OCR (B) Chemistry A-Level

PAG 12: Research skills

# 12.1 Investigating iron tablets

Equipment list

- Weighing boat
- Balance
- Five iron tablets
- Mortar and pestle
- 100 cm^3 graduated volumetric flask
- Stand and clamp
- Burette
- 100 cm^3 conical flask
- 250 cm^3 conical flask
- 25 cm^3 pipette
- Filter funnel and paper
- 150 cm^3 (0.02 mol dm^{-3}) potassium manganate solution
- 150 cm^3 (1 mol dm^{-3}) sulfuric acid
- Distilled water

Method

1. Using the mortar and pestle grind 5 iron tablets, place them on the weighing boat and measure them accurately.
2. Add the iron tablets into the 100 cm^3 conical flask and add 50 cm^3 sulfuric acid.
3. Stopper the conical flask and shake the contents well until the tablet is **completely** dissolved.
4. Leave it for a while until the residue has settled.
5. Without disturbing the residue, carefully filter the solution directly into the volumetric flask.
6. Rinse the residue in the filter paper into the volumetric flask using a small volume of distilled water.
7. Add the sulfuric acid to make the solution in the flask up to the mark.
8. Mix it well to ensure all the contents are mixed. This is acidified solution of iron (II) sulfate. .
9. Fill the burette with potassium manganate solution.
10. Using the pipette measure out 25 cm^3 of the acidified iron (II) sulfate solution. Add this into a 250 cm^3 conical flask.
11. Measure 25 cm^3 sulfuric acid and mix it with the solution in the conical flask.
12. Titrate this by adding potassium manganate from the burette until the first **permanent pink** colour appears.
13. Repeat the experiment until two concordant results are obtained.
14. Record the results in a suitable format and calculate the mean titre.

A key point of this practical is to research a method yourself and then correctly cite your sources of information. The method above is just an example of the kind of practical you will be carrying out. When citing your sources make sure you include the date and time accessed, along with a full URL /if using a book you could use the Harvard referencing format.

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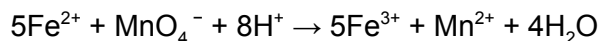
Calculations

- Work out the moles of MnO_4^- that react.
- Find out the moles of Fe^{2+} in 25 cm^3 of the standard solution.
- Find the number of moles of Fe^{2+} in 250cm^3 which is the moles of Fe^{2+} in five tablets.
- Work out the percentage mass of $FeSO_4$ In one tablet.

Errors

- ❏ Ensure all of the iron tablets are dissolved
  Warming using a water bath may help.
- ❏ Finding the end point of the reaction may be tricky and hence measured incorrectly
  Use a white tile under the conical flask to see the colour change more prominently.
- ❏ Some Iron tablet residue was left on the weighing boat.
  Reweigh the weighing boat after adding the tablets to the conical flask.

Safety

- ➢ Sulfuric acid - may irritate skin and eyes.
- ➢ Potassium manganate - harmful if swallowed.
- ➢ Wear protective goggles throughout the experiment.