1. Predict whether the entropy change will be positive or negative for the following:

1. H2O (g) 🡪 H2O (l)
2. 2NH3 (g) + CO2 (g) 🡪 H2O (l) + NH2CONH2 (aq)
3. Cu (s) @ 25 degrees Celsius 🡪 Cu (s) @ 100 degrees Celsius
4. 2NH3 🡪 N2 + 3 H2

2. In 1774 Joseph Priestly prepared oxygen by heating mercury (II) oxide according to the reaction HgO (l) 🡪 Hg (l) + ½ O2, for which the temperature is 25 degrees Celsius, $∆H=90.84 kJ$ and $∆S=108 J/K$. Calculate gibbs free energy. Is the reaction spontaneous at this point?

3. What is true about $∆H$ when a reaction is exothermic? What about endothermic?

4. A 50.0 gram pieces of Copper is placed in 500 kg of solution. The metal was heated to 98 degrees Celsius and then put in the solution that has an initial temperature of 31.9 degrees. The final temperature of the solution is 50.0 degrees Celsius. The copper has a specific heat of 0.092 cal/g\*C. What is the specific heat of the solution?

5. How much total heat is released when 20.0 grams ethyl alcohol changes from a liquid at 20 degrees Celsius to a gas at 100 degrees Celsius?

Melts at -114.1 degrees Celsius

Boils at 78.37 degrees Celsius

Specific Heat of Ethyl Alcohol = 2.460 J/g\*C

Heat of Vaporization = 879 J/g

Heat of Fusion = 109 J/g

6. What is the enthalpy change for the combustion of ethane (C2H6) when gaseous water is one of the products?

7. When hydrogen peroxide is placed on a cut knee it decomposes to form water and oxygen gas. How much energy will be released when 34.0 g of H2O2 decomposes to H2O according to the following equation?

2H2O2(l) 🡪 2H2O(l) + O2(g) H = -200 kJ/mol