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Department of Chemistry

ONLINE STUDY RESOURCE

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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

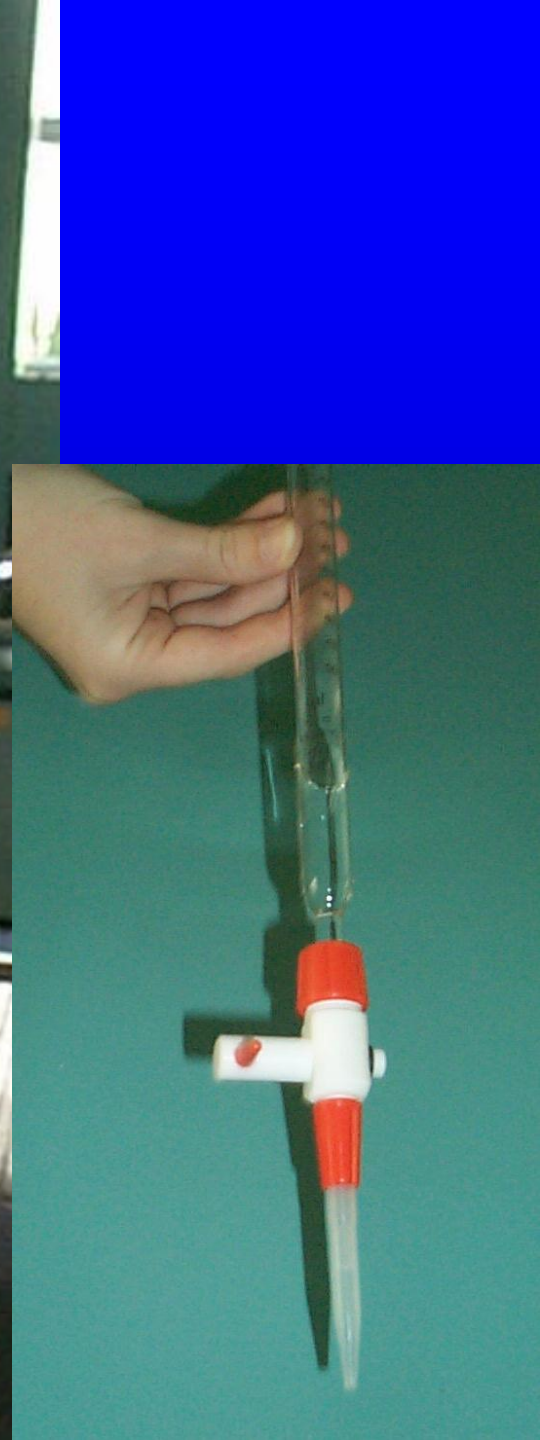
**Pipette is placed
In volumetric
flask and
filled to
calibration
mark then emptied into
a clean conical flask**

**Pipette filler
is attached to
top of the pipette**





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





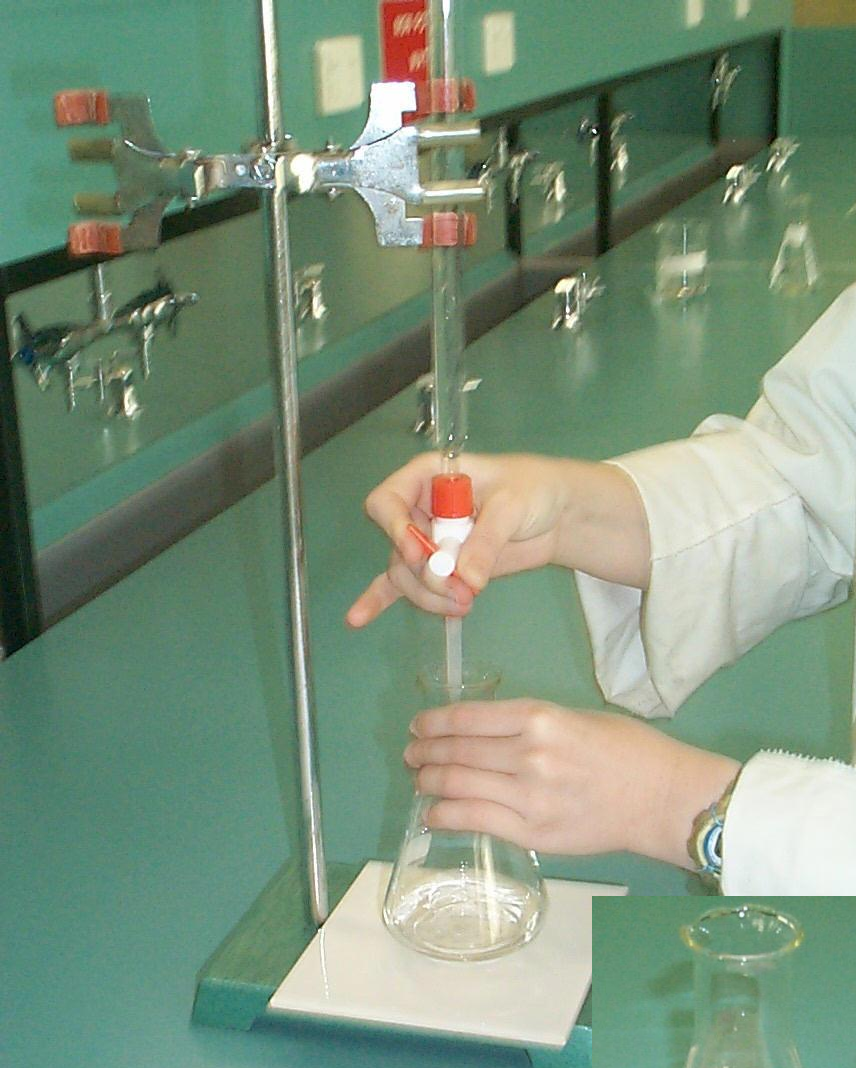
Dispensers are used in the lab and the volume you require will have been set up on the dial for you.



