CHEM 1032 – Week 5 Questions

1. Predict the sign of ΔS_{rxn} for the equation below….

   $CaCO_3$ (s) → CaO (s) + CO_2 (g)

2. Let's say a reaction releases 10 J of heat. The reaction is performed at -40 °C, 0 °C, and 40 °C. Which reaction will see the smallest increase in entropy of the surroundings?

3. Which compound has the highest standard entropy, S^o ?

   a. H_2 (g)
   b. NH_3 (g)
   c. Br_2 (l)
   d. NaCl (s)

4. What is the ΔS^o_{rxn} for the reaction below?

   2 H_2S (g) + 3 O_2 (g) → 2 H_2O (l) + 2 SO_2 (g)

	S^o
H_2S (g)	205.8 J/mol K
O_2 (g)	205.2 J/mol K
H_2O (l)	188.8 J/mol K
SO_2 (g)	248.2 J/mol K

5. Is the reaction below spontaneous or nonspontaneous at 25 °C, determine the value of Δ^oG_{rxn}

   2 $H_2S_{(g)}$ + 3 $O_{2\,(g)}$ --> 2 $H_2O_{(l)}$ + 2 $SO_{2\,(g)}$

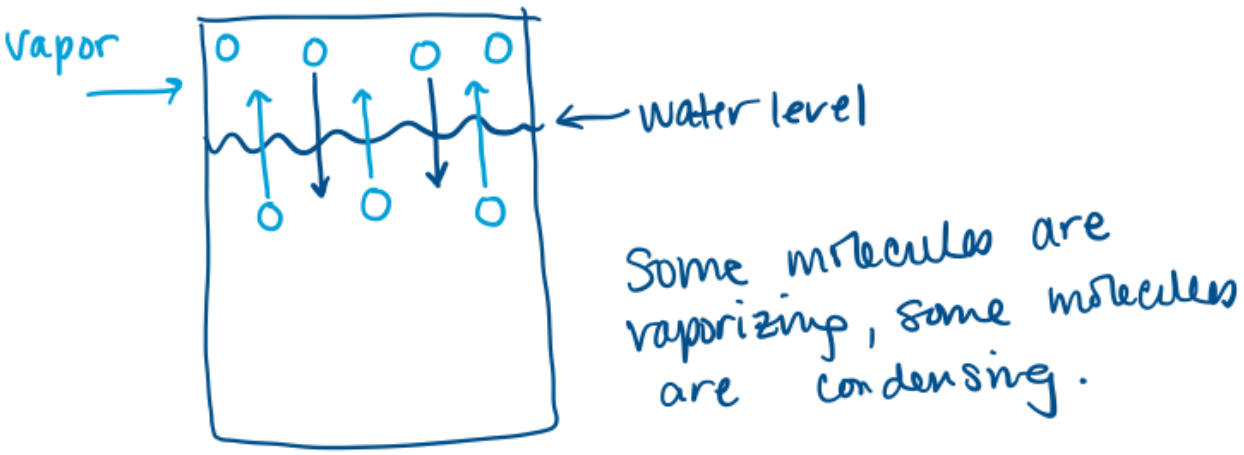
   Δ^oH_{rxn} -1036 kJ/mol

   Δ^oS_{rxn} -153 J/K mol

6. Is the reaction below spontaneous or nonspontaneous at 25 °C?

   $CH_{4\,(g)}$ + 8 $O_{2\,(g)}$ --> $CO_{2\,(g)}$ + 2 $H_2O_{(g)}$ + 4 $O_{3\,(g)}$

	Δ^oG_f kj/mol
$CH_{4\,(g)}$	-50.5
$CO_{2\,(g)}$	-394.4
$H_2O_{(g)}$	-228.6
$O_{3\,(g)}$	163.2



7. Does the level of the liquid change?
8. Is the amount of vapor equal to the amount of liquid?

9. Based on the K value, 1.0×10^{19}…
    a. Which is greater in concentration, reactants or products?
    b. Is the reaction products favored or reactants?
    c. Is the reaction spontaneous or nonspontaneous?
    d. What is the value of $\Delta^{o}G_{rxn}$?

10. At equilibrium the concentrations for H_2, I_2 and HI are 0.033 M, 0.530 M, and 0.934 M, respectively. What is the value of $\Delta^{o}G_{rxn}$?

$$H_2\,(g) + I_2\,(g) \leftrightarrows 2HI\,(g)$$

11. What is the correct K expression for the reaction below?

$$2\,Fe_2O_3\,(g) + 3\,CO\,(g) \rightarrow 2\,Fe\,(s) + 3\,CO_2\,(g)$$