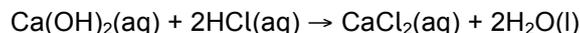




A student carried out a titration to find the concentration of a solution of calcium hydroxide. In each titration, the student used 25.0 cm^3 of the calcium hydroxide solution and titrated it against 0.0100 mol/dm^3 hydrochloric acid solution.



The student's results are shown in the table.

titration	1	2	3
start reading / cm^3	0.00	23.15	0.10
end reading / cm^3	23.15	47.05	23.90
volume added / cm^3	23.15	23.90	23.80

- a Find the mean titre to the appropriate number of significant figures and give the uncertainty in this measurement.

$$\text{mean} = \frac{23.90 + 23.80}{2} = \mathbf{23.85 \pm 0.05 \text{ cm}^3}$$

- b Find the concentration of the calcium hydroxide in mol/dm^3 and g/dm^3 . Give your answers to 3 significant figures.

$$\text{moles HCl} = \text{conc} \times \text{volume (dm}^3) = 0.0100 \times \frac{23.85}{1000} = \mathbf{0.0002385 \text{ mol}}$$

$$\text{moles Ca(OH)}_2 = \frac{\text{moles HCl}}{2} = \frac{0.0002385}{2} = \mathbf{0.00011925 \text{ mol}}$$

$$\text{concentration Ca(OH)}_2 \text{ in mol/dm}^3 = \frac{\text{moles Ca(OH)}_2}{\text{volume (dm}^3)} = \frac{0.00011925}{\frac{25.0}{1000}} = \mathbf{0.00477 \text{ mol/dm}^3}$$

$$\begin{aligned} \text{concentration Ca(OH)}_2 \text{ in g/dm}^3 &= M_r \times \text{concentration Ca(OH)}_2 \text{ in mol/dm}^3 \\ &= \mathbf{0.00477 \times 74 = 0.353 \text{ g/dm}^3} \end{aligned}$$

- c Outline the key steps in carrying out this titration.

- using a pipette
- place 25.0 cm^3 of calcium hydroxide in a conical flask
- add an indicator
- put acid in a burette
- add acid to flask until indicator changes colour
- add drop by drop near the end
- record results
- repeat