

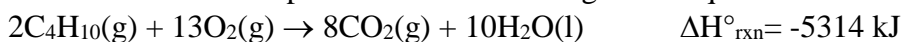
Chem 1104 - 2018 Summer Problem Set #5

1. The specific heat of silver is $0.235 \text{ J/g}\cdot^{\circ}\text{C}$. How many joules of heat are required to heat a 75 g silver spoon from 20°C to 35°C ?

2. At body temperature it requires 2404 joules to evaporate 1 g of water. After vigorous exercise a person feels chilly because their body is giving up heat to evaporate the perspiration. A typical person perspires 25 g of water after 20 minutes of exercise. How much body heat is this person using to evaporate this water?

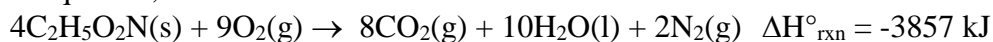
3. If 325 g of water at 4.2°C absorbs 12.28 kJ, then what is the final temperature of the water?

4. The combustion of butane produces heat according to the equation:

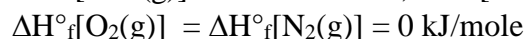


How many grams of butane must be burned to release 6375 kJ of heat?

5. Glycine $\text{C}_2\text{H}_5\text{O}_2\text{N}$ is important for biological energy. The combustion of glycine is given by the equation,

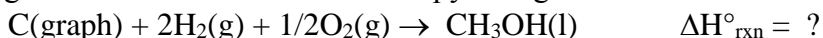


Given that $\Delta H^{\circ}_f[\text{CO}_2(\text{g})] = -393.5 \text{ kJ/mol}$, $\Delta H^{\circ}_f[\text{H}_2\text{O}(\text{l})] = -285.8 \text{ kJ/mol}$.

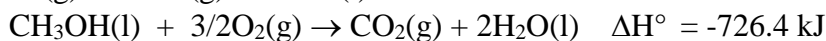
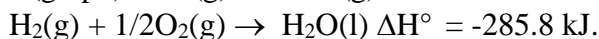


Calculate the enthalpy of formation ΔH°_f per mole of glycine.

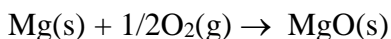
6. Using Hess's Law calculate the enthalpy change for the reaction:



Given the following information:



7. A 0.1326 g sample of magnesium was burned in an oxygen bomb calorimeter. The total heat capacity of the calorimeter plus water was $5760 \text{ J}/^{\circ}\text{C}$. If the temperature rise of the calorimeter with water was 0.570°C , calculate the change in internal energy and the enthalpy of combustion of magnesium. Note: Assume the temperature is about 25°C .



8. a) The combustion of 1.00 mol of glucose liberates 2820 kJ of heat. When 1.25 g of glucose was combusted in a calorimeter containing 950 g of water a temperature rise of 3.15°C was observed. What is the heat capacity of the bomb calorimeter?

b) When 2.02 g of an unknown substance is combusted in the same calorimeter, under the same conditions, a temperature change of 6.86°C is observed. Calculate the heat of combustion of this unknown substance in kJ/g.

Answer Set for Chem 1104-2018 Summer Problem Set #5

1. 260 J

2. 60,100 J

3. 13.2°C

4. 139 g

5. -537.2 kJ/mol

6. -238.7 kJ

7. $q = \Delta E = -3.28 \text{ kJ} = -602 \text{ kJ/mole}$; $\Delta H = -4.52 \text{ kJ} = -828 \text{ kJ/mole}$

8.a) $C_{\text{cal}} = 6.22 \text{ kJ/}^\circ\text{C}$; b) 21.1 kJ/g