6.92 a) $AgNO_3(aq) + NaI(aq) \rightarrow AgI(s) + NaNO_3(aq)$

$$\text{Moles } AgNO_3 = (50.0 \text{ mL})\left(\frac{10^{-3} \text{ L}}{1 \text{ mL}}\right)\left(\frac{5.0 \text{ g } AgNO_3}{1 \text{ L}}\right)\left(\frac{1 \text{ mol } AgNO_3}{169.9 \text{ g } AgNO_3}\right)$$

$= 1.47145 \times 10^{-3}$ mol $AgNO_3$ (unrounded)

$$\text{Moles NaI} = (50.0 \text{ mL})\left(\frac{10^{-3} \text{ L}}{1 \text{ mL}}\right)\left(\frac{5.0 \text{ g NaI}}{1 \text{ L}}\right)\left(\frac{1 \text{ mol NaI}}{149.9 \text{ g NaI}}\right)$$

$= 1.6677785 \times 10^{-3}$ mol NaI (unrounded)

The $AgNO_3$ is limiting, and will be used to finish the problem:

$$\text{Grams AgI} = \left(1.47145 \times 10^{-3} \text{ mol } AgNO_3\right)\left(\frac{1 \text{ mol AgI}}{1 \text{ mol } AgNO_3}\right)\left(\frac{234.8 \text{ g AgI}}{1 \text{ mol AgI}}\right)$$

$= 0.345496 =$ **0.35 g AgI**

b) $Ag^+(aq) + I^-(aq) \rightarrow AgI(s)$

$\Delta H^o_{rxn} = [1 \text{ mol } (\Delta H^o_f, AgI(s))] - [1 \text{ mol } (\Delta H^o_f, Ag^+(aq)) + 1 \text{ mol}(\Delta H^o_f, I^-(aq))]$

$= [1 \text{ mol } (-62.38 \text{ kJ/mol})] - [1 \text{ mol } (105.9 \text{ kJ/mol}) + 1 \text{ mol } (-55.94 \text{ kJ/mol})]$

$=$ **–112.3 kJ**

c) $\Delta H^o_{rxn} = Cm\Delta T$

$$\Delta T = \Delta H^o_{rxn} / Cm = \frac{\left[\left(\frac{112.3 \text{ kJ}}{\text{mol AgI}}\right)\left(\frac{1 \text{ mol AgI}}{1 \text{ mol } AgNO_3}\right)\left(1.47145 \times 10^{-3} \text{ mol } AgNO_3\right)\right]}{\left(\frac{4.184 \text{ J}}{\text{g} \bullet \text{K}}\right)\left[(50.0 + 50.0)\text{mL}\left(\frac{1.00 \text{ g}}{\text{mL}}\right)\right]}\left(\frac{10^3 \text{ J}}{1 \text{ kJ}}\right)$$

$= 0.39494 =$ **0.39 K**