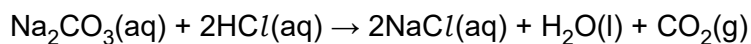


**AS Level Chemistry A**  
**H032/01 Breadth in chemistry**

**Question Set 19**

1. A student carries out a titration to determine the concentration of some hydrochloric acid.

The student titrates the hydrochloric acid against a standard solution of sodium carbonate,  $\text{Na}_2\text{CO}_3$ . The equation is shown below.



- The student prepares  $0.150 \text{ mol dm}^{-3}$   $\text{Na}_2\text{CO}_3$  in a  $250.0 \text{ cm}^3$  volumetric flask.
- The hydrochloric acid is added to a  $50.0 \text{ cm}^3$  burette.
- The student pipettes the  $\text{Na}_2\text{CO}_3(\text{aq})$  using a  $25.0 \text{ cm}^3$  pipette.

- (a) The student's burette readings are shown in the table.

**The rough titre has been omitted.**

- (i) Complete the table by adding the titres to the table.

<b>Final reading / <math>\text{cm}^3</math></b>	24.60	48.45	34.30
<b>Initial reading / <math>\text{cm}^3</math></b>	0.40	24.60	10.00
<b>Titre / <math>\text{cm}^3</math></b>	.....	.....	.....

- (ii) Calculate the mean titre of  $\text{HCl}$ , to the nearest  $0.05 \text{ cm}^3$ , that the student should use for analysing the results.

[1]

- (b) Calculate the concentration, in  $\text{mol dm}^{-3}$ , of the hydrochloric acid.

[1]

Give your answer to **3** significant figures.

[3]

- (c) In the titrations, the student measured volumes with a pipette and a burette.

- The pipette had an uncertainty of  $\pm 0.04 \text{ cm}^3$  in the volume measured.
- The burette had an uncertainty of  $\pm 0.05 \text{ cm}^3$  in the volume measured.

Determine whether the volume measured by the pipette or the volume measured by the burette has the greater percentage uncertainty.

[2]

**Total Marks for Question Set 19: 7**

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