














Hydrogen sulfide *and other sulfides*

including carbon disulfide, ammonium sulfide and most metal sulfides

Substance	Hazard	Comment
Hydrogen sulfide <i>Gas</i>	 FLAMM.  TOXIC  ENVIRON. HAZARD	DANGER: extremely flammable gas; fatal if inhaled; very toxic to aquatic organisms. Mixtures of hydrogen sulfide with air containing between 4% and 45% hydrogen sulfide are explosive. For a 15-minute exposure, the concentration of the gas in the atmosphere should not exceed 14 mg m ⁻³ . It has a very strong smell of rotten eggs and the human nose can detect as little as 0.01 mg m ⁻³ . At higher concentrations it anaesthetises (deadens) the sense of smell and so the danger may not be realised. It may sometimes be found in coal mines (stinkdamp) and is produced by rotting seaweed and is the commonest cause of death in sewer workers.
Hydrogen sulfide <i>Solution in water</i>	 TOXIC	DANGER: hydrogen sulfide gas is acutely toxic by inhalation and diffuses readily from solutions. However, use of solutions of hydrogen sulfide is safer than using the gas.
Carbon disulfide <i>Liquid</i>	 FLAMM.  IRRITANT  HEALTH HAZARD	DANGER: highly flammable liquid and vapour; causes skin and serious eye irritation; suspected of damaging fertility and the unborn child; causes damage to organs through prolonged or repeated exposure. For a 15-minute exposure, the concentration of the gas in the atmosphere should not exceed 45 mg m ⁻³ ; flash point -30 °C. Very volatile. The demonstration involving the reaction with nitrogen monoxide (the 'barking dog') is very dangerous, especially if the oxide is not pure.
Ammonium sulfide <i>Solution in water</i>	 FLAMM.  CORROSIVE  ENVIRON. HAZARD	DANGER (if more than 20%, ~3M): flammable liquid & vapour; causes severe skin burns & eye damage; contact with acids liberates toxic gas; very toxic to aquatic organisms. DANGER (if more than 0.4 M but less than ~3M): causes severe skin burns & eye damage; contact with acids liberates toxic gas. WARNING (if more than 0.1 M but less than 0.4M): irritating to eyes & skin; contact with acids liberates toxic gas. All the solutions are strongly alkaline. Dilute acid reacts to produce hydrogen sulfide. Absorbs carbon dioxide from the atmosphere, producing hydrogen sulfide.
Sodium sulfide <i>Hydrated solid & solutions in water</i>	 CORROSIVE  TOXIC  ENVIRON. HAZARD	DANGER (solid): harmful if swallowed; toxic in contact with skin; causes severe skin burns & eye damage; contact with acid liberates toxic gas; very toxic to aquatic organisms. DANGER (solution if more than 0.4M): harmful if swallowed; causes severe skin burns & eye damage; contact with acid liberates toxic gas. WARNING (solution if more than 0.1M but less than 0.4M): irritating to skin and eyes; contact with acid liberates toxic gas. All the solutions are strongly alkaline. Absorbs carbon dioxide from the atmosphere, producing hydrogen sulfide.
Most metal sulfides <i>Insoluble solids</i>	Currently not classified as hazardous	Includes copper(II) sulfide , copper pyrites , iron(II) sulfide , iron pyrites ('fool's gold'), zinc sulfide . Dilute acid reacts to produce hydrogen sulfide. If heated strongly in air, may produce toxic sulfur dioxide (see <i>Sheet 52</i>).

Typical control measures to reduce risk

- If producing the gas, use the smallest amounts possible, eg no more than a few drops of acid on excess sulfide.
- Wear eye protection.
- Use a fume cupboard if adding more than a few drops of dilute acid to excess sulfide; ensure good laboratory ventilation and quickly dispose of solutions containing hydrogen sulfide.
- If smelling the gas, follow the safe technique: use your hand to waft the gas towards your nose.

Assessing the risks

- What are the details of the activity to be undertaken? What are the hazards?
- What is the chance of something going wrong?
eg a leak of gas into the laboratory from apparatus or a warmed solution.
- How serious would it be if something did go wrong?
- How can the risk(s) be controlled for this activity?
eg can it be done safely? Does the procedure need to be altered? Should goggles or safety spectacles be worn?

Emergency action

In all emergency situations, alert the responsible adult immediately. Be aware that actions may include the following:

- In the eye Irrigate the eye with gently-running tap water for at least 20 minutes. Call 999/111.
- Vapour breathed in Remove the casualty to fresh air. Call 999/111 if breathing is difficult.
- Gas escape in laboratory Open all windows. If over 1 litre of gas is released, evacuate the laboratory.