Thermochemistry #2

1. A sample of sucrose, $C_{12}H_{22}O_{11}$, weighing 4.50 g is burned in a bomb calorimeter. The heat capacity of the bomb is $2.422 * 10^{4}$ J/ °C. The temperature rises in the bomb from 22.15 °C to 25.22 °C. Calculate q for the combustion of 1.0 mole of sucrose.

2. When 1.00 g of ethylene, C_2H_4(g), burns in a bomb calorimeter, the temperature rises 12.92 °C. In a separate experiment, it is found that the addition of 6.23 kJ of heat to the calorimeter raises the temperature by 1.61 °C. What is

   a. the heat capacity for the bomb?

   b. q for the combustion of 1.00 g of ethylene?

   c. q for the combustion of 1.00 mol of ethylene?

   d. Write the thermochemical equation for the combustion of 1.00 mol of ethylene.

   e. How many kJ of heat energy are produced when 7.52mol of ethylene is combusted?

   f. How many grams of carbon dioxide are produced if ethylene is combusted releasing 200.0 kJ of heat energy?

3. When 1.34 g of potassium bromide dissolves in 74.0 g of water in a coffee-cup calorimeter, the temperature drops from 18.000 °C to 17.279 °C. Assume all the heat absorbed in the solution process comes from the water (specific heat is 4.184J/g °C).

   a. Is the dissolving process endo or exo and how do you know?

   b. What is q when 1.34 g of potassium bromide dissolves?

   c. What is q when one mole of potassium bromide dissolves?

   d. Write the thermochemical equation for the dissolving of one mole of KBr.

   e. How many J of energy are involved if 10.0 g of KBr dissolve.

4. Find the ΔH_{rxn} for the following reactions using appendix C in the back of your book.

   a. SiO_2 (s) + 2 C(s) → Si (s) + 2CO (g)

   b. N_2O_5 (g) + H_2O (l) → $2HNO_3$ (l)

   c. 2 NaOH (s) + ½ O_2 (g) → Na_2O_2 (s) + H_2O (l)