



BARISAL ENGINEERING COLLEGE
DURGAPUR, BARISAL

LAB REPORT

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

Course Title : CHEMISTRY SESSIONAL

Course Code : 1202

Name of Experiment : Standardization of HCl with
standard NaOH solution

Date of Experiment :
Experiment No. : 03

Submitted by:

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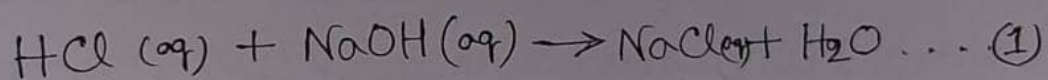
Date of Submission:

Signature

01

Experiment Name : Standardization of Hydrochloric Acid (HCl) with standard sodium hydroxide (NaOH) solution.

Theory : The process of adding base to an acid (or vice versa) to produce a salt and water is called neutralization. In the neutralization of hydrochloric acid with sodium hydroxide the reaction is,



When an acid and a base are present in stoichiometric amount, for example one mole of NaOH is added to one mole of HCl as in the above neutralization process, this means that the equivalent point has been reached in the acid-base system. Suitable indicators can be used to

pipette.

2. Added 1 to 3 drops of phenolphthalein indicator to the solution.
3. Then added NaOH solution drop by drop from a burette. The flask was shaken frequently while adding the base solution. Stopped the addition of NaOH as soon as the pink colour appeared in the solution.
4. Carefully took the reading at lower meniscus & noted them.
5. Repeated the steps 1 to 4 three times.
6. Then calculated the strength of NaOH with the values in the data table.

Step-2: Standardization of supplied HCl solution with the standardized NaOH solution

1. 10 mL of HCl was taken in a conical flask by pipette.

2. Added 1 to 2 drops of Methyl Orange indicator.

3. Then added previously made standard NaOH solution drop by drop from a burette. Shaken the flask frequently during addition of NaOH. Stopped addition as soon as the 'red color' of the solution changed into 'yellow'.

4. Burette reading was noted in Table-2

5. Repeated the above process three times and took average reading.

6. Calculated the strength of the supplied HCl solution.

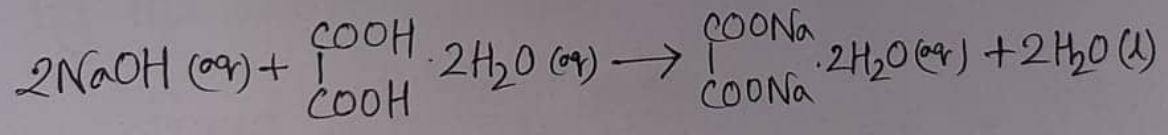
Experimental Data

Table - 01: Standardization of NaOH by Oxalic Acid (C₂H₂O₄) .

No. of Observation	Value of Oxalic Acid Solution V _{acid} (mL)	Burette reading (Volume of NaOH)			
		Initial (mL)	Final (mL)	Difference (mL)	Mean V _{base} (mL)
1	10	0	10.1	10.1	
2	10	10.1	20.3	10.2	10.2
3	10	20.3	30.6	10.3	

Table - 01

Calculation - 1 :



Here, $n_{\text{base}} = 2$; $V_{\text{acid}} = 10 \text{ mL}$ $S_{\text{acid}} = 0.05 \text{ M}$
 $V_{\text{base}} = 10.2 \text{ mL}$ $S_{\text{base}} = ? \text{ M}$

$$\begin{aligned} \text{So, } S_{\text{base}} &= \frac{2 \times V_{\text{acid}} \times S_{\text{acid}}}{V_{\text{base}}} \\ &= \frac{2 \times 10 \times 0.05}{10.2} = 0.098 \text{ M} \\ &\approx 0.1 \text{ M} \end{aligned}$$

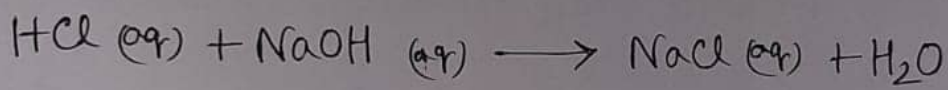
∴ The strength of supplied NaOH is 0.1 M.

Table - 2: Standardization of HCl by NaOH

No of Observation	Volume of HCl Acid V _{acid} (mL)	Burette Reading (Volume of NaOH)			
		Initial (mL)	Final (mL)	Difference (mL)	Mean V _{base} (mL)
1	10	0	10.5	10.5	10.6
2	10	10.5	21.1	10.6	
3	10	21.1	31.8	10.7	

Table - 2

Calculation - 2:



By the above equation,

$$S_{\text{acid}} = \frac{V_{\text{base}} \times S_{\text{base}}}{V_{\text{acid}}}$$

Here, $V_{\text{base}} = 10.6 \text{ mL}$; $S_{\text{base}} = 0.098 \text{ M}$
 (from calculation - 1)

$V_{\text{acid}} = 10 \text{ mL}$; $S_{\text{acid}} = ? \text{ M}$

$$\begin{aligned} \therefore S_{\text{acid}} &= \frac{10.6 \times 0.098}{10} = 0.093 \text{ M} \\ &= 0.093 \text{ M} \\ &\approx 0.09 \text{ M} \end{aligned}$$

7

Result: The strength of the supplied HCl solution is calculated 0.09 M

Discussion:

1. Measuring apparatus used in the experiment was rinsed.
2. The reading of the burette was taken according to lower meniscus.

3. The burette was washed by distilled water between the step-1 and step-2.

4. The change of color was observed very carefully and the reaction was forced stopped after having the faint color to get accurate readings.