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ID<sup>o</sup> 19-41790-3 section 8-M

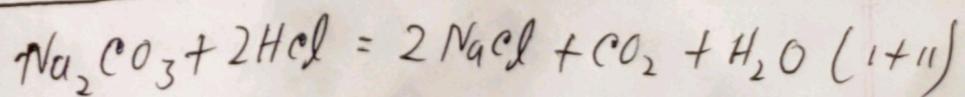
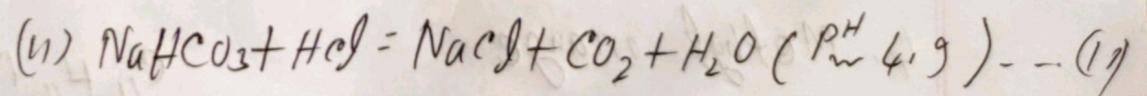
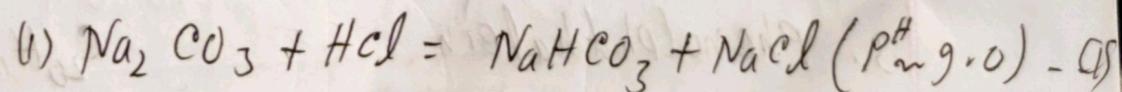
Name of the experiment :- Standardization

of Hydrochloric Acid (HCl) solution with standard  
Sodium Carbonate ( $\text{Na}_2\text{CO}_3$ ) solution.

Purpose :- The strength of supplied HCl solution  
will be measured with standard  $\text{Na}_2\text{CO}_3$  solution by  
acid-base titration.

Theory & (i) Method involved :- Acid-base titration

(ii) Reactions



P-2

(ii) Indicators: Phenolphthalein, methyl orange.

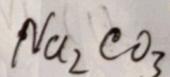
We know that, methyl orange works when the  $p^H$  value is between 3.1 - 4.4 that's why we use methyl orange in second reaction. On the other hand, phenolphthalein works when the range of  $p^H$  is 8.3 - 10. For this reason we use phenolphthalein in our first reaction.

Name of the chemicals :-

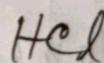
Name of the chemicals

Chemical Formula

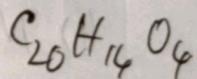
1. Sodium Carbonate



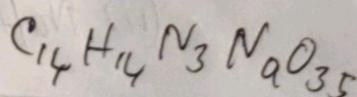
2. Hydrochloric Acid



3. Phenolphthalein



4. Methyl orange



Apparatus

1. Burette (50 ml)
2. Pipette (10 ml)
3. Conical Flask (250 mL)
4. Volumetric Flask (100 mL)
5. Watch glass.
6. Pipette filler
7. dropper.
8. stand and clamp.

Preparation of Standard Solution

The strength of sodium carbonate solution

$$= \frac{0.54 \times 0.1}{0.53} (N)$$

$$= 0.101886 (N)$$

## Experiment for Data 8

Table: Standardization of supplied HCl solution against standard  $\text{Na}_2\text{CO}_3$  solution by acid-base titration.

No. of reading	Vol. of $\text{Na}_2\text{CO}_3$ (in mL)	Vol. of HCl (in mL)			Difference between (a) and (c)	mean
		initial (a)	1st End point (b)	2nd End Point(c)		
1	10	0.00	5.60	10.00	10.00	
2	10	10.00	14.60	20.30	10.30	
3	10	20.30	25.30	30.70	10.40	10.20
4	10	30.70		40.80	10.10	

Calculation :-

(A) The strength of supplied dil. HCl solution:-

$$V_{Na_2CO_3} \times N_{Na_2CO_3} = V_{dil. HCl} \times N_{dil. HCl}$$

$$\Rightarrow N_{dil. HCl} = \frac{10 \times 0.10188}{10 \cdot 20}$$

$$= 0.0998 (N)$$

(B) The strength of conc. HCl solution :-

$$V_{dil.} \times N_{dil. HCl} = V_{conc. HCl} \times N_{conc. HCl}$$

$$\Rightarrow N_{conc. HCl} = \frac{1000 \times 0.0998}{10}$$

$$= 9.98 (N)$$

Results

- (A) The strength of supplied dil. HCl solution  
is 0.09 (N)
- (B) The strength of conc. HCl solution  
is 9.98 (N)

Discussion :-

## (A) Precaution Taken:-

- (i) At first we cleaned all the apparatus,
- (ii) we wore protective equipment for safety.

## (B) Possible errors:-

- (i) Error may be occurred when we were taking burette reading.
- (ii) The weight of chemicals which we were taken in the experiment may be error,