

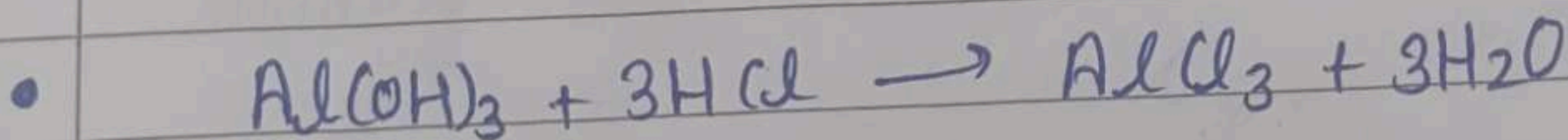
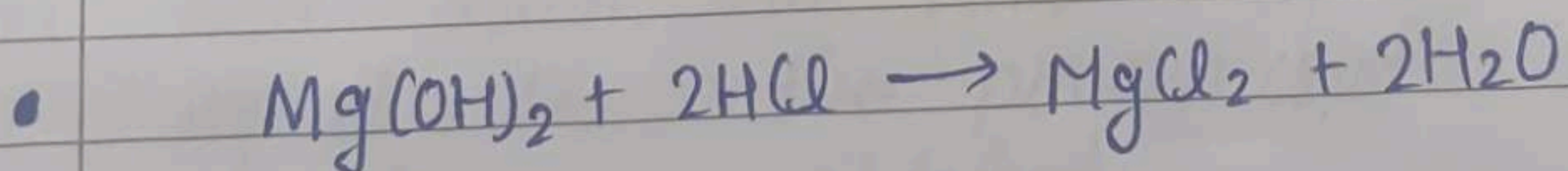
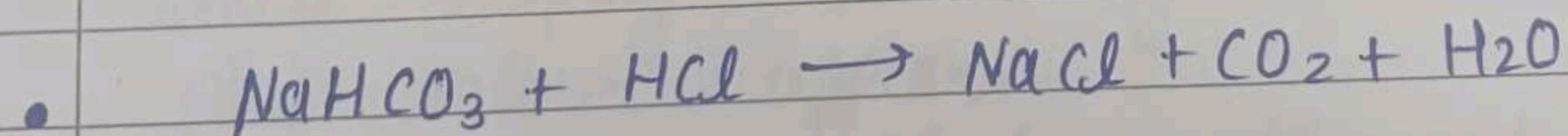
Experiment - 4

Aim - Estimation of the alkali content of an antacid tablet using HCl.

Objective - To determine the alkali content of the given antacid tablet by titrating it against a standard N/10 HCl solution using methyl orange as an indicator.

Theory - Antacids are basic (alkaline) substances used to neutralize excess stomach acid (hydrochloric acid) and relieve symptoms of acidity, heartburn, and indigestion. Antacids react chemically with HCl in the stomach to form salt, water, and sometimes carbon dioxide.

Common antacids contain NaHCO_3 , $\text{Mg}(\text{OH})_2$, or $\text{Al}(\text{OH})_3$ as alkalis. These compounds neutralize excess stomach acid (HCl) according to the following chemical eqⁿ.

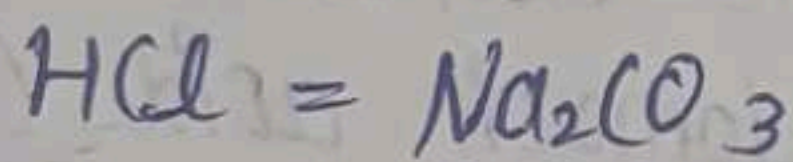


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Observation:-(I) To Standardize the hydrochloric acid (HCl) Solution using standard sodium carbonate (Na_2CO_3) Solution (as a primary Standard).

