A. Summary
Hydrogen sulfide (H₂S) is a colorless and extremely poisonous gas with a very pungent and characteristic odor of rotten eggs. It occurs naturally in coal pits, sulfur springs, gas wells, and as a product of decaying organic matter. It is commonly generated as a byproduct of many research, industrial, and manufacturing processes. It is also a flammable gas, with an ignition temperature of 260°C.

B. Hazards
Classified as a chemical asphyxiant, similar to carbon monoxide and the cyanides, H₂S interferes with cellular respiration and uptake of oxygen, causing biochemical suffocation.

Despite a low odor threshold for the gas in the air (less than 1 ppm can be easily detected), an individual's sense of smell is not reliable as a warning device. H₂S is considered an insidious poison, because the gas rapidly fatigues one’s sense of smell. At high concentration levels, this fatigue can occur almost instantaneously. When this occurs, it is impossible to smell the gas at any concentration.

- Concentrations above 100 ppm: Can cause a collapse, coma and death from respiratory failure may occur within seconds after only one or two inhalations.
- Concentrations from 20 - 50 ppm: Can cause severe eye and respiratory tract irritation, acute conjunctivitis, lacrimation, difficulty breathing, and sudden loss of consciousness.
- Concentrations from 10 - 20 ppm: Can cause mild eye and respiratory tract irritation, headaches and dizziness.
- Concentrations less than 10 ppm: Can cause mild irritation of the eyes, mucous membranes, and upper respiratory system.

Note: Prolonged exposures at the lower levels can lead to bronchitis, pneumonia, migraine headaches, pulmonary edema, and loss of motor coordination.
C. Exposure Pathways
The primary route of exposure is inhalation. The California Occupational Safety and Health Administration (Cal/OSHA) permissible exposure limit (PEL) for H₂S 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).

D. Recommended Protection
The best protection from overexposure to H₂S is regular monitoring to identify areas and operations likely to exceed Cal/OSHA’s PEL. The use of direct reading instrumentation should be required before entering confined spaces such as manholes, tanks, pits, and large reaction vessels that could contain or accumulate H₂S 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 be necessary to use supplied air respirators.

If you have any questions about H₂S and your workplace procedures, potential exposures, or the use of personal protective equipment, please contact EH&S (530-752-1493).