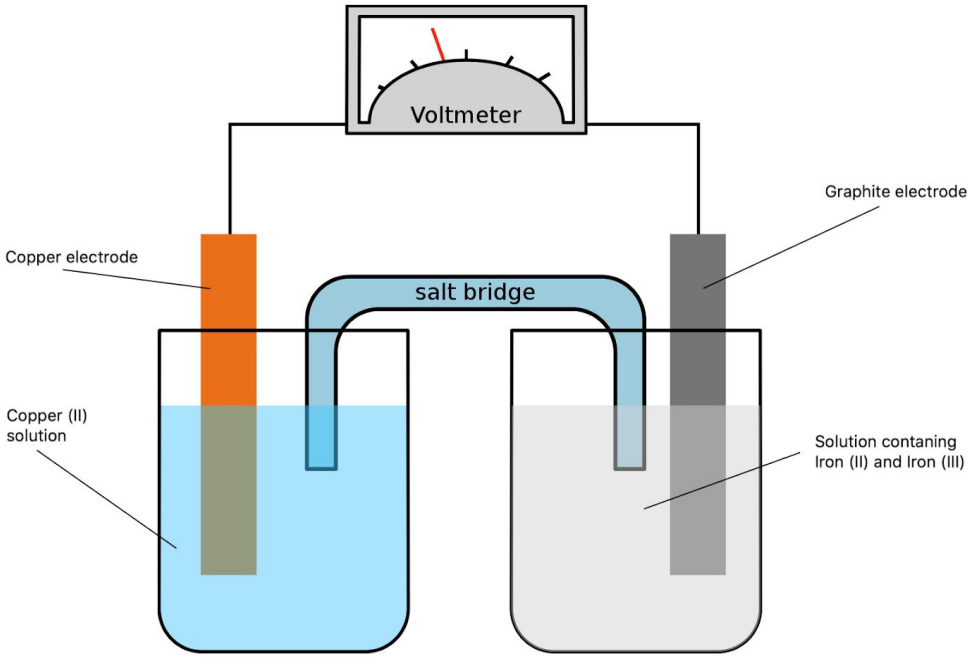
OCR (B) Chemistry A-Level

PAG 08: Electrochemical Cells

8.1: Electrochemical cells 1

Equipment list

- Eye protection
- Voltmeter
- 2 × wires and crocodile clips
- Copper strip (1 × 10 cm)
- Carbon/graphite rod
- 2 × 100 cm^3 beakers
- 2 × 50 cm^3 measuring cylinders
- Filter paper in strips (3 cm × 20 cm)
- Tweezers
- Emery paper
- Distilled water
- Copper sulfate (VI) solution (0.1 mol dm^{-3})
- Saturated potassium nitrate(V) solution
- Ammonium iron(II) sulfate solution
- Iron(III) chloride solution



Method

1. Clean a piece of copper and a piece of carbon using emery paper. Rinse them with distilled water and dry them.
2. Place the copper into a 100 cm^3 beaker with approx. 50 cm^3 of 0.1 mol dm^{-3} $CuSO_4$ solution.
3. Using a crocodile clip, connect the electrode to the negative terminal of the voltmeter
4. Place the carbon electrode into a mixture of aqueous ammonium iron (II) sulfate: iron (III) chloride of about 50 cm^3. (1:5 ratio)
5. Using a crocodile clip, connect the electrode to the positive terminal of the voltmeter.
6. Make a salt bridge by soaking a filter paper in saturated potassium nitrate solution.
7. Place each end of the filter paper in each of the beakers.
8. Measure and record the readings in a suitable format.
9. Repeat the experiment with the mixture of aqueous ammonium iron (II) sulfate: iron (III) chloride in different ratios.

Errors

- ❑ A non graphite/platinum electrode is used.
  This may react with the solutions. To prevent this use platinum or graphite electrodes as they are very unreactive and will not affect the voltmeter readings.
- ❑ A piece of wire is used as a salt bridge
  This will not allow the flow of ions, instead it will allow the flow of electrons through the wire, which will affect the voltmeter reading.
- ❑ The ratios are not exact due to errors in volume measurements
  Use more precise measurements or take from a standard solution.

Safety

- ➢ Mixture of aqueous ammonium iron (II) sulfate and iron (III) chloride causes serious eye irritation. Wear eye protection.
- ➢ $CuSO_4$ is very toxic to aquatic animals and cannot be poured down the sink.