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

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

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

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

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

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

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

$\qquad$ = 0.345496 = **0.35 g AgI**

b) $Ag^+(aq) + I^-(aq) \rightarrow AgI(s)$
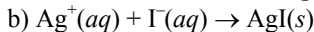
ΔH_{rxn}° = [1 mol (ΔH_f°, AgI(s))] – [1 mol (ΔH_f°, $Ag^+(aq)$) + 1 mol(ΔH_f°, $I^-(aq)$)]

$\qquad$ = [1 mol (–62.38 kJ/mol)] – [1 mol (105.9 kJ/mol) + 1 mol (–55.94 kJ/mol)]

$\qquad$ = **–112.3 kJ**

c) ΔH_{rxn}° = CmΔT

ΔT = ΔH_{rxn}° / Cm = $\dfrac{\left[\left(\dfrac{112.3 \text{ kJ}}{\text{mol AgI}}\right)\left(\dfrac{1 \text{ mol AgI}}{1 \text{ mol } AgNO_3}\right)\left(1.47145 \times 10^{-3} \text{ mol } AgNO_3\right)\right]}{\left(\dfrac{4.184 \text{ J}}{\text{g} \cdot \text{K}}\right)\left[\left(50.0 + 50.0\right)\text{mL}\left(\dfrac{1.00 \text{ g}}{\text{mL}}\right)\right]}\left(\dfrac{10^3 \text{ J}}{1 \text{ kJ}}\right)$

$\qquad$ = 0.39494 = **0.39 K**