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.

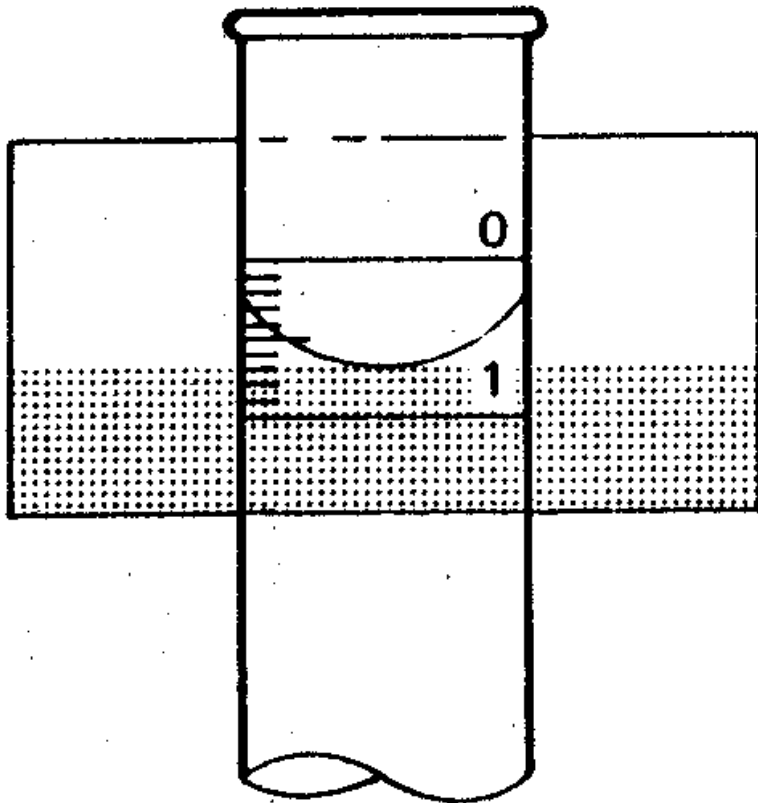
After some time , a pink colour will appear and quickly disappear as the solutions are mixed. The longer the pink colour persists, the closer to the end-point(stoichiometric point).



RECORD THE VOLUME OF SOLUTION USED FROM YOUR BURETTE

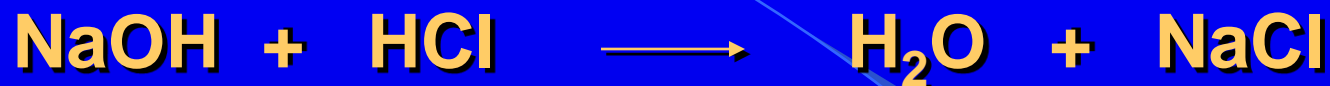


- An Indicator is used to signal the end-point. It is a highly coloured dye which shows a very sharp colour change at a specific pH.
- End-point indicates that a reaction is complete.



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

Titration of 0.1M NaOH with HCl



$$\text{Molarity (M)} = \frac{\text{Moles (mol)}}{\text{Volume (L)}} = \text{mol L}^{-1}$$

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 = No. of moles
Volume (L)**

$$\begin{array}{l} \text{M} \\ \text{M(HCl)} = \frac{0.0025}{0.024} = 0.104 \end{array}$$