Name:

Period:

**Equilibrium & Reaction Rate Constant Homework**

1. How does a catalyst speed up a chemical reaction? What are the other three factors that affect a reaction rate?
2. What is the general formula for the reaction rate constant? What do the uppercase letters mean? What do the lowercase letters mean?
3. Set the following equations up correctly solving for k. (remember, **DON’T** include **LIQUIDS** and **SOLIDS**)
   1. N2(g) + 3Cl2(g) ⇌ 2NCl3(g) c. CO2(g) + MgO(s) ⇌ MgCO3(s)
   2. 2KClO3(s) ⇌ 2KCl(s) + 3O2(g) d. SO3(g) + H20(l) ⇌ H2SO4(aq)
4. 2H20(g) ⇌ 2H2(g) + O2(g)
   1. What are the reactants in this equation? The products?
   2. Set up the equation to find k (remember, products on top, reactants on bottom)
   3. If a 12.5M solution of water forms a 2.3M solution of H2 and a 3M solution of O2. What is the equilibrium constant, k?
5. N2(g) + 3H2(g) ⇌ 2NH3(g)
   1. Set up the equation to find k.
   2. If 0.150M of N2 react with 0.250M of H2 to form 0.50M of NH3, what is the reaction constant?
6. H2SO4(aq) + H20(l) ⇌ H30+(aq) + HSO4-(aq)
   1. Identify in the equation above which is the acid, base, conj. acid and conj. base.
   2. Identify the two pairs in the above equation.
   3. [H2SO4] = 0.450M [H30+] = 1.25M [HSO4-] = 0.650M. Find k.
7. HCl(aq) + NaOH(aq) ⇌ H20(l) + NaCl(s)
   1. Identify in the equation above which is the acid, base, conj. acid and conj. base.
   2. Is this a HOMOGENEOUS equilibrium or HETEROGENEOUS equilibrium? How do you know?
   3. If a 5.24M solution of HCl combines with 5.6M solution of NaOH to form 3.5M of NaCl, what is the reaction constant?
8. NaOH(aq) + H20(l) ⇌ NaOH2+(aq) + OH-(aq)
   1. Identify in the equation above which is the acid, base, conj. acid and conj. base.
   2. If a 8.9M solution of NaOH forms a 6M solution of NaOH2 and 2M solution of OH-, what is the reaction constant?
9. CHALLENGE PROBLEM: HNO3(aq) + H20(l) ⇌ H30+(aq) + NO3-(aq)
   1. Identify in the equation above which is the acid, base, conj. acid and conj. base.
   2. Your reaction constant (k) = 15. You know that you form 2.5M solution of H30+ and a 5M solution of NO3-. What is the concentration of your reactant, HNO3?
10. CHALLENGE PROBLEM: HClO4(aq) + H20(l) ⇌ H30+(aq) + ClO4-(aq)
    1. Identify in the equation above which is the acid, base, conj. acid and conj. base.
    2. Your reaction constant (k) = 20. You know that you form a 7.5M solution of H30+ and a 4M solution of ClO4-. What is the concentration of your reactant, HClO4?
    3. You know that you dissolved the HClO4 in 10L of water. How many moles of HClO4 do you have? (remember M = mol/L)
    4. How many grams of HClO4 is that? (convert moles to grams using T-Chart)