WORKSHEET 2 - QUESTION 5

$C_7H_{16}(g) + 11\,O_2(g) \longrightarrow 7\,CO_2(g) + 8\,H_2O(l) \qquad \Delta H^o = ?$

$$Q = ?$$
$$m = 50.0\ L \Rightarrow 50\,000\ mL \Rightarrow 50\,000\ g$$
$$c = 4.184\ \frac{J}{g^oC}1$$
$$\Delta T = (31.187 - 22.000)\ ^oC = 9.187\ ^oC$$

$$Q = mc\Delta T$$
$$Q = 50\,000\ g\ x\ 4.184\ \frac{J}{g^oC}\ x\ 9.187\ ^oC$$
$$Q = 1921920.4\ J$$
$$Q = 1921.92\ kJ$$

$$\frac{1921.92\ kJ}{40.0\ g\ C_7H_{16}}\ x\ \frac{100.23\ g\ C_7H_{16}}{1\ mol\ C_7H_{16}} = \frac{4815.85\ kJ}{1\ mol\ C_7H_{16}}$$

$$\Delta H = -Q$$
$$\Delta H = -4815.85\ kJ/1\ mol\ C_7H_{16}$$

$C_7H_{16}(g) + 11\,O_2(g) \longrightarrow 7\,CO_2(g) + 8\,H_2O(l) \qquad \Delta H^o = -4815.85\ kJ$

$$\Delta H^o = [7\Delta H^o_{CO_2(g)} + 8\Delta H^o_{H_2O(l)}] - [\Delta H^o_{C_7H_{16}(g)} + 11\,\Delta H^o_{O_2(g)}]$$
$$-4815.85\ kJ = [7(-393.5\ kJ) + 8(-285.8\ kJ)] - [\Delta H^o_{C_7H_{16}} + 11\,(0)]$$
$$\Delta H^o_{C_7H_{16}(g)} = -5040.9\ kJ + 4815.85\ kJ$$
$$\Delta H^o_{C_7H_{16}(g)} = -225.05\ kJ$$
