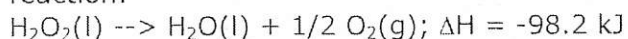


CHAPTER 12 REVIEW ☺

1. Hydrogen peroxide decomposes according to the following thermochemical reaction:



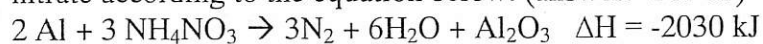
Calculate the change in heat when 1.00 g of hydrogen peroxide decomposes.
(answer: -2.89 kJ)

$$1.00 \text{ g H}_2\text{O}_2 \times \frac{1 \text{ mol H}_2\text{O}_2}{34.0 \text{ g}} \times \frac{-98.2}{1 \text{ mol}} = -2.89 \text{ kJ}$$

Exo

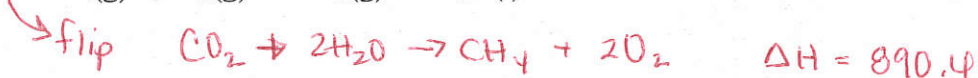
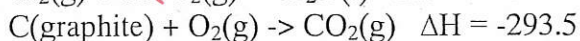
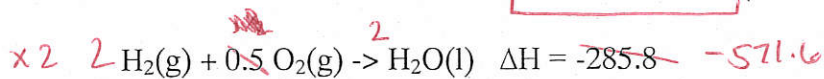


2. How much heat will be released if 9.75 g of Aluminum reacts with excess ammonium nitrate according to the equation below. (answer: -367 kJ)



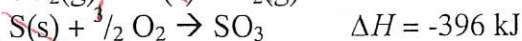
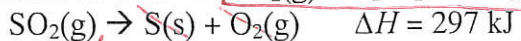
$$9.75 \text{ g Al} \times \frac{1 \text{ mol}}{27.0} \times \frac{-2030}{2 \text{ mol}} = -367 \text{ kJ}$$

3. Calculate ΔH for the reaction $\text{C} + 2\text{H}_2 \rightarrow \text{CH}_4$ (answer: 25.3 kJ/mol)



CHAPTER 12 REVIEW ☺

4. Calculate ΔH for the reaction $\text{SO}_2(\text{g}) + \frac{1}{2} \text{O}_2 \rightarrow \text{SO}_3$ (answer: -99 kJ/mol)



$$\Delta H = 297 - 396 = -99 \text{ kJ}$$

5. When a 1.000 g sample of the rocket fuel hydrazine, N_2H_4 , is burned in a bomb calorimeter which contains 1200 g of water, the temperature rises from 24.62°C to 28.16°C . Calculate ΔH for the process (answer: -569.7 kJ)

$$\textcircled{1} \quad Q = (1200)(4.184)(28.16 - 24.62) = 17774 \text{ J}$$

$$\textcircled{2} \quad Q = -17774 \text{ J}$$

$$\textcircled{3} \quad 1.000 \text{ g N}_2\text{H}_4 \times \frac{1 \text{ mol}}{32.0 \text{ g}} = 0.0313$$

$$\textcircled{4} \quad \Delta H = -17774 / 0.0313 = -567,859 \text{ J or } -567.9 \text{ kJ}$$

6. If a 348 g sample of mercury in 546g of water at 127°C is cooled to 103°C , calculate ΔH for the system. (31.7 kJ)

$$\textcircled{1} \quad Q = (546)(4.184)(103 - 127) = -54827 \text{ J}$$

$$\textcircled{2} \quad Q = 54,827 \text{ J}$$

$$\textcircled{3} \quad 348 \text{ g Hg} \times \frac{1 \text{ mol}}{200.6} = 1.73 \text{ mol}$$

$$\textcircled{4} \quad 54827 / 1.73 = 31,692 \text{ J or } 31.7 \text{ kJ}$$

7. An 18.7g sample of Platinum metal increases in temperature by 2.3°C when 5.7J of heat are added. What is the specific heat of platinum? ($0.133 \text{ J/g}^\circ\text{C}$)

$$c = \frac{Q}{m\Delta T} = \frac{5.7}{(18.7)(2.3)} = 0.133 \text{ J/g}^\circ\text{C}$$