EXPERIMENT NO. 2

Quantitative Analysis

Read through the whole method before starting any practical work. Where appropriate, prepare a table for your results in the space provided.

Show your working and appropriate significant figures in the final answer to **each** step of your calculations.

Acids are defined as substances that can donate hydrogen ions, H^+, to bases. Monoprotic acids contain one H^+ that can be donated per molecule. Diprotic acids contain two H^+ that can be donated per molecule.

You will determine by a titration method whether acid **Z** is monoprotic or diprotic.

FA 1 is a solution containing 6.10 g dm^{-3} of acid **Z**.
FA 2 is 0.105 mol dm^{-3} aqueous sodium hydroxide, NaOH.
methyl orange indicator

(a) Method

- Pipette 25.0 cm^3 of **FA 1** into a conical flask.
- Fill a burette with **FA 2**.
- Add several drops of methyl orange indicator to the conical flask.
- Carry out a rough titration and record your burette readings in the space below.

The rough titre is ..... cm^3.

- Carry out as many accurate titrations as you think necessary to obtain consistent results.
- Make sure any recorded results show the accuracy of your practical work.
- Record, in a suitable form below, all of your burette readings and the volume of **FA 2** added in each accurate titration.

I	
II	
III	
IV	
V	
VI	
VII	

[7]

(b) From your accurate titration results, obtain a suitable value for the volume of **FA 2** to be used in your calculations. Show clearly how you obtained this value.

25.0 cm^3 of **FA 1** required ..... cm^3 of **FA 2**. [1]

(c) Calculations

(i) Calculate the number of moles of sodium hydroxide present in the volume of **FA 2** calculated in **(b)**.

moles of NaOH = ... mol

Then deduce the number of moles of H^+ present in 25.0 cm^3 of **FA 1**.

moles of H^+ in 25.0 cm^3 of **FA 1** = ... mol
[1]

(ii) Calculate the number of moles of H^+ present in 1 dm^3 of **FA 1**.

moles of H^+ in 1 dm^3 of **FA 1** = ... mol [1]

(iii) **FA 1** contains 6.10 g dm^{-3} of acid **Z**. The relative molecular mass of **Z** is 126.

Calculate the number of moles of **Z** in 1 dm^3 of **FA 1**.

moles of **Z** in 1 dm^3 of **FA 1** = ... mol [1]

(iv) Use your answers to **(ii)** and **(iii)** to determine whether **Z** is a monoprotic or a diprotic acid. Explain your answer.

.....

..... [1]

[Total: 12]