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Exp 3 : Standardization of hydrochloric Acid (HCl) Solution with Standard Sodium Carbonate (Na_2CO_3) Solution.

Method : Acid-base titration

Reactions :

(i) $Na_2CO_3 + HCl = NaHCO_3 + NaCl$ (pH-9)

(ii) $NaHCO_3 + HCl = NaCl + CO_2 + H_2O$ (pH-4)

Experimental data : Amount of sodium carbonate taken = 0.63

Strength of sodium Carbonate solution $= \frac{\text{Weight taken (in gm)} \times 0.1}{0.53}$ (N)

$= \frac{0.63 \times 0.1}{0.53}$ N

$= 0.1188$ N

$= 0.12$ N

(P.T.O)

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Table: Standardization of supplied HCl solution against standard Na_2CO_3 solution by acid-base titration.

No of reading	Vol. of Na_2CO_3 (in mL)	Vol. of HCl (in mL)			Difference between (a) and (c) (in mL)	Mean (in mL)
		Initial (a)	1st End point (b)	2nd End-point (c)		
1	10	0.00	5.60	10.20	10.20	
2	10	10.20	19.80	20.40	10.20	10.42
3	10	20.40	25.90	31.30	10.90	5
4*	10	31.30	—	41.80	10.40	=10.43

Calculations:

A) The strength of supplied dil. HCl Solution:

$$V_{Na2CO3} \times N_{Na2CO3} = V_{dil.HCl} \times N_{dil.HCl \text{ to be determined}}$$

$$N_{dil.HCl \text{ to be determined}} = \frac{10 \times 0.12}{10.425} N$$

$$= 0.1150 N \quad 0.1148N$$

$$= 0.12N$$

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(B) The strength of conc. HCl Solution:

$V_{dil.\,HCl} \times N_{dil.\,HCl}$ determined $= V_{conc.\,HCl}$ taken (10 ml) $\times N_{conc.\,HCl}$ to be determined.

(1000 mL)

$$V_{dil.\,HCl} \times N_{dil.\,HCl} \text{ determined} = \frac{1000 \times 0.12}{10} N$$

$$= 12 (N)$$

Results:

A) The strength of supplied dil. HCl Solution is 0.12N

(B) (A) The strength of conc. HCl Solution is 12N.