COMBINATION PROBLEM 2

$C_4H_{10}(g) + \frac{13}{2}\,O_2(g) \longrightarrow 4\,CO_2(g) + 5\,H_2O(l) \qquad \Delta H^o = ?$

$$\Delta H^o = [4\Delta H^o_{CO_2(g)} \ + \ 5\Delta H^o_{H_2O(l)}] - [\Delta H^o_{C_4H_{10}(g)} \ + \ \tfrac{13}{2}\Delta H^o_{O_2(g)}]$$
$$\Delta H^o = [4(-393.5\text{ kJ}) \ + \ 5(-285.8\text{ kJ})] - [-125.6\text{ kJ} + \tfrac{13}{2}(0)]$$
$$\Delta H^o = -2877.4\text{ kJ}$$

$C_4H_{10}(g) + \frac{13}{2}\,O_2(g) \longrightarrow 4\,CO_2(g) + 5\,H_2O(l) \qquad \Delta H^o = -2877.4\text{ kJ}$

$$Q = -\Delta H$$
$$Q = 2877.4\text{ kJ/mol } C_4H_{10}$$

$$25.00\text{ g } C_4H_{10}\text{ x }\frac{1\text{ mol } C_4H_{10}}{58.14\text{ g } C_4H_{10}}\ \text{x}\ \frac{2877.4\text{ kJ}}{1\text{ mol } C_4H_{10}}\ \text{x}\ \frac{1000\text{ J}}{1\text{ kJ}}\ =\ 1237272\text{ J}$$

$$\Delta T = \frac{Q}{mc}$$
$$\Delta T = \frac{1237272\text{ J}}{50\,000\text{ g x }4.184\frac{\text{J}}{\text{g}^o\text{C}}}$$
$$\Delta T = 5.914\ ^o\text{C}$$