| SCH4U |
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| Energy Changes & Rates of Reaction |

Thermochemical Equations & Stoichiometry

Reinforce your understanding of the stoichiometry of thermochemical equations.

1. Consider the following thermochemical equation:

   $2ZnS_{(s)} + 3O_{2(g)} \rightarrow 2ZnO_{(s)} + 2SO_{2(g)}$ $\qquad \Delta H° = -878.2$ kJ

   (a) How much heat is released when 3.0 mol $ZnS_{(s)}$ reacts in excess oxygen?

   (b) How much heat is released when 2.3×10^{-2} mol $ZnS_{(s)}$ reacts in excess oxygen?

   (c) What is the enthalpy change when 223.9 g $ZnS_{(s)}$ reacts in excess oxygen?

   (d) What is the enthalpy change when 0.96 g $ZnO_{(s)}$ is produced?

2. Slaked lime ($Ca(OH)_{2(s)}$) is produced when lime (calcium oxide, $CaO_{(s)}$) reacts with liquid water. 65.2 kJ of heat is released for each mol of $Ca(OH)_2$ that is produced.

   (a) Write a thermochemical equation for the reaction.

   (b) What is the enthalpy change when 523.3 kg of lime reacts with excess water?

3. The following reaction represents the complete combustion of hexane, $C_6H_{14(l)}$, at SATP.

   $C_6H_{14(l)} + \dfrac{19}{2}O_{2(g)} \rightarrow 6CO_{2(g)} + 7H_2O_{(l)}$ $\qquad \Delta H° = -4163$ kJ
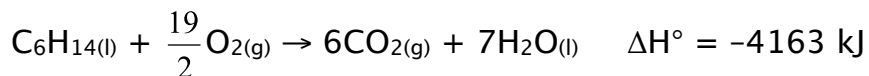
   (a) If 0.537 mol of carbon dioxide is produced in the reaction represented by the equation above, how much heat is released by the reaction?

   (b) If 25.0 kg of hexane is burned in sufficient oxygen, how much heat will be released?

   (c) What mass of hexane is required to produce 1.0×10^5 kJ of heat by complete combustion?