Hydrogen Sulphide Awareness — study guide

Hydrogen sulphide (H_2S) is a toxic, flammable gas found in crude oil and in tank atmospheres on oil and chemical tankers. It deadens the sense of smell, so you cannot rely on your nose to warn you. This guide covers the exposure limits, the health effects, detection and protection.

Exposure limits

Under the COSHH Regulations, the **long-term** exposure limit for hydrogen sulphide is **5 ppm averaged over an 8-hour reference period**, and the **short-term** exposure limit is **10 ppm averaged over a 15-minute reference period**.[1][2]

Properties

Hydrogen sulphide is heavier than air (so it accumulates in low spaces), it is flammable, and it burns with a blue flame.

Health effects by concentration

- **0–10 ppm** — you may detect a "rotten egg" smell, but this can disappear after a time as your sense of smell is damaged.
- **50–100 ppm** — may lead to eye damage.
- **320–530 ppm** — may result in pulmonary oedema (fluid in the lungs) with the possibility of fatal consequences.

Personal protective equipment

Work in areas where personnel may be exposed to H_2S requires waterproof, chemical-resistant coveralls, gloves and boots, and protective goggles — together with respiratory protective equipment (RPE).

Detection

- **Fixed detectors** are placed strategically around the installation and initiate toxic-gas alarms to the bridge.
- **Portable detectors** include hand-held sampling detectors used for background monitoring of H_2S levels.
- **Personal detectors** are worn by personnel and must be within the user's breathing zone.

RPE must be checked before use (check the air lines for air-supplied breathing apparatus) and examined and tested thoroughly at least every month.

Duties under COSHH

Employers must provide means of detecting, monitoring and protecting personnel from exposure; establish H_2S contingency plans and ensure emergency escape and

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evacuation arrangements are in place; and ensure defined occupational exposure levels are not exceeded. **Employees** must co-operate with the ship's Master and follow company procedures at all times, and use the protective equipment provided as instructed.

Bunkering and risk assessment

Fuel tanks should be checked for H_2S before bunkering, during bunkering and after bunkering. Where there is a potential risk of exposure to significant levels of H_2S on oil and chemical tankers, the ship operator or owner is required to **assess** the risk, put a contingency plan in place and **manage** the identified risks.

Key facts to remember

- Long-term limit 5 ppm (8-hour); short-term limit 10 ppm (15-minute).
- H_2S is heavier than air, flammable, and burns with a blue flame.
- 0–10 ppm: rotten-egg smell that fades as smell is damaged; 50–100 ppm: eye damage; 320–530 ppm: pulmonary oedema, potentially fatal.
- PPE: chemical-resistant coveralls, gloves, boots, goggles, plus RPE.
- Detectors: fixed (alarm to bridge), portable (background), personal (breathing zone). Test RPE at least monthly.
- COSHH: employer monitors and plans; employee co-operates and uses PPE as instructed.
- Check tanks before, during and after bunkering; tanker operators must assess and manage the risk.

Sources

1. Control of Substances Hazardous to Health (COSHH) Regulations 2002 (UK) — assessment, control and contingency planning for hazardous substances.
2. HSE EH40/2005 — Workplace Exposure Limits (long-term 5 ppm / 8 h; short-term 10 ppm / 15 min for hydrogen sulphide).