Thermo Review

1. Predict whether ΔS° would be positive or negative for each of the following reactions.
   a. $C_8H_{18(l)} + \frac{25}{2}O_{2(g)} \longrightarrow 8CO_{2(g)} + 9H_2O_{(g)}$
   b. $Ag^+_{(aq)} + Cl^-_{(aq)} \longleftrightarrow AgCl_{(s)}$
   c. $2NO_{2(g)} \longleftrightarrow N_2O_{4(g)}$

2. Calculate ΔS° for each reaction.
   a. $N_{2(g)} + 3H_{2(g)} \longleftrightarrow 2NH_{3(g)}$
   b. $2NaHCO_{3(s)} \longrightarrow Na_2CO_{3(s)+}CO_{2(g)} + H_2O_{(l)}$

3. Calculate ΔG° for each reaction. Is the reaction thermodynamically favored at this temperature (298 K)?
   a. $Br_{2(l)} + H_{2(g)} \longleftrightarrow 2HBr_{(g)}$
   b. $2C_2H_{6(g)} + 7O_{2(g)} \longrightarrow 4CO_{2(g)} + 6H_2O_{(g)}$

4. Is the following reaction thermodynamically favored at 25 °C? If not, find the temperature at which it will be favored? Hint: you will need to calculate ΔH°, ΔS°, and ΔG°.
   $CaCO_{3(s)} \longrightarrow CaO_{(s)+}CO_{2(g)}$

5. If ΔH°=-424 kJ/mol and ΔS°=-300J/molK, find ΔG° at 298 K. Is the reaction thermodynamically favor4ed? If not, find the temperatures at which it will be.

6. Barium fluoride has a K_{sp} of 1.7×10^{-6}. Find ΔG° for this reaction.
   $BaF_{2(s)} \longrightarrow Ba^{+2}_{(aq)} + 2F^{-1}_{(aq)}$

7. For each of the following reactions determine whether they are thermodynamically favored at 25°C, whether they are driven by entropy, enthalpy, both or neither?

Rxn	ΔH° (kJ/mol)	ΔS° (J/molK)	Thermodynamically favored at 298K?	Driven by enthalpy?	Driven by entropy?
A	-424	-300			
B	-150	+200			
C	+58	+390			
D	+2400	-450			