

Unit 11 – Chapter 6: Thermochemistry

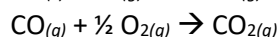
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Assignment #2: ΔH Calculations & Hess's Law

Period _____

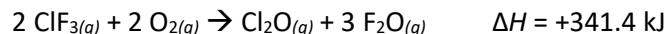
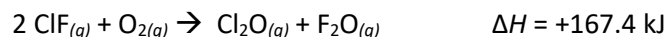
- 1) The enthalpy of combustion of solid carbon to form carbon dioxide is -393.7 kJ/mol carbon, and the enthalpy of combustion of carbon monoxide to form carbon dioxide is -283.3 kJ/mol CO.

Use these data to calculate the ΔH for the reaction: $2 \text{C}_{(s)} + \text{O}_{2(g)} \rightarrow 2 \text{CO}_{(g)}$



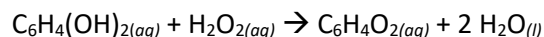
- 2) Combustion reactions involve reacting a substance with oxygen. When compounds containing carbon and hydrogen are combusted, carbon dioxide and water are the products. Using the enthalpies of combustion for C_4H_4 (-2341 kJ/mol), C_4H_8 (-2755 kJ/mol), and H_2 (-286 kJ/mol), calculate ΔH for the reaction: $\text{C}_4\text{H}_{4(g)} + 2 \text{H}_{2(g)} \rightarrow \text{C}_4\text{H}_{8(g)}$

- 3) Given the following data:

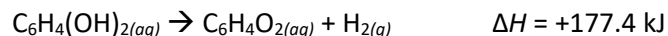


Calculate ΔH for the reaction: $\text{ClF}_{(g)} + \text{F}_{2(g)} \rightarrow \text{ClF}_{3(g)}$

- 4) The bombardier beetle uses an explosive discharge as a defensive measure. The chemical reaction involved is the oxidation of hydroquinone by hydrogen peroxide to produce quinone and water:



Calculate ΔH for this reaction from the following data:

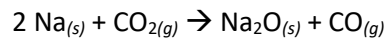
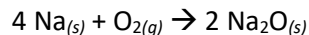


- 5) Given the following data:



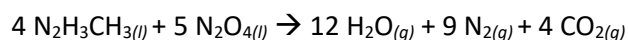
Calculate the ΔH for the reaction: $\text{P}_4\text{O}_{10(s)} + 6 \text{PCl}_{5(g)} \rightarrow 10 \text{Cl}_2\text{PO}_{(g)}$

- 6) Calculate ΔH^0 for each of the following reactions using the data in Appendix 4:



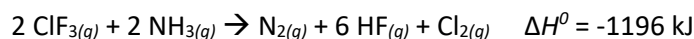
Explain why a water or carbon dioxide fire extinguisher might not be effective in putting out a sodium fire.

- 7) The space shuttle orbiter utilizes the oxidation of methylhydrazine by dinitrogen tetroxide for propulsion:



Calculate ΔH^0 for this reaction.

- 8) Consider the reaction:



Calculate ΔH_f for $\text{ClF}_{3(g)}$.

- 9) The standard enthalpy of combustion of ethene gas, $\text{C}_2\text{H}_{4(g)}$, is -1411.1 kJ/mol at 298 K. Given the following enthalpies of formation, calculate ΔH_f^0 for $\text{C}_2\text{H}_{4(g)}$.

