Preparation and Standardization of 1 \( N \) HCl Solution

Glass ware and instruments:

- beaker
- glass stirrer
- graduated cylinders
- washing bottle
- volumetric flask
- fume hood
Preparation and Standardization of 1 M HCl Solution

Glass ware and instruments:

- conical flask
- burette
- burette stand
- burette clamp
- tripod stand
- wire gauze
- Bunsen burner
Preparation and Standardization of $1\ N\ HCl$ Solution

Glass ware and instruments:

- **standardization**

- spatula
- watch glass
- electrical balance
- oven
Preparation and Standardization of 1 N HCl Solution

- **preparation of 100 mL of 1 N HCl solution**

  Dilute 9 mL of HCl with distilled water to a final volume of 100 mL using a 100 mL- volumetric flask.

  \[ N_1 \times V_1 = N_2 \times V_2 \]

  \( N_1 \): the normality of concentrated HCl used  
  \( V_1 \): the volume of concentrated HCl to be used for dilution  
  \( N_2 \): the requested normality of HCl (1 N in our experiment)  
  \( V_2 \): final volume after dilution (100 mL in our experiment)
Preparation and Standardization of 1 \( N \) HCl Solution

\[
N = \frac{\% \times sp.\ gr. \times 1000}{eq.\ wt.}
\]

\( N \) : the normality of the concentrated acid  
\( \% \) : the weight by weight concentration of the acid  
\( sp. \ gr. \) : the specific gravity of the acid  
\( eq. \ wt. \) : the equivalent weight of the acid
Preparation and Standardization of 1 N HCl Solution

- **standardization**

  \[ \text{Na}_2\text{CO}_3 + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{H}_2\text{O} + \text{CO}_2 \]

- anhydrous sodium carbonate is used as the primary standard

- methyl red is used as the indicator

  *yellow* \[\rightarrow\] *faint pink*
Preparation and Standardization of 1 $N$ HCl Solution

- titration apparatus
Preparation and Standardization of 1 \textit{N} HCl Solution

- burette adjustment
Preparation and Standardization of 1 N HCl Solution

- burette adjustment
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procedure

- wash the burette with the D. W. and the titrant (HCl)
- fill the burette with HCl to a level (adjust it)
- dissolve the primary standard (Na₂CO₃) in enough D. W. (100 mL) using the conical flask
- add 2 drops of methyl red
- start titration by adding HCl drop wise with continuous stirring until the solution becomes faint pink
- heat the solution to boiling so that the colour changes back into yellow, cool, and titrate again until the faint pink colour is no longer affected by boiling
- record the volume of HCl used and calculate the normality
Preparation and Standardization of 1 \( \textit{N} \) HCl Solution

- **procedure**

end point (faint pink)
Preparation and Standardization of 1 N HCl Solution

**Calculations**

\[
N \times V = \frac{wt.}{eq.wt.} \times 1000
\]

- **N**: the normality of HCl to be calculated
- **V**: the volume of HCl used (in mL)
- **wt.**: the weight of sodium carbonate (in g)
- **eq. wt.**: the equivalent weight of sodium carbonate