**Quiz 6**

# Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work. Where appropriate answers should be boxed for clarity, written to the correct number of significant figures, and, include the proper units.

1. Consider the following balanced thermochemical equation for a reaction sometimes used for H2S production (8 points):

⅛S8 (s) + H2 (g) → H2S (g) ∆H = -20.2 kJ

* 1. Is this an exothermic or endothermic reaction? Exothermic\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. What is ∆H for the reverse reaction? +20.2 kJ\_\_\_\_\_\_\_
	3. What is ∆H when 2.6 g of S8 reacts?

$$2.6 g S\_{8}×\frac{1 mol S\_{8}}{256.488 g S\_{8}}×\frac{-20.2 kJ}{\frac{1}{8} mol S\_{8}}=-1.6 kJ$$

1. A manufacturer claims that its new dietetic dessert has “fewer than 10 Calories per serving.” To test the claim, a chemist at the Department of Consumer Affairs places one serving in a bomb calorimeter and burns it in O2. The initial temperature is 21.862 °C and the temperature rises to 26.799 °C. If the heat capacity of the calorimeter is 8.151 kJ/K, is the manufacture’s claim correct (4 points)?

$$-q\_{system}=q\_{calorimeter}=C∆T=\left(8.151\frac{kJ}{K}\right)\left(26.799℃-21.862℃\right)= $$

$$=\left(8.151\frac{kJ}{K}\right)\left(26.799℃-21.862℃\right)=\left(8.151\frac{kJ}{K}\right)\left(4.937 K\right)$$

$$=40.24 kJ×\frac{1000 J}{1 kJ}×\frac{1 cal}{4.184 J}×\frac{1 Cal}{1000 cal}=9.618 Cal $$

Yes, 9.681 Cal is less than 10 Cal.

1. Calculate ∆Hrxn for the following reaction (8 points):

CH4 (g) + 4 Cl2 (g) 🡪 CCl4 (g) + 4 HCl (g)

Using the following reactions:

C (s) + 2 H2 (g) → CH4 (g) ∆H = -74.6 kJ

C (s) + 2 Cl2 (g) → CCl4 (g) ∆H = -95.7 kJ

H2 (g) + Cl2 (g) → 2 HCl (g) ∆H = -92.3 kJ

CH4 (g) → C (s) + 2 H2 (g) ∆H = 74.6 kJ

C (s) + 2 Cl2 (g) → CCl4 (g) ∆H = -95.7 kJ

[H2 (g) + Cl2 (g) → 2 HCl (g) ∆H = -92.3 kJ] x2

CH4 (g) + 4 Cl2 (g) → CCl4 (g) + 4 HCl (g) ∆H = -205.7 kJ