Chemistry 236 -- Quiz 7

Lab Day ___

October 17, 2007 — Bomb Calorimetry

Pledge and signature:

Note: If you want your paper returned folded (*i.e.*, score concealed), please print your name on the back.

1. (2) Combustion of 1.00 g of substance A raises the temperature of 1.000 kg of water by 2.00 K. Therefore combustion of 2.00 g of A will raise the temperature of 2.000 kg of water by

   a. 0.50 K b. 1.00 K c. 2.00 K d. 4.00 K e. none of these

2. (2) Combustion of 1.00 g of substance A raises the temperature of 1.000 kg of water by 2.00 K. Suppose the water is replaced by 1.000 kg of a liquid having exactly half the specific heat capacity of water and the experiment is repeated (again, combustion of 1.00 g of A). The observed ΔT will be

   a. 0.50 K b. 1.00 K c. 2.00 K d. 4.00 K e. none of these

3. (2) Substance A has specific heat of combustion $q_{spec,A}$, while substance B has specific heat of combustion $q_{spec,B}$ that is exactly half the value for A. Thus, compared with the amount of heat produced by combusting 1.00 mol of A, the amount produced by combusting 2.00 mol of B will be

   a. less b. the same c. more d. This cannot be determined w/o additional information.

4. (4) Calculate the value of $\Delta H° - \Delta E°$ at 25°C for the combustion of 1.00 mol of cyclohexane (C_6H_{12}) to produce $CO_2(g)$ and $H_2O(\ell)$. (R = 8.3145 J mol^{-1} K^{-1}.)

5. (4) In a calorimetry experiment at ~25°C, 0.967 g of benzoic acid yields a T rise of 1.735 K. Then a second experiment run the same way, except using 1.237 g of an unknown, produces a T rise of 1.211 K. Calculate the specific heat of combustion for the unknown, given that the value for benzoic acid is –26.413 kJ/g.

6. (2) In the determination just above, suppose the masses are both uncertain by 0.005 g and the ΔTs by 0.008 K. Calculate the uncertainty in q_{spec} for the unknown. (Hint: First write your computations in (5) as a single expression, if you have not already done so.)