Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_

GIBBS FREE ENERGY PRACTICE 2

Due: Friday, May 22nd, 2020

1. The hydrogenation of ethene gas under standard conditions (T = 298.15 K) shows a decrease in disorder (ΔS˚ = -0.1207 kJ/(mol•K)) during an exothermic reaction (ΔH˚ = -136.9 kJ/mol). Determine whether the reaction is spontaneous or nonspontaneous by calculating ΔG˚.

C2H4 (g) + H2 (g) → C2H6 (g)

1. Calculate the standard free energy of the following reaction from standard free energies of formation.

2 CO (g) + O2 (g) → 2 CO2 (g)

1. The vaporization of bromine requires 31.0 kJ/mol and an increase in disorder (ΔS˚ = 93.0 J/(mol•K)). At what temperature will this process be spontaneous?

Br2 (l) → Br2 (g)

1. Copper (I) sulfide reacts with sulfur to produce copper (II) sulfide under standard conditions. The process is exothermic (ΔH˚ = -26.7 kJ/mol) with a decrease in disorder (ΔS˚ = -19.7 J/(mol•K)). Determine the spontaneity of the reaction by calculating ΔG˚.

Cu2S (s) + 2 S (s) → 2 CuS (s)

1. For a certain process at 300.0 K, ΔG = -77.0 kJ/mol and ΔH = -56.9 kJ/mol. Find the entropy change for this process.
2. The entropy of a system at 337.1 K increases by 221.7 J/mol•K. The free energy value is found to be –717.5 kJ/mol. Calculate the change in enthalpy of this system.
3. A system at 776.5 K undergoes a change in enthalpy of –5.711 kJ/mol. If the free energy value is 6.771 kJ/mol, what is the change in entropy?
4. In a system in which the enthalpy changed –447.1 kJ/mol and the entropy decreases by 75.1 kJ/mol•K, calculate the temperature at which the system will be at equilibrium.