**Chapter 18 Quiz Review**

1. What does equilibrium mean? How does Le Chatlier’s Principle relate to equilibrium?
2. Review: in an endothermic reaction, which side of the equation is the “heat” on? How do you know? What about in an exothermic reaction?
3. Review: How are pressure and volume related? What gas law shows this relationship?
4. N2(g) + 3H2(g) ⇌ 2NH3(g) + heat. Show the equilibrium shift if:
   1. The concentration of NH3 decreased.
   2. The temperature increased
   3. The pressure decreased
   4. The concentration of N2 decreased
   5. The volume was halved
5. If the reaction shifts to the right, what does this mean? What about if the reaction shifts to the left?
6. Write the equilibrium expression for the equation in number 4. Where do the coefficients in the original equation go in the equilibrium expression?
7. How does the value of Keq relate to the direction the equilibrium will shift?
8. What does NOT go into an equilibrium equation?
9. How does a catalyst affect the chemical reaction? What does it do specifically to affect the chemical reaction?
10. In the previous equation, you are given a 0.2M sample of N2 reacting with a 0.5M sample of H2 to form a 1.5M sample of NH3. What is the reaction constant? What direction does the reaction shift in, given this information. How do you know?
11. Balance the following reaction: \_\_CH4(g) + \_\_O2(g) 🡪 \_\_CO2(g) + \_\_H2O (g)
    1. Set up a reaction rate (k) equation for this problem.
    2. If the concentration of the reactants are 0.67M and the concentration of the products are .34M, determine the rate of reaction. Which side of the reaction is favored, and how do you know?
    3. Calculate the heat of formation for this reaction, using the values on the given formula sheet
    4. If the reaction started at 30 kJ and has an activation energy of 350 kJ, draw a reaction pathway, labeling the Y-axis as Energy (kJ)
    5. In your energy diagram, depict the effect of a catalyst, use a dashed line to show this.
    6. How would a pressure change affect this reaction? How do you know this?
12. Using your formula sheet, determine the heat of formations for the following reactions, labeling them as endo/exothermic.
    1. C3H8(g) + 5O2 ⇌ 3 CO2(g) + 4 H2O(g)
    2. NO(g) + 2HNO3(l) ⇌ H2O(l) + 3 NO2(g)
    3. C2H4(g) + Cl2(g) ⇌ C2H3Cl(g) + HCl(g)
13. For the above equations, state BOTH: which side heat would be on AND if ΔH is positive or negative.
14. Using the steps below, calculate the overall heat (ΔH) of the reaction
    1. 2 CO (g) + O2 (g) 🡪 CO2(g) (ΔH = \_\_\_\_\_\_kJ/mol)

Steps: 1) C(s) + O2(g) 🡪 CO2(g) ΔH = -393.5  
 2) 2 C(s) + O2(g) 🡪 2 CO(g) ΔH = -221.0

* 1. 2 C(s) + 2 H2(g) 🡪 HC2H3O2(l) (ΔH = \_\_\_\_\_kJ/mol)

Steps: 1) HC2H3O2(l) + 2O2(g) 🡪 2 CO2(g) + 2 H2O(l) ΔH = -875.5  
 2) C(s) + O2(g) 🡪 CO2(g) ΔH = -395.0  
 3) 2 H2(g) + O2(g) 🡪 2 H2O ΔH = -571.6

1. For each of the solid compounds you will be given a molar solubility. Calculate the Ksp.
   1. Compound = AgCN, Solubility = 7.73 x 10¯9M
   2. Compound = Ag2SO4, Solubility = 2.8x10-5 M
2. For each of the solid compounds you will be given a Ksp. Calculate the molar solubility.
   1. The Ksp of AgBr is 3.2 x10-13
   2. The Ksp for Magnesium phosphate is 3.6x10-17