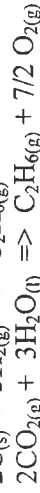
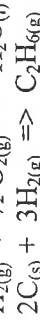
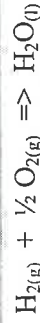


1. Use the thermochemical equations shown below to determine the enthalpy for the following reaction:



$$\Delta H = -214.3 \text{ kJ}$$

$$\Delta H = -63.5 \text{ kJ}$$

$$\Delta H = 1170.4 \text{ kJ}$$

$$\Delta H_{rxn} = 295.5 \text{ kJ}$$

2. Use the thermochemical equations shown below to determine the enthalpy for the reaction:



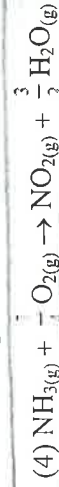
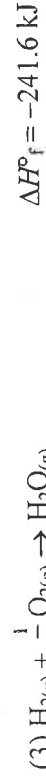
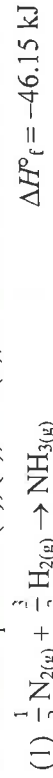
$$\Delta H = 51.7 \text{ kJ}$$

$$\Delta H = 87.7 \text{ kJ}$$

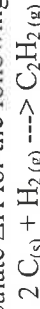
$$\Delta H = -2.3 \text{ kJ}$$

$$\Delta H_{rxn} = -40.6 \text{ kJ}$$

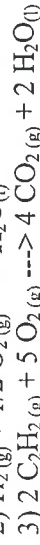
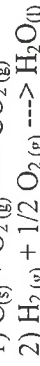
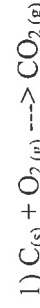
3. Given equations (1), (2), and (3), calculate the heat of reaction for equation.



4. Calculate ΔH for the following reaction using the thermochemical equations given.



$$\Delta H = ?$$



$$\Delta H = 226.6 \text{ kJ}$$

5. A small piece of aluminium of mass 5 g is used on a circuit that has a normal temperature of 20 °C. If the piece of aluminium absorbs 585 000 J, what is its final temperature? Specific heat capacity of Aluminium is 0.900 J/g°C.

$$t_f = 150.0^\circ\text{C}$$

$$\text{If the final temperature is } 22.1^\circ\text{C,}$$

$$\text{gained by the water is equal to the heat lost by the metal. } c_w = 4.184 \text{ J/g} \cdot ^\circ\text{C} \quad [5] \quad c_{\text{metal}} = 0.7519 \text{ J/g} \cdot ^\circ\text{C}$$

7. $\text{HNO}_{3(aq)}$ $\Delta H^\circ_f = -207 \text{ kJ/mol}$ $\text{Mg(OH)}_{2(s)}$ $\Delta H^\circ_f = -925 \text{ kJ/mol}$



- (a) Given the ΔH°_f values above, calculate ΔH°_{rxn} for the equation below, using the direct method:



$$\Delta H = -107.6 \text{ kJ}$$

- (b) Is the reaction above exothermic or endothermic? How can you tell?

- (c) Write the thermochemical equation with the heat value included.

8. Consider the following thermochemical equation.



Calculate ΔH°_f for $\text{C}_6\text{H}_{12}\text{O}_6(s)$, given the following information:

$$\Delta H^\circ_f \text{ CO}_{2(g)} = -393.5 \text{ kJ/mol}$$

$$\Delta H^\circ_f \text{ H}_2\text{O}_{(l)} = -285.8 \text{ kJ/mol}$$

$$\Delta H = -1273.8 \text{ kJ/mol}$$

9. 1.435 g of naphthalene (C_{10}H_8) is burned in a bomb calorimeter. There is exactly 2000.0 g of water surrounding the naphthalene. The temperature of the water rises from 20.17 °C to 25.85 °C. Write the thermochemical equation including the heat value.



10. Calculate the standard enthalpy (heat) of reaction for the reaction of ammonia gas with oxygen to produce nitrogen dioxide gas and water vapour using the direct method and table of enthalpies of formation. ($\text{NO}_{2(g)}$ $\Delta H^\circ_f = +34 \text{ kJ mol}^{-1}$)

$$-565.6 \text{ kJ} / 2 \text{ mol NH}_3$$

11. Use standard heats of formation (from the table) and the direct method to determine the heat of combustion for the following reaction. (4 marks)



$$\Delta H = -2818.4 \text{ kJ}$$

12. Calculate the heat of reaction, ΔH , for the following reaction, using the direct method. Use the table of enthalpy values.



$$\Delta H = -890.7 \text{ kJ}$$