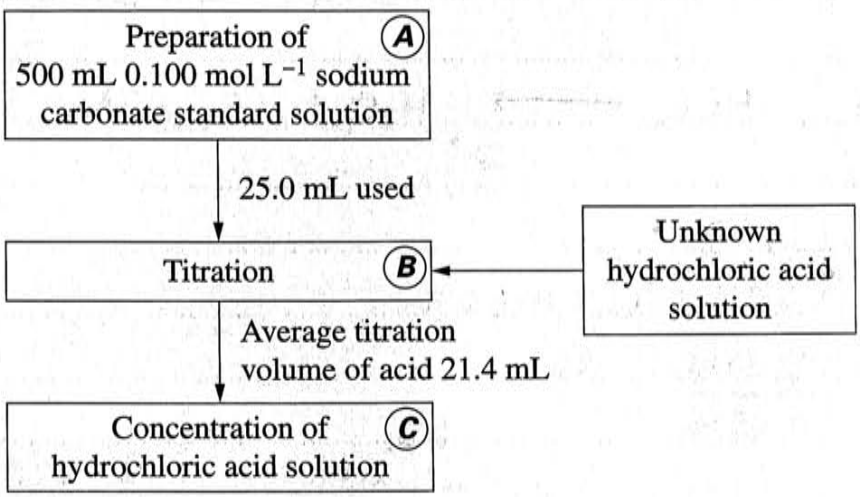
Question 28 (8 marks)

The flowchart shown outlines the sequence of steps used to determine the concentration of an unknown hydrochloric acid solution. **8**



Describe steps ***A***, ***B*** and ***C*** including correct techniques, equipment and appropriate calculations. Determine the concentration of the hydrochloric acid.

Step A: Weigh given amount of solid sodium carbonate on a electric scaler and once weighed put into a beaker. Fill beaker with water and dilute the ~~con~~ solution, making sure there are no more solid pieces of sodium carbonate, this could be done by mixing the solution with a stiring rod. Pour the solution into a conical flask using a funnel, making sure all sodium carbonate grains are in the flask. Put a stopper on the flask, then gently turn upside down, mixing the solution.

Step B: Rinse a burrete with sodium carbonate solution. Fill the burrete beyond "0" mark. Connect the pippete to a retort stand and put a beaker flushed with water under the pippete, with a white surface under the beaker. Drain the sodium carbonate solution up to the "0" mark. Use a pippete to transfer the hydrochloric acid into the beaker under the burrete.

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Question 28 (continued)

Add a suitable indicator such as universal indicator into the beaker and tell the burrete ~~flow~~ flow. As the sodium carbonate flows into the beaker of HCl Hydrochloric acid, swirl the beaker. Once a slight colour change is detected change the "flow" to "drip", once there has been a complete colour change, immediately stop the driping (as the end point is reached) and calculate the amount of sodium carbonate solution remains in the burrete

STEP C:

$C = n/V$

$Na_2CO_{3(aq)} + 2HCl_{(l)} \longrightarrow H_2O_{(l)} + CO_{2(g)} + 2NaCl_{(aq)}$

~~Step~~

$C_1V_1 = C_2V_2$

molar mass

$0.100 \times 0.025 = 2C_2 \times 0.0214$

$\frac{2.5 \times 10^{-3}}{0.0214} = 2C_2$ ∴ C_{Na}

Concentration is 2×0.116822429

$= 0.233644859$

$= 0.23 \text{ mol L}^{-1}$

500mL of 0.100mL only 25mL used

titration ~~was~~ 21.4mL

End of Question 28