

AP WORKSHEET 06I: Hess's Law

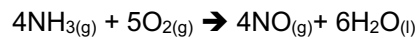
1. Calculate the enthalpy change in the reaction below given the data below (in kJ mol^{-1}). (4)

$$\Delta H_f^\circ \text{NH}_{3(g)} = -45.5$$

$$\Delta H_f^\circ \text{NO}_{(g)} = +91.0$$

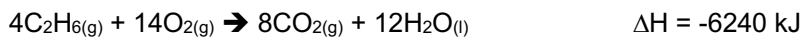
$$\Delta H_f^\circ \text{H}_2\text{O}_{(l)} = -286.$$

$$\Delta H_f^\circ \text{O}_{2(g)} = 0.00$$



2. Consider the formation of ethane.

(a) Given the following data, calculate ΔH for the reaction, $2\text{C}_{(s)} + 3\text{H}_{2(g)} \rightarrow \text{C}_2\text{H}_{6(g)}$. (4)



(b) Consider the enthalpy change calculated in (a), does this represent the standard enthalpy of formation of ethane? Explain your answer. (2)



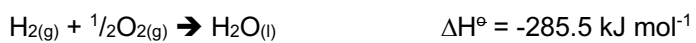
3. Calculate the standard enthalpy of formation of benzene (C_6H_6), given the following standard enthalpies of combustion (in kJ mol^{-1}): $C_6H_6(l) = -3273$; $C(s) = -393.5$; $H_2(g) = -285.5$. (2)



4. Calculate the standard enthalpy of formation of cyclohexanol ($\text{C}_6\text{H}_{11}\text{OH}$), given the following standard enthalpies of combustion (in kJ mol^{-1}): $\text{C}_6\text{H}_{11}\text{OH}(\text{l}) = -3727.$; $\text{C}(\text{s}) = -393.5$; $\text{H}_2(\text{g}) = -285.5$. (2)



5. The standard enthalpy of formation of buta-1,3-diene (C_4H_6) = $112.0 \text{ kJ mol}^{-1}$. Calculate the standard enthalpy of combustion of this compound, given the data below. (4)



6. Calculate the standard enthalpy of formation of butane (C₄H₁₀) from the data below. (4)



Standard enthalpy of combustion of butane $\Delta H^\circ = -2877 \text{ kJmol}^{-1}$

