







Sulfur & Phosphorus

Substance	Hazard	Comment
Sulfur <i>Solid</i>	 IRRITANT	<p>WARNING: Causes skin irritation. Some suppliers may also classify it as a flammable solid. Under the <i>Explosives Regulations</i> it is illegal to make mixtures with potassium chlorate(V) or other chlorates, without the prior approval of the Health & Safety Executive.</p> <p>Yellow crystals of sulfur occur in volcanic regions. In Victorian times, children were fed a mixture of brimstone (sulfur) and treacle, to do them good!</p> <p>Sulfur burns to form sulfur dioxide gas (TOXIC). See CLEAPSS <i>Student Safety Sheet 52</i>. Asthmatics are particularly vulnerable.</p> <p>When melting sulfur or heating it, eg, with iron, insert a plug of mineral wool in the mouth of the test tube to prevent sulfur vapour escaping and igniting.</p>
Phosphorus (red) <i>solid</i>	 FLAMMABLE	<p>DANGER: Flammable solid; harmful to aquatic life with long-lasting effects. Under the <i>Explosives Regulations</i> it is illegal to make mixtures with potassium chlorate(V) or other chlorates, without the prior approval of the Health & Safety Executive.</p> <p>May be explosive when mixed with oxidising substances. It has been used in the heads of some matches.</p>
Phosphorus (yellow/white) <i>solid</i>	  FLAMMABLE TOXIC   CORROSIVE ENVIR.	<p>DANGER: catches fire spontaneously if exposed to air; fatal if swallowed or inhaled; causes severe skin burns and eye damage; very toxic to aquatic life. For a 15-minute exposure, the concentration in the atmosphere should not exceed 0.3 mg m^{-3}. Under the <i>Explosives Regulations</i> it is illegal to make mixtures with potassium chlorate(V) or other chlorates, without the prior approval of the Health & Safety Executive.</p> <p>It has a long history of causing poisoning, eg, amongst workers using phosphorus to make matches. When handling it, have copper(II) sulfate(VI) solution (0.2 M to 0.5 M) available to remove specks on the skin, clothing, bench, etc.</p> <p>It is used in incendiary bombs. When it burns, corrosive fumes are formed. Phosphorus fires are difficult to extinguish; smother with dry sand.</p> <p>It must be stored under water (or under an inert gas). When cutting phosphorus, do this under water, otherwise friction ignites it. It is hard to cut; do this in a strong container, eg, a mortar or plastic bowl – not glass, which is too fragile.</p>

Typical control measures to reduce risk

- Wear eye protection when handling phosphorus or when heating or burning sulfur. Use small amounts.
- Avoid breathing fumes of sulfur dioxide, eg, use a fume cupboard or prevent sulfur vapour from igniting by using a mineral-wool plug in the mouth of a test tube.
- Wear protective gloves if handling yellow/white phosphorus; store and handle it in the absence of air.

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, could sulfur vapour form? Could it ignite?
- **How serious would it be if something did go wrong?**
eg, could people be exposed to sulfur dioxide gas?
- **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. Consult a medic unless only a small amount of sulfur is involved.
- **Vapour breathed in** Remove the casualty to fresh air. Consult a medic if breathing is even slightly affected.
- **Swallowed** Do no more than wash out the mouth with drinking water. Do **not** induce vomiting. Consult a medic.
- **Spilt on the floor, bench, etc** For sulfur or red phosphorus, brush up. For yellow/white phosphorus, cover with sand to prevent ignition. Soak in copper sulfate solution until there is no further reaction, then brush up.