





Iron and its compounds

including Iron(II) and iron(III) oxides, carbonates, sulfates(VI), chlorides, bromide

Note: iron(II) compounds are often called **ferrous** and iron(III) compounds **ferric**

Substance	Hazard	Comment
Iron metal (powder)	 FLAMMABLE	WARNING: the powder is a flammable solid. Iron filings/powder in the eye are very painful because the iron oxidises rapidly in the saline environment. Samples of iron are often not very pure and on reacting with dilute acids may produce toxic hydrogen sulfide gas (smelling of bad eggs) (see CLEAPSS <i>Student Safety Sheet 59</i>). For reaction with sulfur, see CLEAPSS <i>Student Safety Sheet 82</i> . Iron often coated with zinc (galvanised) to protect it from corrosion.
Iron metal (filings, sheets or bars of metal)	LOW HAZARD	
Iron oxides or iron(II) carbonate	LOW HAZARD	Applies to all iron oxides: iron(III) oxide (haematite), iron(II) iron(III) oxide (magnetite or ferrosferric oxide). Iron(II) carbonate is usually sold mixed with a sugar (saccharated), to slow down oxidation.
Iron(II) or iron(III) sulfate(VI) or ammonium iron(II) sulfate (Mohr's salt) or ammonium iron(III) sulfate (ferric alum) Solid or concentrated solutions (if 0.5 M or more for iron(II) or 0.3 M for iron(III))	 IRRITANT	WARNING: Causes skin and serious eye irritation. Iron(III) also harmful by ingestion if 0.6 M or more. Usually solutions are made up in dilute sulfuric acid (which may itself be hazardous – see CLEAPSS <i>Student Safety Sheet 22</i>) to slow down oxidation. Ammonium iron(II)/iron(III) solutions are more stable but are still made up in acid to limit oxidation.
Iron(II) or iron(III) sulfate(VI) or ammonium iron(II) or iron(III) sulfate Dilute solutions (if less than 0.5 M iron(II) or 0.3 M iron(III))	LOW HAZARD	Solutions which have been made up in sulfuric acid may be hazardous if the acid is more than 0.5 M (see CLEAPSS <i>Student Safety Sheet 22</i>).
Iron(II) or iron(III) chloride Hydrated or anhydrous solid or concentrated solutions (if 0.1 M or more).	  HARMFUL CORROS.	DANGER: harmful if swallowed; causes skin irritation and serious eye damage. Some suppliers classify anhydrous solids and solutions more concentrated than 0.2M as corrosive. Usually solutions are made up in hydrochloric acid (see CLEAPSS <i>Student Safety Sheet 20</i>) to slow down oxidation. Solution (about 2 M) used for etching printed circuit boards.
Iron(II) or iron(III) chloride Dilute solutions (If less than 0.1M)	LOW HAZARD	Usually solutions are made up in hydrochloric acid (see CLEAPSS <i>Student Safety Sheet 20</i>) to slow down oxidation.

Typical control measures to reduce risk

- Use the lowest possible quantities and concentrations.
- Take care not to rub the eye with fingers contaminated with iron filings or powder.
- Wear eye protection.

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 heated to dryness and decomposing. .
- **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 eye with gently-running tap water for 10 minutes. Consult a medic if pain persists.
- **Swallowed** Do no more than wash out the mouth with drinking water. Do **not** induce vomiting. Consult a medic.
- **Dust breathed in** Remove the casualty to fresh air. Consult a medic if breathing is difficult.
- **Spilt on the skin or clothing** Brush solid off contaminated clothing. Rinse clothing or skin as necessary.
- **Spilt on the floor, bench, etc** Brush up solid spills, trying to avoid raising dust, then wipe with a damp cloth. Wipe up small solution spills with a cloth and rinse it well. For larger spills use mineral absorbent (eg, cat litter).