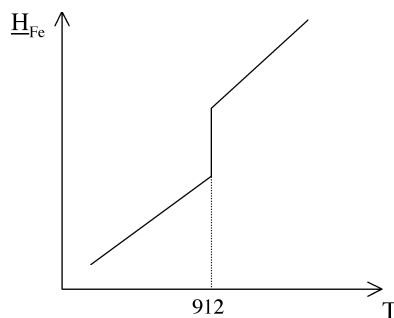


In-class Practice Problems (9/15/08)

Problem 3

(a)



$$\Delta \underline{H}_{Fe} = n \int_{1100^{\circ}C}^{912^{\circ}C} c_{p,\gamma} dT + n \Delta \underline{H}^{\gamma \rightarrow \alpha} + n \int_{912^{\circ}C}^{0^{\circ}C} c_{p,\alpha} dT$$

$$\Delta \underline{H}_{Fe} = \frac{100 \text{ g}}{55.845 \text{ g/mol}} \left[34 \frac{\text{J}}{\text{mole-K}} (912^{\circ}C - 1100^{\circ}C) - 900 \frac{\text{J}}{\text{mole}} + 38 \frac{\text{J}}{\text{mole-K}} (0^{\circ}C - 912^{\circ}C) \right]$$

$$\Delta \underline{H}_{Fe} = -41.95 \text{ kJ/mole}$$

$$\boxed{\Delta \underline{H}_{Fe} = -75.11 \text{ kJ}}$$

(b) System Fe+ice water is adiabatic $\rightarrow \Delta H = 0$

$$\Delta H_{Fe} = \Delta H_{icewater}$$

$$\Delta H_{Fe} = -(m_{ice} \Delta \underline{H}_{melting}), m_{ice} = \text{mass of ice transformed}$$

$$m_{ice} = \frac{75110 \text{ J}}{6048 \frac{\text{J}}{\text{mole-K}} * \frac{1 \text{ mol}}{18 \text{ g}}}$$

$$\boxed{m_{ice} = 223 \text{ g}}$$