Volumetric Analysis

Solution Composition

- Solution: A solute dissolved in a solvent.

- Solute: The substance which is dissolved.

- Solvent: The substance in which it is dissolved.

- Aqueous solutions: A solution in water.

- **Molarity:** Moles of solute per litre of solution.

- If we know the molarity and litres of solution, we can calculate the moles (and mass) of solute present.

VOLUMETRIC ANALYSIS

- **Volumetric Analysis is a method of analysis based on titration.**

- **Titration is a procedure for determining the amount of a particular substance A by adding a carefully measured volume of a solution with a known concentration of B until the reaction is complete.**

Making up a standard solution

1. **Weigh out solid on balance**
2. **Dissolve solid in water and stir with a glass rod**

Solution is then transferred to a container; e.g volumetric flask

Add distilled water to about 1cm below the mark on the volumetric flask. Use a pasteur pipette to add water dropwise to the mark.

Remember to stopper The flask and shake Well to mix

Using a Pipette

Pipette is placed In volumetric flask and filled to calibration mark then emptied into a clean conical flask
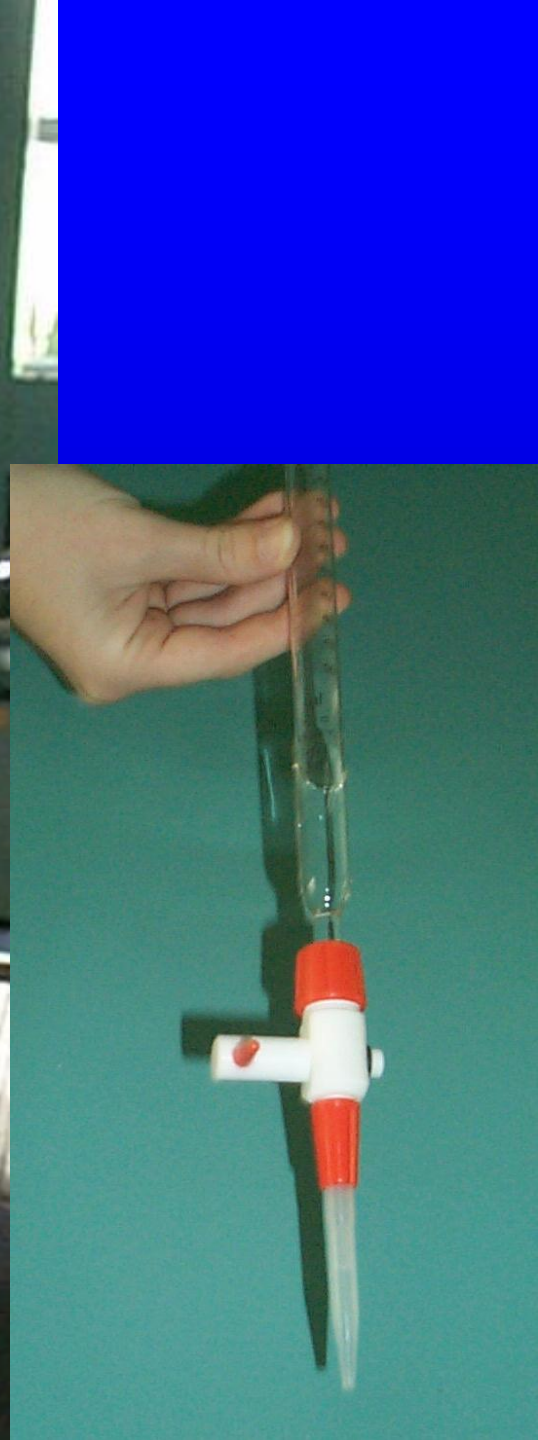
Pipette filler is attached to top of the pipette

Rinse your burette with a small volume of the solution of unknown molarity.

Dispensers are used in the lab and the volume you require will have been set up on the dial for you.

