**Year 12 Practical Investigation** **NAME**_____

# Titration

## Purpose:

To determine the concentration of a solution of potassium permanganate by titration with a primary standard solution of iron(II) ammonium sulphate.

## Procedure:

1. Calculate the *mass* of iron(II) ammonium sulphate which would be needed to make up 250 mL of an approximately 0.1 mol $L^{-1}$ solution.
2. Using a small beaker, weigh approximately this calculated mass of the iron(II) ammonium sulphate accurately. Record this mass.
3. Transfer the iron(II) ammonium sulphate to a 250 mL volumetric flask using a funnel, washing down with distilled water. Rinse the container carefully and add the rinsings to the volumetric flask
4. After adding about 100 mL of water, add 5 mL of concentrated sulphuric acid. Stopper, shake well and then make up to the mark with distilled water.
5. Fill the burette with the permanganate solution to be standardised, then record the first reading
6. Pipette 20.0 mL of the prepared primary standard solution into a 250 mL conical flask. Add approximately 10 mL of 2 mol $L^{-1}$ sulphuric acid.
7. Titrate until the first faint permanent pink colour is obtained.
8. Record the final reading.
9. Repeat to obtain concordant results.

## Practical Report & Discussion Questions

Write a practical report which has the following sections:

- Purpose
- Results
- Manipulation and Collaboration
- Calculations
- Discussion and Evaluation
- Conclusion

In the **Calculations**, include the calculations from step 1 of the procedure, and:

1. Calculate the concentration of the primary standard solution, from the mass recorded.
2. Calculate the average titre value, explaining any reasons for results not included in the calculation.
3. Write half equations and then a full equation for the reaction of iron(II) ions with permanganate ions.
4. Calculate the concentration of the permanganate solution in moles per litre, grams per litre, and %w/v

In the **Discussion and Evaluation**, include the following :

1. Explain why the iron(II) ammonium sulphate was suitable for making a primary standard solution
2. Explain why the instructions above ask to "weigh ***approximately*** this calculated mass of iron(II) ammonium sulphate ***accurately***".
3. Explain why no indicator is needed in this titration.
4. Describe and explain rinsing procedures for all glassware used
5. Discuss possible sources of random and systematic errors.
6. Explain the importance of the number of samples and repeating the experiment.