Name: Period

GIBB’S FREE ENERGY WORKSHEET

Due: Friday May 15th, 2020

1. Consider the combustion of Ethanol (circle the correct answer)

2 CH3OH(l) + 3 O2(g) → 2 CO2(g) + 4 H2O(g)

1. Based on the reactants and products, predict the sign of ΔS

Zero Negative Positive

1. Given that this is a combustion reaction, predict the sign of ΔH

Zero Negative Positive

1. Based on your answer for part a and b, predict the sign of ΔG

Zero Negative Positive

1. Predict the sign of ΔG, ΔH, and ΔS
2. Water evaporates at 100oC
3. Water freezes into ice as you put it into the freezer at below 0oC
4. Consider the reaction

CO(g) + H2O(l) → CO2(g) + H2(g)

Given that ΔH = -41.2 kJ and ΔS = -135 J/K\*mol

1. Calculate ΔG at room temperature (25oC)
2. Calculate ΔG at 500K. Assuming that the change in enthalpy and entropy are temperature independent.
3. Does raising temperature favor this reaction? Why?
4. Determine whether this is a forward or backward reaction if it happens at 300K
5. In the introduction of ammonia at 25oC, the entropy was found to be -198 J/K\*mol. Calculate the Gibbs free energy to produce ammonia. Given that the change in enthalpy is -93 kJ/mol.

N2(g) + 3 H2(g) → 2 NH3(g)

1. Calculate the Gibbs free energy for the following reaction at 150oC. Given that ΔH = 84.5 kJ/mol, ΔS = -48.7 J/K\*mol.

Cu(s) + H2O(g) → CuO(s) + H2(g)

1. For the reaction C2H5OH(l) → C2H5OH(g) at 25oC, select the correct statement from the ones below. Given that ΔS = 122 J/K\*mol, and ΔH = -205.4 kJ/mol. Show your explanation at the space below.
2. The reaction will always be spontaneous.
3. The reaction will always be non-spontaneous.
4. The reaction will be spontaneous only at high temperature.
5. The reaction will be spontaneous only at low temperature.