

EXPERIMENT

Objective:

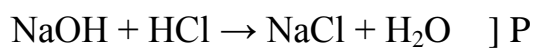
To determine the strength of given alkali mixture (NaOH & Na₂CO₃) by titrating it against standard HCl solution using phenolphthalein and methyl orange as an indicator.

Apparatus and Chemicals required:

Burette, pipette, conical flask, HCl, NaOH, Na₂CO₃, phenolphthalein and methyl orange indicators.

Theory:

The alkalinity of water is due to the presence of hydroxide ion (OH⁻), carbonate (CO₃²⁻) and bicarbonate ion (HCO₃⁻) present in the given sample of water. These can be estimated separately by titration against standard acid, using phenolphthalein and methyl orange indicators.



Procedure:

Pipette out 10 ml of alkali mixture in a conical flask + 1-2 drops of phenolphthalein indicator → Pink color appears → Titrate this against N/50 HCl until pink color just disappears → This is the first end point P → to the same mixture add 1-2 drops of methyl orange → light yellow color appears → continue the titration with N/50 HCl until the light yellow color changed to orange - red color → This gives the second end point M.

Observation:

S.No.	Volume of N/50 HCl used with phenolphthalein (V ₁ ml)	Volume of N/50 HCl used with methyl orange (V ₂ ml)
1.		
2.		
3.		

Calculation:

V_1 ml \equiv Half neutralization of Na_2CO_3 + neutralization of NaOH

V_2 ml \equiv Half neutralization of Na_2CO_3

Hence, (1) for complete neutralization of Na_2CO_3 required HCl (N/50) = $2V_2$ ml

(2) for complete neutralization of NaOH required HCl (N/50) = $(V_1 - V_2)$ ml

Using Formula, $N_1 V_1 = N_2 V_2$

For NaOH, $N_1 \times 10 = 1/50 \times (V_1 - V_2)$

Strength of NaOH = $N \times \text{Eq. wt. (40)}$ gm/lit.

(Eq.wt. of NaOH = 40)

For Na_2CO_3 , $N_1 \times 10 = 1/50 \times 2 V_2$

Strength of Na_2CO_3 = $N_1 \times \text{Eq. wt. (53)}$ gm/lit.

(Eq.wt. of Na_2CO_3 = 53)

Result :

(1) The strength of NaOH isgm/lit.

(2) The strength of Na_2CO_3 isgm/lit.

Precautions:

(1) Burette should be vertical throughout the experiment.

(2) The reaction mixture should continuously be shaken during titration.

(3) Glass ware should be washed and dried before doing the experiments.

(4) The amount of indicators should be same.