ICE Box Practice & Review
HBA AP Chemistry

1. At the start of an experiment, $[H_2] = 1 \times 10^{-3}$ M and $[I_2] = 2 \times 10^{-3}$ M. When equilibrium is reached, the $[HI] = 1.86 \times 10^{-3}$ M. Find the K_{eq}.

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

2. Initially, N_2 and H_2 each have a concentration of 0.01 M. At equilibrium, $[NH_3]$ is 0.002 M. What is the K_{eq} value for this reaction at equilibrium?

   $N_2\,(g) + 3H_2 \rightleftharpoons 2NH_3$

3. The initial concentration of HCl is 0.4 M and has a $K_c = 6.25$. What are the equilibrium concentrations of all products and reactants?

   $2HCl \rightleftharpoons H_2 + Cl_2$

4. A sample containing 0.800 moles of $POCl_3$ is enclosed in a 0.500 litre vessel at a certain temperature. When the equilibrium for the dissociation reaction below is attained, it is found that the vessel contains 0.259 moles of Cl_2. Calculate the equilibrium constant.

   $POCl_{3\,(g)} \rightleftharpoons POCl_{(g)} + Cl_{2\,(g)}$

5. The brown gas NO_2 on cooling is converted into the colourless gas N_2O_4 as described by the equation below. If the original concentration of NO_2 is 0.90 M, and at equilibrium its concentration is only 0.26 M, what is the equilibrium constant for the reaction ?

   $2\,NO_{2(g)} \rightleftharpoons N_2O_{4(g)}$

6. If 0.300 mol of SO3 and 0.300 mol NO were placed in a 1.00 L flask and allowed to react, what would be the equilibrium concentration of each gas ? (Keq = 0.500)

   $SO_{3\,(g)} + NO_{(g)} \rightleftharpoons NO_{2\,(g)} + SO_{2\,(g)}$

7. If 2.00 mol HCl are placed in a 5.00 L flask and allowed to come to the equilibrium shown above, what will the equilibrium [H2] be ? ($K_{eq} = 3.2 \times 10^{-4}$)

   $2\,HCl_{(g)} \rightleftharpoons H_{2\,(g)} + Cl_{2\,(g)}$

8. If 1.50 mol of each chemical species are placed in a 3.00 L flask and allowed to achieve the equilibrium above, what mass of CO will be present at equilibrium ? (Keq = 3.59)