

2024 Higher Chemistry Paper 1 - Q18

Section: Chemistry in Society

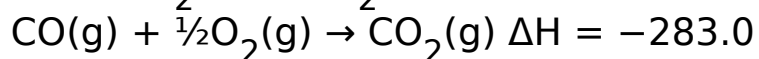
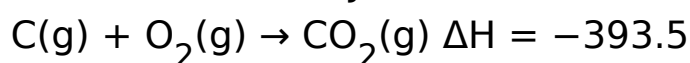
Topic: Chemical Energy (Hess's Law)

Question summary (Q18):

Using the enthalpies given, apply Hess's law to calculate the enthalpy change for reaction X.

Worked Solution:

- Given data (ΔH , kJ mol^{-1}):



- We need enthalpy for: $\text{C(g)} + \frac{1}{2}\text{O}_2\text{(g)} \rightarrow \text{CO(g)}$.

This can be obtained by: $[\text{C} + \text{O}_2 \rightarrow \text{CO}_2] - [\text{CO} + \frac{1}{2}\text{O}_2 \rightarrow \text{CO}_2]$.

$$\Delta H = (-393.5) - (-283.0) = -393.5 + 283.0 = -110.5 \text{ kJ mol}^{-1}.$$

Final Answer: B — $-110.5 \text{ kJ mol}^{-1}$

Revision Tips:

- Hess's Law: enthalpy change is independent of the pathway.
- Use $\Delta H_{\text{target}} = \Delta H_1 - \Delta H_2$ when subtracting two related reactions.
- Always align arrows so intermediates cancel properly.