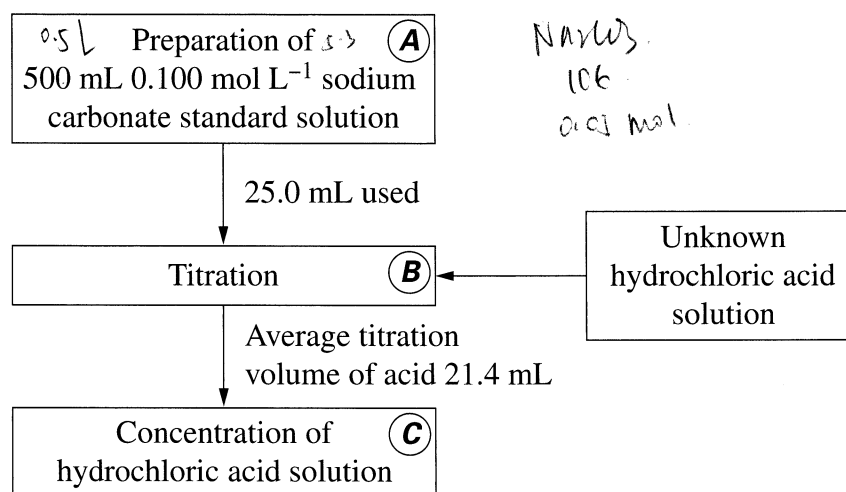**Question 28** (8 marks)

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

```
0.5 L   Preparation of s-s    (A)              NaₓCO₃
500 mL 0.100 mol L⁻¹ sodium                      106
carbonate standard solution                    0.03 mol
```

25.0 mL used

```
Titration              (B) ◄──── Unknown
                                  hydrochloric acid
                                  solution
```

Average titration
volume of acid 21.4 mL

```
Concentration of       (C)
hydrochloric acid solution
```

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

[A] preparation of Na₂CO₃ standard solution.
     by calculation.   Molar M (Na₂CO₃) = 106.

     n (Na₂CO₃) = 0.5 L × $\frac{0.1 \text{ mol}}{L}$ = 0.05 mol

     ∴ M (Na₂CO₃) = 106 × 0.05 = 5.3 g

  1 – prepare 5.3 g sodium carbonate powder by
  using a electricity scale to weigh.

  2 – dissolve the 5.3g sodium carbonate powder completely
  using a dry and clean beaker with small amount of
  distilled water

  3 – transfer the solution into a volumetric flask

Question 28 continues on page 18