Copper *and its* compounds

including copper oxides, carbonate, sulfate, chloride *and* nitrate

Substance	Hazard	Comment
Copper (metal)	**Currently not classified as hazardous**	Sharp edges can present a risk of cuts. *Granulated* copper may be classified by some suppliers as toxic to aquatic life with long lasting effects.
Copper(I) oxides (Cuprous oxides) **Copper(II) oxides** (Cupric oxides)	 **CORROSIVE IRRITANT ENVIRON. HAZARD**	DANGER – copper(I) oxide – *causes serious eye damage; skin irritant; harmful if swallowed/inhaled; toxic to aquatic life. WARNING – copper(II) oxide – causes serious eye irritation; skin irritant; harmful if swallowed/ inhaled; toxic to aquatic life.
Copper(II) carbonate hydroxide (Basic copper carbonate, malachite)	 **IRRITANT ENVIRON. HAZARD**	WARNING – copper(II) carbonate hydroxide – causes serious eye irritation; skin irritant; harmful if swallowed/inhaled; toxic to aquatic life.
Copper(II) sulfate **Copper(II) nitrate** *Solids and concentrated solutions*	 **CORROSIVE IRRITANT ENVIRON. HAZARD**	DANGER – solids and solutions (≥ 1.0M **sulfate**, ≥ 1.3 M **nitrate**) – cause serious eye damage; skin irritant; harmful if swallowed (especially saturated solutions for crystal-growing). *Solid only – very toxic to aquatic life. Water added to anhydrous solid copper(II) sulfate(VI) produces heat.
Copper(II) sulfate **Copper(II) nitrate** *Dilute solutions*	 **CORROSIVE IRRITANT**	DANGER – **sulfate** (< 1.0 M and ≥ 0.2 M) and **nitrate** (< 1.3 M and ≥ 0.2 M) – skin irritant; cause serious eye damage. WARNING – **sulfate** (< 0.2 M and ≥ 0.02 M) and **nitrate** (< 0.15 M and ≥ 0.05 M) – skin and eye irritant. Currently not classified as hazardous – **sulfate** (< 0.02 M) and **nitrate** (< 0.05 M). Benedict's solution and Fehling's solution both contain dilute copper(II) sulfate(VI) but Fehling's solution has other hazards.
Copper(II) chloride *Solid*	 **IRRITANT ENVIRON. HAZARD**	WARNING – eye and skin irritant; harmful if swallowed; toxic to aquatic life.
Copper(II) chloride Solutions *(if 0.8M or more)*	 **IRRITANT**	WARNING – eye and skin; harmful if swallowed (≥ 1.8M).
Copper(II) chloride *Solution (if less than 0.8M)*	**Currently not classified as hazardous**	–

Typical control measures to reduce risk

- Wear eye protection.
- Use the lowest concentration possible.
- Avoid raising dust, eg by dampening powders.
- Take care if evaporating solutions to dryness.

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 solutions spurting out of test tubes when heated or solutions decomposing to toxic products when heated to dryness.
- How serious would it be if something did go wrong?
  eg are there hazardous reaction products (such as chlorine from the electrolysis of copper chloride)?
- 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.
- In the mouth/swallowed — Do no more than rinse and spit with drinking water. Do **not** induce vomiting. Call 999/111.
- Dust breathed in — Remove the casualty to fresh air. Consult a medic if breathing is difficult.
- Spilt on the skin or clothing — Remove contaminated clothing. Irrigate the affected area with gently-running tap water for at least 20 minutes. Call 999/111 as appropriate. Rinse clothing.
- Spilt on the floor, bench, etc — Scoop up solid (take care not to raise dust). Wipe up small solution spills or any traces of solid with cloth; for larger spills use mineral absorbent (eg cat litter).