Setup for Titration

Burette is placed in clamp over Conical flask. White paper Beneath flask
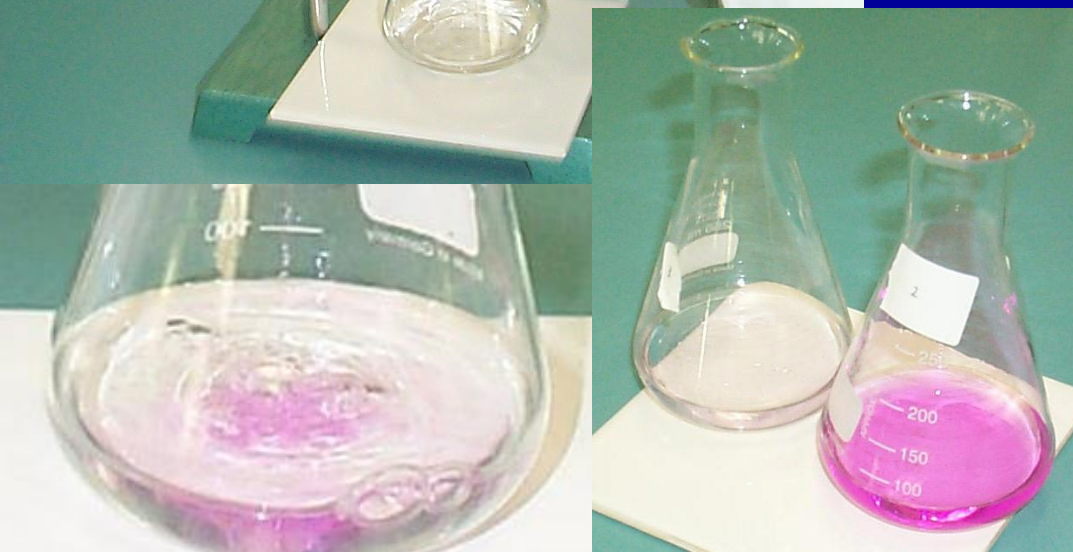
1-2 drops of phenolphthalein indicator is added to the 25mL of primary standard solution in the conical flask

Slowly add solution to the flask from burette while gently swirling.

After some time , a pink colour will appear and quickly disappear as the solutions are mixed. The longer the pink colour persists, the closer to the end-point(stoichiometric point).
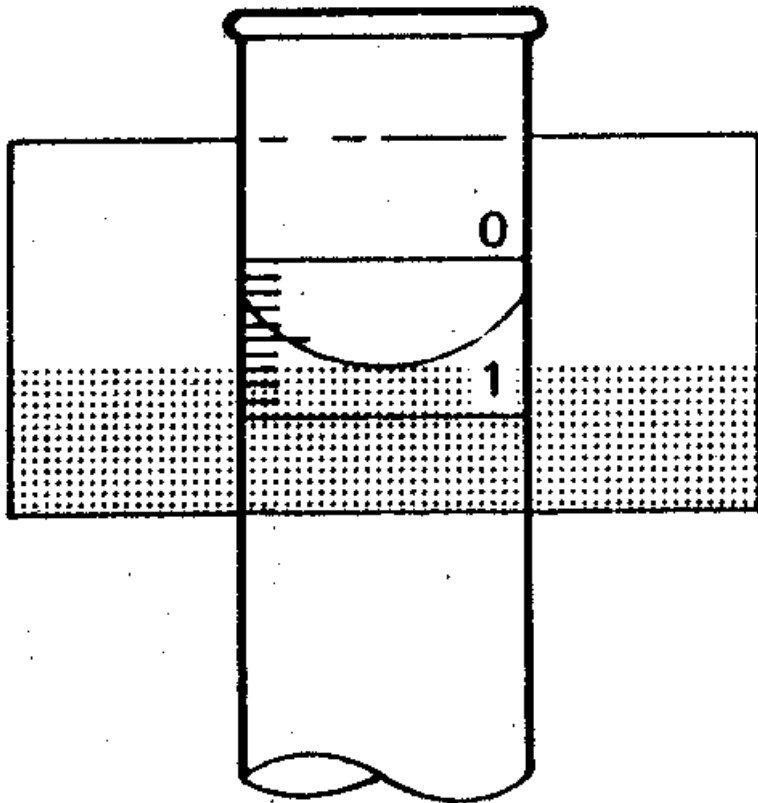
RECORD THE VOLUME OF SOLUTION USED FROM YOUR BURETTE

- **An <u>Indicator</u> is used to signal the end-point. It is a highly coloured dye which shows a very sharp colour change at a specific pH.**

- **<u>End-point</u> indicates that a reaction is complete.**

Use the first result as an indication then repeat steps 3-5 until the results are <u>within 0.1mL of each other.</u>

Titration of 0.1M NaOH with HCl

$$NaOH + HCl \longrightarrow H_2O + NaCl$$
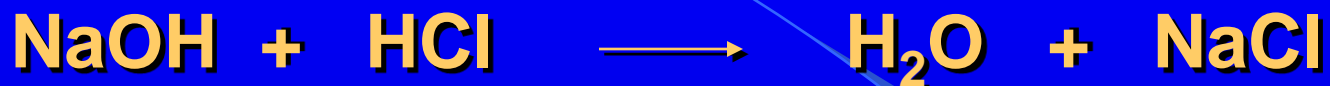
$$Molarity\ (M) = \frac{Moles\ (mol)}{Volume\ (L)} = mol\ L^{-1}$$

0.1 M NaOH means that we have 0.1 moles NaOH in 1 L

25 mL of 0.1 M NaOH contains 0.0025 moles NaOH

For this Titration 24.8 mL neutralised 25 mL of NaOH

Reaction Ratio is 1 : 1

Therefore

0.0025 mol NaOH react with 0.0025 mol HCl

Molarity of HCl = <u>No. of moles</u>

Volume (L)

$$M(HCl) = \underline{0.0025} = 0.104 \; M$$

0.024