Edexcel International Chemistry A-level

Practical 13

Carry out redox titrations with both:

i) iron(II) ions and potassium manganate(VII)

ii) sodium thiosulfate and iodine

Practical 13a

Finding the **percentage of iron** in the tablet using a redox reaction between iron ions and manganate ions:

$$5Fe^{2+} + MnO_4^- + 8H^+ \rightarrow 5Fe^{3+} + Mn^{2+} + 4H_2O$$

Preparing iron (II) solution

1. Use mortar and pestle to crush the tablets to a powder.
2. Weigh and record the mass of the crushed iron tablets in a weighing boat. Transfer to a 250 cm^3 beaker and reweigh the weighing boat and calculate the mass of iron transferred.
3. Add 100 cm^3 sulphuric acid and stir to dissolve tablets.
4. Filter the solution into a volumetric flask to remove any undissolved solids in the filter paper.
5. Wash the beaker and filter paper with distilled water to get any remaining solution into the volumetric flask. Dilute the solution in the volumetric flask by adding sulphuric acid to the 250 cm^3 mark.
6. Stopper the flask, then mix thoroughly by inverting and shaking vigorously.

Method

1. Prepare the titration equipment.
2. Add the standard solution $KMnO_4$ to burette.
3. Use a pipette to transfer 25 cm^3 of the iron (II) solution into a conical flask.
4. Titrate the solution.
    - No indicator is required as $KMnO_4$ is self indicating; the end point is when you get the first permanent pale pink colour.
5. Repeat until you get concordant titres.
6. Calculate a mean titre from these concordant values.

Errors

- Make sure as much iron salt as possible is **dissolved**. Warming may help.
- **Wash** the containers with water transfer as much iron as possible.
- Use a **white tile** to better see the **endpoint** of your titration.

Practical 13b - Redox titration using sodium thiosulfate and iodine.

Sodium thiosulfate can be used in a titration with a solution of iodine to find its concentration. This is because sodium thiosulfate is **oxidised** as it reacts with iodine in the following **redox equation:**

$$2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$$

Method

1. Set up titration apparatus.
2. Use a pipette to fill a conical flask with 25 cm^3 of the iodine solution and fill a burette with the sodium thiosulfate solution. Note the start reading on the burette.
3. Add a few drops of starch, which turns blue-black if iodine if present.
4. Carry out the titration until the starch turns blue-black and record the volume of sodium thiosulfate solution used.
5. Repeat until you obtain concordant titres.
6. Calculate a mean titre.

Errors

- Use a **white tile** to better see the **endpoint** of your titration.