SNO	Volume of Na_2CO_3 Solution taken (ml)	Burette Reading		Volume of HCl used (ml)
		(Initial) ml	Final	
1.	10 ml	0	14.7 ml	
2.	10 ml	0	15.0 ml	15.0 ml
3.	10 ml	0	15.0 ml	

Calculation:-



$$N_1 V_1 = N_2 V_2$$

$$N_1 = \frac{0.1 \times 10}{15 \times 15} = \frac{1}{15}$$

$$N_1 = 0.066$$

$$N_1 = 0.067$$

Normality of HCl is 0.067 N.

Experimental Setup.

- Apparatus:- Burette, pipette, conical flask, beaker, funnel, burette stand.
- Chemicals:- Antacid tablet (Aciloc), N/10 Hydrochloric acid (HCl) Sodium carbonate crystals.
- Indicator: Methyl orange
- Experimental procedure:-

- (i) Fill up the burette with the standard N/10 HCl solution and adjust the level up to the zero mark.
- (ii) pipette out 20 ml of the antacid tablet sample solution into a conical flask. Add 2-3 drops of methyl orange indicator to it and shake well.
- (iii) A yellow colour will appear in the solution.
- (iv) Titrate the solution in the conical flask with the standard N/10 HCl from the burette while shaking continuously until a permanent pink colour appears.
- (v) Note down the final reading of the burette. Repeat the entire process until two concordant readings are obtained.

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Observation: - (II) table

Estimation of alkali content

SNO.	Volume of Tablet Sample taken (ml)	Burette Reading		Volume of N/10 HCl used (ml)
		initial (ml)	final (ml)	
1.	20 ml	0	1.8	2.0
2.	20 ml	0	2.0	
3.	20 ml	0	2.0	

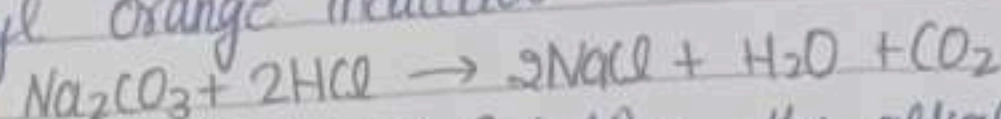
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Standardization of HCl Solution.

- Sodium carbonate crystal is used to prepare a standard solution with which hydrochloric acid can be standardized using methyl orange indicators.



using the standardized HCl solution, the alkali present in antacid tablets can be estimated

Estimation of Alkali Content in Antacid Tablet:-

Calculation:- Number of milliequivalents of alkali = " " acid

$$N_{\text{antacid}} V_{\text{antacid}} = N_{\text{HCl}} V_{\text{HCl}}$$

Given data, $N_{\text{HCl}} = 0.066 \text{ N}$.

$$V_{\text{HCl}} = 2 \text{ ml}$$

milliequivalents of alkali = ?

$$\begin{aligned} \text{Milliequivalents of acid} &= \text{Normality} \times \text{Volume of HCl (in ml)} \\ &= 0.066 \times 2 \\ &= 0.132 \end{aligned}$$

thus, Milliequivalents of alkali = 0.132.

$$\begin{aligned} \text{Milliequivalents of alkali content in the whole solution} &= 0.132 \times \frac{100}{20} \\ &= 0.66 \end{aligned}$$

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- Milli-equivalent of alkali per 300 g of antacid tablet:
= 0.66
- Milli-equivalent of alkali per tablet (150 mg):

$$\left(\frac{0.66}{300}\right) \times 150 = 0.33 \text{ milli-equivalent}$$

⊙ Result: Alkali Content per tablet = 0.33 milli equivalent.

Precautions:-

- (1) All glassware should be thoroughly rinsed with distilled water.
- (2) The burette and pipette should be rinsed with the specific solution they will contain before use.
- (3) The tablet sample must be completely dissolved or properly suspended in distilled water or an appropriate solvent to ensure all alkaline components react for an accurate result.
- (4) Titration should be done carefully.
- (5) Note all readings (initial or final burette readings) carefully and accurately.

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