8.1 b) $SO_2(g) + \frac{1}{2}O_2(g) + H_2O(l) \rightarrow H_2SO_4(l)$

$$\Delta H_{rxn}^\circ = \sum_{j=1}^{4} \Delta H_{f,j}^\circ$$

from Appendix C, Table C-4 in Smith Van Ness

$$= \Delta H_{f,H_2SO_4(l)}^\circ - \Delta H_{f,SO_2(g)}^\circ - \frac{1}{2}\Delta H_{f,O_2(g)}^\circ - \Delta H_{f,H_2O(l)}^\circ$$

$$= -813989 \frac{J}{mol} - (-296830 \frac{J}{mol}) - 0 - (-285830 \frac{J}{mol})$$

$$= -231329 \ J/mol$$

8.2 c) n-Hexane (l), $\Delta H_c^\circ = -4163.1 \ kJ/gmol$

$$C_6H_{14}(l) + \frac{19}{2}O_2(g) \rightarrow 6CO_2(g) + 7H_2O(l)$$

$$\Delta H_c^\circ = \Delta H_{rxn}^\circ = \sum_{j=1}^{4} \Delta H_{f,j}^\circ$$

$$-4163.1 \frac{kJ}{gmol} = 6\Delta H_{f,CO_2(g)}^\circ + 7\Delta H_{f,H_2O(l)}^\circ - \frac{19}{2}\Delta H_{f,O_2(g)}^\circ - \Delta H_{f,C_6H_{14}(l)}^\circ$$

$$-4163100 \ J/mol = 6(-393509 \frac{J}{mol}) + 7(-285830 \frac{J}{mol}) - 0 - \Delta H_{f,C_6H_{14}(l)}^\circ$$

$$\Delta H_{f,C_6H_{14}} = -198.764 \ kJ/gmol$$