









Hydrogen sulfide & other sulfides

including carbon disulfide, ammonium, sodium, potassium, zinc, copper and iron sulfides

Substance	Hazard	Comment
Hydrogen sulfide Gas	  EXTREMELY VERY FLAMMABLE TOXIC	Mixtures of hydrogen sulfide with air containing between 4% and 45% hydrogen sulfide are explosive. It is very toxic if breathed in (more toxic than hydrogen cyanide). For a 15-minute exposure, the concentration of the gas in the atmosphere should not exceed 14 mg m ⁻³ . In an average school laboratory, that level would be reached by the action of 200 cm ³ . 1 M hydrochloric acid on excess sulfide. It has a very strong smell of rotten eggs and the human nose can detect as little as 0.01 mg m ⁻³ , ie a drop or two 1 M hydrochloric acid on excess sulfide in an average school laboratory. 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 (<i>stinkdamp</i>) and is produced by rotting seaweed and is the commonest cause of death in sewer workers. Use of solutions of hydrogen sulfide or ammonium, potassium or sodium sulfides is safer than using the gas, although the gas will escape readily from the solutions, especially on warming.
Hydrogen sulfide Solution in water (if 0.3 M or more)	 TOXIC	
Hydrogen sulfide Dilute solution in water (if less than 0.3 M but 0.03 M or more)	 HARMFUL	
Hydrogen sulphide (if less than 0.03M) Very dilute solution in water	LOW HAZARD	
Carbon disulfide Liquid	  HIGHLY TOXIC FLAMMABLE	This is highly flammable and toxic. There is a danger of serious damage to health through prolonged exposure by inhalation. It may harm the unborn child and may impair fertility. It is irritating to eyes and skin. Use of this is not recommended in schools. The demonstration involving the reaction with nitrogen monoxide is very dangerous, especially if the oxide is not pure.
Sodium & potassium sulfide solid or solution (if 0.4 M or more) & ammonium sulfide solution (if 0.7 M or more)	 CORROSIVE	Dilute acid reacts to produce hydrogen sulfide. The solids absorb moisture from the atmosphere, producing hydrogen sulfide. The solutions are strongly alkaline.
Sodium & potassium sulfide dilute solution (if less than 0.4 M but 0.2 M or more) & ammonium sulfide dilute solution (if less than 0.7 M but 0.2 M or more)	 IRRITANT	
Sodium, potassium & ammonium sulfide very dilute solution (if less than 0.2 M)	LOW HAZARD	
Copper sulfide, copper pyrites, iron sulfide, iron pyrites, zinc sulfide solids	LOW HAZARD	These are insoluble in water. Dilute acid reacts to produce hydrogen sulfide. If heated strongly in air, may produce toxic sulfur dioxide (see <i>Sheet 52</i>) and the metal oxide. Iron pyrites is known as fool's gold.

Typical control measures to reduce risk

- If producing the gas in the lab, 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 the eye Flood the eye with gently-running tap water for 10 minutes. See a doctor.
- Vapour breathed in Remove the casualty to fresh air. Call a doctor if breathing is difficult.
- Gas escape in a laboratory Open all windows. If over 1 litre of gas is released, evacuate the laboratory.