

Hydrogen Sulfide (H₂S) Safety in Industrial Environments: Protecting Workers and Preventing Incidents

Course general description:

Hydrogen sulfide (H₂S) is a highly toxic gas commonly encountered in industries such as oil and gas, refining, wastewater treatment, and agriculture. Its rapid onset of toxicity and potential for catastrophic incidents make **H₂S** safety a critical focus for industrial operations. This course provides participants with comprehensive knowledge of **H₂S** properties, detection methods, respiratory protection, and emergency response procedures. Through lectures, hands-on exercises, case studies, and interactive discussions, participants will learn to identify H₂S hazards, implement monitoring systems, and protect workers effectively. The course aligns with **ANSI/ASSE Z390.1** and **OSHA 29 CFR 1910.1000** standards to ensure compliance and best practices.

Audience:

This course is intended for:

- Oil and gas industry professionals (drilling, production, refining)
- Wastewater treatment plant operators
- HSE (Health, Safety, and Environment) managers and officers
- Emergency response teams
- Confined space entry supervisors and workers
- Anyone working in environments where H₂S exposure is a potential risk.

Course objectives:

By the end of this course, participants will be able to:

- Understand the properties, toxicity, and sources of hydrogen sulfide (H₂S).
- Identify H₂S hazards in industrial environments and assess associated risks.
- Use fixed and portable gas monitors for H₂S detection and monitoring.
- Implement respiratory protection and confined space entry protocols for H₂S exposure.
- Respond effectively to H₂S incidents, including rescue procedures and first aid.
- Align training and safety programs with ANSI/ASSE Z390.1 and OSHA 29 CFR 1910.1000 standards.

Course duration:

5 days

Course location:

Dubai

Course contents:

Day-1: H₂S Properties, Toxicity, and Sources

- Overview of H₂S – Physical and chemical properties, toxicity mechanisms, exposure limits (PEL, STEL, IDLH), and health effects.
- Common sources of H₂S – Found in oil wells, refineries, wastewater treatment plants, and agricultural settings.
- Regulatory frameworks – ANSI/ASSE Z390.1 and OSHA 29 CFR 1910.1000 compliance requirements.
- Case study – Analyzing an H₂S exposure incident in a refinery.
- Pretest – Assessing participants' baseline knowledge of H₂S safety principles.

Day-2: Detection Methods and Monitoring Systems

- Fixed and portable gas detection systems – Installation, calibration, maintenance, and limitations.

- Continuous monitoring best practices – Ensuring safety in high-risk areas.
- Alarm systems and emergency response protocols – Procedures for handling elevated H₂S levels.
- Practical exercise – Hands-on calibration and use of a portable H₂S monitor.
- Quiz – Covering detection methods and monitoring systems.

Day-3: Respiratory Protection and Confined Space Entry

- Respiratory protection types – SCBA, supplied-air respirators, and escape hoods.
- Selection criteria for respiratory equipment – Based on H₂S exposure levels.
- Confined space entry protocols – Permits, hazard assessments, atmospheric testing, and emergency retrieval systems.
- Practical exercise – Simulating a confined space entry with H₂S monitoring.
- Quiz – Focused on respiratory protection and confined space safety.

Day-4: Emergency Response and First Aid

- Emergency response planning – Roles and responsibilities in H₂S incidents.
- Rescue procedures – Non-entry vs. entry rescues.
- First aid for H₂S exposure – Oxygen therapy, CPR, and medical evacuation.
- Practical exercise – Simulating an H₂S rescue operation.
- Quiz – Covering emergency response strategies.

Day-5: Compliance, Case Studies, and Final Assessment

- Compliance with ANSI/ASSE Z390.1 and OSHA 29 CFR 1910.1000 – Record-keeping and safety program documentation.
- Review of key concepts and emerging trends – Advanced detection technologies and worker protection methods.
- Final assessment – Written test covering all course topics.
- Post-course feedback session – Evaluating participants' learning outcomes.

Methodology:

- 50% lectures & concepts
- 10% Videos
- 10% Case studies
- 10% Exercises
- 10% Discussions

Course code: (THSE017)