexposure hazards should be equipped with continuous monitoring instruments. Where concentration levels cannot be adequately reduced with engineering equipment and ventilation systems, it may necessary to use supplied air respirators.

If you have any questions about hydrogen sulfide, your workplace procedures, potential exposure, or the use of detection or personal protective equipment, please contact your EH&S Safety Advisor, EH&S at 530-752-1493 or ehsdesk@ucdavis.edu.

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Reference: <http://www.eh.doe.gov/docs/hha/hha.0006.html>