

Ch7 Thermochem Exercises

35a) $2387 \text{ Cal} \times \frac{4.184 \text{ J}}{1 \text{ Cal}} = 9.987 \times 10^6 \text{ J}$ b) $\times \frac{1 \text{ KJ}}{1000 \text{ J}} = 9987 \text{ KJ}$ c) $\times \frac{1 \text{ KWh}}{3.60 \times 10^6 \text{ J}} = 2.774 \text{ KWh}$

41) $\Delta E = q + w$ $w = 105 \text{ KJ}$ $q = -622 \text{ KJ}$ $\Delta E = -622 + (-105) = -727 \text{ KJ}$

45) "A" had more ice because the ice in "B" was melted to cool the soft drinks that started at room temp in "A" the drinks were already cool

47) $q = m C \Delta T = 1500 \text{ g} \times \frac{4.184 \text{ J}}{1 \text{ g} \cdot ^\circ\text{C}} \times 75.6^\circ\text{C} = 470,000 \text{ J}$

59) $177 \text{ mL} \times \frac{0.788 \text{ g}}{1 \text{ mL}} \times \frac{1 \text{ mol}}{58.08 \text{ g}} \times \frac{-1790 \text{ KJ}}{1 \text{ mol}} = -4.30 \times 10^3 \text{ KJ}$

65) $q_{\text{water}} = 100.0 \text{ g} \times \frac{4.184 \text{ J}}{1 \text{ g} \cdot ^\circ\text{C}} \times (26.2 - 24.8)^\circ\text{C} = 585.76 \text{ J}$

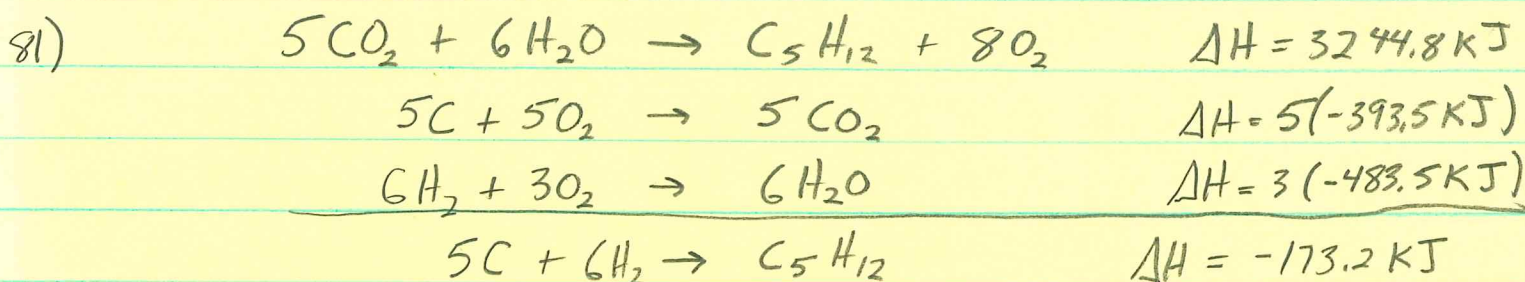
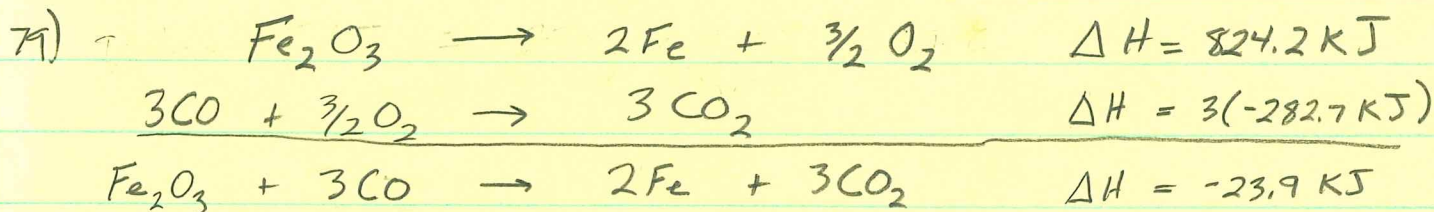
$m_{\text{Ag}} = \frac{q}{C \Delta T} = \frac{-585.76 \text{ J}}{\left(\frac{0.235 \text{ J}}{1 \text{ g} \cdot ^\circ\text{C}}\right)(26.2 - 58.5^\circ\text{C})} = 77 \text{ g Ag} \quad q_{\text{water}} + q_{\text{Ag}} = 0$

73) $q_{\text{cal}} = \frac{5.86 \text{ KJ}}{^\circ\text{C}} \times 3.6^\circ\text{C} = 21.1 \text{ KJ} = -q_{\text{rxn}} \quad q_{\text{cal}} + q_{\text{rxn}} = 0$

$\frac{-21.1 \text{ KJ}}{0.514 \text{ g}} \times \frac{154.20 \text{ g C}_{12}\text{H}_{10}}{1 \text{ mol}} = -6300 \text{ KJ/mol}$

76) $q_{\text{soln}} = m C \Delta T = 25.0 \text{ g} \times \frac{4.18 \text{ J}}{1 \text{ g} \cdot ^\circ\text{C}} \times -3.9^\circ\text{C} = -407.55 \text{ J} \rightarrow 0.407 \text{ KJ}$

$q_{\text{soln}} + q_{\text{rxn}} = 0 \quad \Delta H_{\text{rxn}} = \frac{0.407 \text{ KJ}}{1.25 \text{ g}} \times \frac{80.05 \text{ g NH}_4\text{NO}_3}{1 \text{ mol}} = 26 \text{ KJ/mol}$



$$89) \Delta H_{rxn}^{\circ} = [(-1273.3) + 6(0)] - [6(-393.5) + 6(-285.8)] = 2802.5 \text{ KJ}$$

$$91) -1418.4 = [2(-393.5) + 3(-285.8) + (0)] - [2(\Delta H_f^{\circ} \text{CH}_3\text{NO}_2) + (0)]$$

$$\Delta H_f^{\circ} = -113.0 \text{ KJ/mol}$$

$$101) \text{H}_2\text{O}_{(s)} \rightarrow \text{H}_2\text{O}_{(l)} \quad \Delta H_f^{\circ} \text{H}_2\text{O}_{(s)} = -291.8 \text{ KJ/mol}$$

$$\Delta H_f^{\circ} \text{H}_2\text{O}_{(l)} = -285.8 \text{ KJ/mol}$$

$$\Delta H_{rxn}^{\circ} = [1(-285.8)] - [1(-291.8)] = \underline{+6.0 \text{ KJ}}$$

mol/rxn

Cool
lig bev
25.0°C
↓
0°C

$$q_{bev} = 355\text{g} \times \frac{4.184 \text{ J}}{1\text{g}^{\circ}\text{C}} \times -25.0^{\circ}\text{C} = -37133 \text{ J}$$

$$q_{melt} + q_{bev} = 0 \quad 37.133 \text{ KJ} \times \frac{1 \text{ mol}^{\text{H}_2\text{O}}}{6.0 \text{ KJ}} \times \frac{18.02 \text{ g}}{1 \text{ mol}} = 110 \text{ g ice}$$