

- 3 The enthalpy change of reaction, $\Delta_r H$, for the equation shown can be calculated using bond enthalpy data.



Bond	Bond enthalpy / kJ mol^{-1}
H—H	436
Cl—Cl	242
H—Cl	431

The expression that should be used in the calculation is

- A $(0.5 \times 436 + 0.5 \times 242) - 431$
- B $(2 \times 431) - (436 + 242)$
- C $431 - (0.5 \times 436 + 0.5 \times 242)$
- D $(436 + 242) - (2 \times 431)$

(Total for Question 3 = 1 mark)

- 2 Which equation represents the standard enthalpy change of atomisation, $\Delta_{\text{at}} H^\ominus$, of bromine?

- A $\frac{1}{2}\text{Br}_2(\text{l}) \rightarrow \text{Br}(\text{g})$
- B $\frac{1}{2}\text{Br}_2(\text{g}) \rightarrow \text{Br}(\text{g})$
- C $\text{Br}_2(\text{l}) \rightarrow 2\text{Br}(\text{g})$
- D $\text{Br}_2(\text{g}) \rightarrow 2\text{Br}(\text{g})$

(Total for Question 2 = 1 mark)

- 6 In an experiment to calculate the enthalpy change of neutralisation, $\Delta_{\text{neut}}H$, 25 cm^3 of 0.1 mol dm^{-3} hydrochloric acid, HCl, was reacted with 25 cm^3 of 0.1 mol dm^{-3} sodium hydroxide solution. The increase in temperature, ΔT , was recorded.

[Assume the density of the solutions = 1.00 g cm^{-3}

Specific heat capacity of solutions = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$]

- (a) Which is the correct expression to calculate the enthalpy change of neutralisation for this reaction, in J mol^{-1} ?

(1)

A $\frac{\Delta T \times 4.2 \times 50}{5.0 \times 10^{-3}}$

B $\frac{\Delta T \times 4.2 \times 25}{2.5 \times 10^{-3}}$

C $\frac{-\Delta T \times 4.2 \times 50}{5.0 \times 10^{-3}}$

D $\frac{-\Delta T \times 4.2 \times 50}{2.5 \times 10^{-3}}$

- (b) The table below shows the measurement uncertainty of some laboratory apparatus.

Apparatus	Measurement uncertainty on each reading / cm^3
burette	+/- 0.05
25 cm^3 measuring cylinder	+/- 0.5
25 cm^3 volumetric flask	+/- 0.1
25 cm^3 pipette	+/- 0.06

- Which piece of apparatus would measure 25 cm^3 of hydrochloric acid with the **lowest** percentage uncertainty?

(1)

- A burette
- B measuring cylinder
- C volumetric flask
- D pipette