Dougherty Valley HS Chemistry - AP
Equilibrium – Extra Practice

Worksheet #8*

Name: **Period:** **Seat#:**

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. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. 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) Suppose that 0.50 moles of hydrogen gas, 0.50 moles of iodine gas, and 0.75 moles of hydrogen iodide gas are introduced into a 2.0 Liter vessel and the system is allowed to reach equilibrium. Calculate the concentrations of all three substances at equilibrium. At the temperature of the experiment, Kc = 2.0 × 10^{-2} *0.41, 0.41. 0.058*

$$H_2(g) + I_2(g) \rightleftharpoons 2\ HI(g)$$

2) When 2.0 mol of carbon disulfide and 4.0 mol of chlorine are placed in a 1.0 Liter flask, the following equilibrium system results. At equilibrium, the flask is found to contain 0.30 mol of carbon tetrachloride. What quantities of the other components are present in this equilibrium mixture? *1.7, 3.1, 0.30, 0.30*

$$CS_2(g) + 3\ Cl_2(g) \rightleftharpoons S_2Cl_2(g) + CCl_4(g)$$

3) Nitrosyl chloride NOCl decomposes to nitric oxide and chlorine when heated:

$$2\ NOCl(g) \rightleftharpoons 2\ NO(g) + Cl_2(g)$$

At 600K, the equilibrium constant Kp is 0.060. In a vessel at 600K, there is a mixture of all three gases. The partial pressure of NOCl is 675 torr, the partial pressure of NO is 43 torr and the partial pressure of chlorine is 23 torr.

a. What is the value of the reaction quotient? *0.093*
b. Is the mixture at equilibrium?
c. In which direction will the system move to reach equilibrium?
d. When the system reaches equilibrium, what will be the partial pressures of the components in the system? *681, 37, 20*

4) Ammonium chloride is placed inside a closed vessel where it comes into equilibrium at 400ºC according to the equation shown. Only these three substances are present inside the vessel. If Kp for the system at 400ºC is 0.640, what is the pressure inside the vessel? *1.60 atm*

$$NH_4Cl(s) \rightleftharpoons NH_3(g) + HCl(g)$$

5) When ammonia is dissolved in water, the following equilibrium is established. If the equilibrium constant is 1.8 x 10^{-5}, calculate the hydroxide ion concentration in the solution if 0.100 mol of ammonia is dissolved in sufficient water to make 500 mL of solution. *1.90E^{-3}*

$$NH_3(aq) + H_2O(l) \rightleftharpoons NH_4^+(aq) + OH^-(aq)$$