**Name: Period: Seat#:**

**Worksheet #9\* #X\***

**Directions**: Any worksheet that is labeled with an \* means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website…and the entire internet! See me if you need help finding practice on a topic you are struggling with.

1. What is Dynamic Equilibrium Video – Fuse School   
   <https://www.youtube.com/watch?v=wlD_ImYQAgQ>
2. Le Chatelier’s Principle Video Part 1 – Fuse School  
   <https://www.youtube.com/watch?v=7zuUV455zFs>
3. Le Chatelier’s Principle Video Part 2 – Fuse School  
   <https://www.youtube.com/watch?v=XhQ02egUs5Y>
4. Reversible reactions – Bozeman Science  
   <https://www.youtube.com/watch?v=b6WmwtVNDf4>
5. Equilibrium video – Bozeman Science  
   <https://www.youtube.com/watch?v=cHAjhM3y3ds>
6. Le Chatelier’s Principle – Bozeman Science  
   <https://www.youtube.com/watch?v=PciV_Wuh9V8>
7. Equilibrium Calculations – Crash Course  
   <https://www.youtube.com/watch?v=DP-vWN1yXrY>
8. Equilibrium Constant – Bozeman Science  
   <https://www.youtube.com/watch?v=xfGlEXWDRZE&t=0s&list=PLllVwaZQkS2op2kDuFifhStNsS49LAxkZ&index=66>
9. Reaction Quotient – Bozeman Science  
   <https://www.youtube.com/watch?v=60Sylqei2DY&list=PLllVwaZQkS2op2kDuFifhStNsS49LAxkZ&index=64&t=0s>
10. Equilibrium Disturbances – Bozeman Science  
    <https://www.youtube.com/watch?v=dd5p0VZ-MZg&t=0s&list=PLllVwaZQkS2op2kDuFifhStNsS49LAxkZ&index=68>
11. **Need a video about equilibrium calculations – calculating K**
12. **Need a video about ICE tables**
13. **Need a video about 5% rule**
14. \_\_\_NH3 (*g*) + \_\_\_O2 (*g*) ↔ \_\_\_NO (*g*) + \_\_\_H2O (*g*) + energy   
    Determine the direction of shift resulting from each applied stress. Explain your reasoning:
    1. addition of NO (*g*)
    2. removal of O2 (*g*)
    3. increase the pressure by decreasing the volume
    4. decreasing the temperature
    5. adding a catalyst
15. Write equilibrium expressions for the following:
    1. 2NO2 (g) ↔ N2O4 (g)
    2. N2(g) + 3H2(g) ↔ 2NH3 (g)
    3. 2SO2 (g) + O2 (g) ↔ 2SO3 (s)
16. Write the Ksp expression for the following reactions:
    1. AlPO4
    2. AgCN
    3. Zn3(AsO4)2
17. State the effect of an increase in temperature:
    1. 2SO2 + O2 ↔ 2SO3 + Heat
    2. Heat + PCl5 ↔ PCl3 + Cl2
    3. Heat + N2 + O2 ↔ 2NO
    4. CO + H2O ↔ CO2 + H2 + Heat
    5. N2 + 3H2 ↔ 2NH3 + Heat
18. State the effect of an increase of pressure:
    1. 2NO(g) + O2 (*g*) ↔ 2NO2 (*g*) + Heat
    2. CaCO3 (*s*) ↔ CaO (*s*) + CO2 (*g*)
    3. H2(*g*)+ I2 (*g*) ↔ 2HI(*g*)
    4. C2H4 (*g*) + H2 (*g*) ↔ C2H6 (*g*)
    5. N2 (*g*) + 3H2 (*g*) ↔ 2NH3 (*g*)
19. State the effect on the following equilibria if the stated stress is applied to the equilibrium indicated:
    1. *(add O2)* 2CO(*g*) + O2 (*g*) ↔ 2CO2 (*g*)+ Heat
    2. *(remove I2)* 2HI(*g*) + O2 (*g*) ↔ 2H2O (*l*) + I2 (*s*)
    3. *(add CO)* H2O (*l*) + CO(*g*) ↔ H2 (*g*)+ CO2 (*g*)
    4. *(decrease pressure)* CO(g)+ 2H2 (*g*) ↔ CH3OH
    5. *(remove HCl)* H2 (g) + Cl2 (*g*) ↔ 2HCl (*g*)
20. What is the effect on the [concentration] of chlorine if we---
    1. (AddPCl5) PCl5(*g*) ↔ PCl3(*g*) + Cl2(*g*)
    2. (AddCO) CO(*g*) + Cl2(*g*) ↔ COCl2(s)
    3. (Decr.pressure) H2(*g*) + Cl2(*g*) ↔ 2HCl(*g*)
    4. (Incr.pressure) 2HI(*g*) + Cl2(*g*) ↔ 2HCl(*g*) + I2(*s*)
    5. (Cool)4HCl(*aq*) + O2(*g*) ↔ 2Cl2(*g*) + 2H2O(*l*) + heat
21. For the system, if we start with 0.100 mol/L of CO2 and H2, what are the concentrations of the reactants and products at equilibrium given that Keq = 0.64 at 900K?   
    CO2 (g) + H2 (g) ↔ CO (g) + H2O (g)
22. COBr2, can be formed by reacting CO with Br2. A mixture of 0.400 mol CO, 0.300 mol Br2, and 0.0200 mol COBr2 is sealed in a 5.00L flask. Calculate equilibrium concentrations for all gases Keq= 0.680.   
    CO (g)+ Br2 (g) ↔ COBr2 (g)
23. 2NH3(g) ↔ N2(g) + 3H2(g) At 500 K, the following concentrations were measured: [N2] = 3.0 x 10-2 M, [H2] = 3.7 x 10-2 M, [NH3] = 1.6 x 10-2 M. What is Kc?
24. At 1000 K, the equilibrium partial pressures for the reaction below are: CH4 = 0.20 atm, H2S = 0.25 atm,   
    CS2 = 0.52 atm, and H2 = 0.10 atm. What is Kp?
25. **We need any topics missing, maybe more ice table problems? Maybe add some conceptual questions?**