**PART 1**

Q1: 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. Determine the concentration of all species at equilibrium. Kc = 2.0 x 10-2

**H2(g) + I2(g) <--> 2 HI(g)**

1. Equilibrium [H2]. Answer to 2 decimal places in Molarity, no units
2. Equilibrium [I2]. Answer to 2 decimal places in Molarity, no units
3. Equilibrium [HI]. Answer to 3 decimal places in Molarity, no units. Also, **show work** for problems 1-3 in show your work using gofo tools or upload image

# Q2: 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?

# CS2(g) + 3 Cl2(g) <--> S2Cl2(g) + CCl4(g)

1. Equilibrium [CS2]. Answer to 1 decimal places in Molarity, no units
2. Equilibrium [Cl2]. Answer to 1 decimal places in Molarity, no units
3. Equilibrium [S2Cl2]. Answer to 1 decimal places in Molarity, no units
4. Equilibrium [CCl4]. Answer to 1 decimal places in Molarity, no units. Also **show all** work for problems 4-7 using gofo tools or upload image in show your work.

Q3: Nitrosyl chloride NOCl decomposes to nitric oxide and chlorine when heated:

**2 NOCl(g)** <--> **2 NO(g) + Cl2(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?

b. Is the mixture at equilibrium?

c. In which direction will the system move to reach equilibrium?

1. Answer for Part A. Answer to 4 decimal places
2. Answer to Part B. Show your work to prove why you choose your answer
3. Answer to Part C. Show work to prove why you chose your answer

**PART 2**

# Q1: A container consisting initially of 3.00 moles NH3, in a 1.00 L container was heated to 900 K, and allowed to reach equilibrium. Determine the equilibrium concentration for each species present in the equilibrium mixture.

# 2 NH3 <---> N2 + 3 H2 Kc = 0.00076

1. Do you start with any products this time?
2. Will the reaction proceed in the forward or backwards direction?
3. Is K less than 1?
4. Is K more than ~1000 times smaller than your initial concentrations?
5. So can you use the 5% rule?
6. What will the value for the "change" row be for NH3 ?
7. What will the value for the "change" row be for N2 ?
8. What will the value for the "change" row be for H2 ?
9. At equilibrium the [NH3] is:  
   Answer to TWO decimal places. No units
10. At equilibrium the [N2] is:   
    Answer to FOUR decimal places. No units
11. At equilibrium the [H2] is:

Answer to FOUR decimal places. No units

1. Upload your work for this problem. Should show ICE table and any/all math that you did.

# Q2: This time - a mixture consisting initially of 3.00 moles NH3, 2.00 moles of N2, and 2.00 moles of H2, in a 1.00 L container was heated to 900 K, and allowed to reach equilibrium. Determine the equilibrium concentration for each species present in the equilibrium mixture.

# 2 NH3(g) <---> N2(g) + 3 H2(g) Kc = 0.00076

1. Do you start with any products this time?
2. So do you need to calculate Q to determine the direction the reaction proceeds?
3. What is the value of Q for this reaction?

Answer to TWO decimal places

1. Is the reaction at equilibrium?
2. Which direction will reaction proceed?
3. Based on the way the reaction proceeds due to the Q value, which will you use to do this problem?
4. Based on the way the reaction proceeds due to the Q value, which will you use to do this problem?
5. What will the value for the "change" row be for NH3 ?
6. What will the value for the "change" row be for N2 ?
7. What will the value for the "change" row be for H2 ?