

Application of Hess's Law

1. Given the following data:

Substance	ΔH_c^\ominus (kJ mol ⁻¹)
C(graphite)	-394
H ₂ (g)	-286
CH ₄ (g)	-890

- (a) Write all thermochemical equations.
(b) Draw an enthalpy change cycle and hence calculate the standard enthalpy change of formation of CH₄(g)?

2. Given that:

$$\Delta H_f^\ominus[\text{C}_8\text{H}_{18}(\text{l})] = -278.5 \text{ kJ mol}^{-1}$$

$$\Delta H_f^\ominus[\text{CO}_2(\text{g})] = -393.5 \text{ kJ mol}^{-1}$$

$$\Delta H_f^\ominus[\text{H}_2\text{O}(\text{l})] = -285.8 \text{ kJ mol}^{-1}$$

- (a) Write all thermochemical equations.
(b) Draw an enthalpy change cycle and hence calculate the standard enthalpy change of combustion of C₈H₁₈(l)?

3. Given that the standard enthalpy changes of formation of P₄O₁₀(s), H₂O(l) and H₃PO₄(l) are -2984 kJ mol⁻¹, -285.8 kJ mol⁻¹ and -1272 kJ mol⁻¹ respectively. Calculate the standard enthalpy change of the reaction between phosphorus pentoxide and water.

