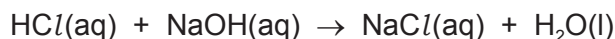


## EXPERIMENT NO. 4

- 1 You will determine the concentration of a solution of hydrochloric acid by diluting it and then titrating the diluted solution against an alkali.



**FA 1** was made by dissolving 1.06 g of sodium hydroxide, NaOH, in distilled water to make 250 cm<sup>3</sup> of solution.

**FA 2** is hydrochloric acid, HCl.  
bromophenol blue indicator

### (a) Method

- Pipette 25.0 cm<sup>3</sup> of **FA 2** into the 250 cm<sup>3</sup> volumetric flask.
- Add distilled water to make 250 cm<sup>3</sup> of solution and shake the flask thoroughly. Label this solution **FA 3**.
- Fill the burette with **FA 3**.
- Use the second pipette to transfer 25.0 cm<sup>3</sup> of **FA 1** into a conical flask.
- Add about 10 drops of bromophenol blue.
- Perform a rough titration and record your burette readings in the space below. The end point is reached when the solution becomes a permanent yellow colour.

The rough titre is ..... cm<sup>3</sup>.

- Carry out as many accurate titrations as you think necessary to obtain consistent results.
- Make certain any recorded results show the precision of your practical work.
- Record, in a suitable form below, all of your burette readings and the volume of **FA 3** 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 3** to be used in your calculations. Show clearly how you obtained this value.

25.0 cm<sup>3</sup> of **FA 1** required ..... cm<sup>3</sup> of **FA 3**. [1]

**(c) Calculations**

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

- (i) Calculate the concentration, in  $\text{mol dm}^{-3}$ , of sodium hydroxide in **FA 1**.  
Ar of Na: 23, O: 16, H: 1.

concentration of NaOH in **FA 1** = .....  $\text{mol dm}^{-3}$

- (ii) Calculate the number of moles of sodium hydroxide present in  $25.0 \text{ cm}^3$  of **FA 1**.

moles of NaOH = ..... mol

- (iii) Deduce the number of moles of hydrochloric acid present in the volume of **FA 3** you have calculated in (b).

moles of HCl = ..... mol

- (iv) Calculate the concentration, in  $\text{mol dm}^{-3}$ , of hydrochloric acid in **FA 2**.

concentration of HCl in **FA 2** = .....  $\text{mol dm}^{-3}$   
[5]

[Total: 13]