Lab Chemistry A
Thermochemistry review assignment

Name: _____
Period: _____ Date: _____

Calorimetry

$q = m \times \Delta T \times C_p$

$C_{p(water)} = 4.184\ J/g^oC$

1. If you were to measure the q of a melting ice cube placed in a glass of water, would it have a negative or positive value?

2. As the sun rises on a hot summer day would the q of your car's hood be positive or negative?

3. When 12.29 g of finely divided brass (60% Cu, 40% Zn) at 95.0°C is quickly stirred into 40.00 g of water at 22.0°C in a calorimeter, the water temperature rises to 24.0°C. Find the amount of heat it takes to raise the water 2°C.

4. What is the C_p of brass if it takes 175J to raise 50g of the metal 9.2°C?

Heat of Reaction

Use these heat of reaction values to solve the following problems.

$2\ S(s) + 3\ O_2(g) \rightarrow 2\ SO_3\ (g)$ $\quad \Delta H = -790$ kJ

$6\ CO_2(g) + 6\ H_2O(l) \rightarrow C_6H_{12}O_6(s) + 6\ O_2(g)$ $\quad \Delta H = 2801.3$ kJ

1. When Sulfur and Oxygen react is the reaction endothermic or exothermic?

2. Is the photosynthesis reaction above endothermic or exothermic?

3. If 4 moles of S reacts with 6 moles of O_2, what will the ΔH be?

4. How much heat is absorbed or released with 20g of S reacts completely with excess O_2?

Problems from S.B. Piepho 2005 & Holt Modern Chemistry Text

5. How much heat is absorbed or evolved if 11.0 g of $CO_2(g)$ reacts completely with excess water to form glucose and oxygen gas?

6. Which of the following ΔH values would indicate an endothermic reaction?
   a. ΔH = -285.83 kJ
   b. ΔH = -1200 kJ
   c. ΔH = 62.4 kJ
   d. ΔH = – 24.7 kJ

Reaction Tendency

$$\Delta G^0 = \Delta H^0 - T\Delta S^0 \qquad T_k = T_c + 273$$

1. For an exothermic reaction, which of the following is true?
   a. The reaction is always spontaneous
   b. The reaction is spontaneous at low temperature, but not a high temperatures
   c. The reaction is spontaneous at high temperature, but not at low temperatures
   d. The reaction is never spontaneous

2. Which set of values will result in spontaneous reactions? Show your work.
   a. ΔH = 125 kJ, T = 293K, ΔS = 0.0350 kJ/K
   b. ΔH = -85.2 kJ, T = 127°C, ΔS = 0.125 kJ/K
   c. ΔH = -275 kJ, T = 773K, ΔS = 0.450 kJ/K
   d. ΔH = 11 kJ, T = 298.15K, ΔS = 0.041 kJ/K