1. Calculate the standard entropy change for the following reaction.

\[ 2 \text{Ag}_2\text{O}(s) \rightarrow 4 \text{Ag}(s) + \text{O}_2(g) \]

\[ \Delta S^\circ = +1(42.55) + 1(205.07) - 2(121.3) = 132.7 \text{ J/K} \]

2. Predict the sign of \( \Delta S \) for the following reactions:
   
   A) \( 2 \text{NH}_3(g) \rightarrow \text{N}_2(g) + 3 \text{H}_2(g) \) 
   
   B) \( \text{CaO}(s) + \text{CO}_2(g) \rightarrow \text{CaCO}_3(s) \)

   C) \( 2 \text{CO}(g) \rightarrow 2 \text{C}(s) + \text{O}_2(g) \)

   D) \( \text{NaCl}(s) \rightarrow \text{Na}^+(aq) + \text{Cl}^-(aq) \)

3. Write equation for the reaction with \( \Delta G^\circ_{\text{rev}} = \Delta G^\circ \) for \( \text{Al}_2\text{O}_3(s) \)

\[ 2 \text{Al}(s) + 3/2 \text{O}_2(g) \rightarrow \text{Al}_2\text{O}_3(s) \]

4. Based on the \( \Delta H^0 \) and \( \Delta S^0 \) for ethanol (CH₃CH₂OH), determine the boiling point of ethanol.

\[ \Delta G = \Delta H^0 - T \Delta S^0 \]

\[ T = \frac{\Delta H^0}{\Delta S^0} = \frac{41.7 \text{ kJ/mol}}{0.1237 \text{ J/K mol}} = 340. \text{ K} \]

5. Consider the reaction:

   A) Calculate \( \Delta G^\circ \) for this reaction at 25°C

\[ \Delta G^\circ_{\text{rev}} = 4(51.23) - 2(104.20) - 3(83) \]

\[ = -3.48 \text{ kJ} \]

\[ \Delta G^\circ = \Delta H^0 - T \Delta S^0 = -31.7 \text{ kJ} - (298.15 \text{ K})(0.09475 \text{ kJ/mol}) \]

\[ = -3.64 \text{ kJ} \]

B) Calculate \( \Delta G \) for this reaction at 100°C

\[ \Delta G = -31.7 \text{ kJ} - (373 \text{ K})(-0.09475 \text{ kJ/mol}) \]

\[ = 3.64 \text{ kJ} \]