Titrations

- a quantitative lab technique used to determine the concentration of an acid or base. A neutralization reaction takes place.

neutralization
- a reaction between an acid and a base
- the number of moles of acid added must equal the number of moles of base present

$$n_{H+} = n_{OH-}$$

endpoint - the neutralization point during a titration. Usually signaled by a colour change.

indicator - a substance which changes colour depending on the acidity or alkalinity of a solution

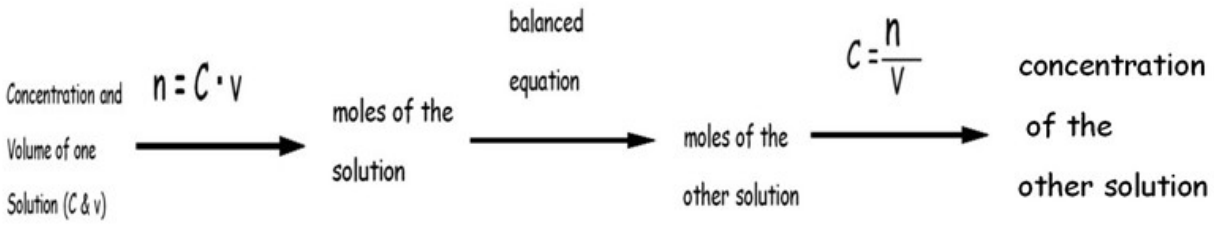
e.g. phenolphthalein
- magenta in solution with pH > 7 (basic)
- colourless in a solution with a pH < 7 (acidic)

Lab Set-up:

* Always read the burette to 2 decimal places

Titration Problems

- need the balanced neutralization equation
- three step stoichiometric problem



e.g. 10.74 mL of 0.10 mol/L NaOH was required to neutralize 10.00 mL of HCl during a titration. Determine the molarity of the HCl solution.

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Titration Problems

1. During a titration, 15.0 mL of HCl requires 18.70 of 0.25 mol/L NaOH.
a) Sketch the experimental set-up.
b) Write the balanced neutralization reaction.
c) Calculate the concentration of the HCl solution. (0.31 mol/L)

2. In an acid base titration, 24.00 mL of H_2SO_4 is neutralized completely by 37.50 mL of 0.250 mol/L KOH solution.
a) Calculate the $[H_2SO_4]$. (0.195 mol/L)
b) Calculate $[H^+]$ in the H_2SO_4 solution. (0.390 mol/L)

3. During a titration, 10.0 mL of LiOH required 23.48 mL of 0.65 mol/L H_2CO_3 . Calculate the initial concentration of LiOH. (3.0 mol/L)

4. In an acid-base titration, 25.00 mL of HNO_3 required 14.72 mL of 0.98 mol/L $Ca(OH)_2$ to reach the endpoint.
a) Calculate the concentration of the HNO_3.
b) Calculate the mass of $Ca(NO_3)_2$ produced. (2.3 g)