CHAPTER 6: CHEMICAL EQUILIBRIUM

1. Kp for the reaction

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

   at 400°C is 1.64×10^{-4}. Calculate Kc.

   A. 0.30 C. 0.50

   B. 0.40 D. 0.60

2. One mole of SO_3 was placed in a one litre reaction flask at a given temperature.

   $2SO_3(g) \rightleftharpoons 2SO_2(g) + O_2(g)$

   When the reaction equilibrium was established in the reaction, the vessel was found to contain 0.6 mole of SO_2. The value of equilibrium constant is

   A. 0.360 C. 0.450

   B. 0.675 D. 0.540

3. The value of Kc for the reaction;

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

   is 50.2 at 450°C. If at the same temperature, $[H_2] = [I_2] = [HI] = 1.75X10^{-3}$ M, which of the following statement is **TRUE**?

   A. The system is at equilibrium.

   B. HI concentration increases when the system re-establishes equilibrium.

   C. Concentration H_2 and I_2 increase as the system re-establishes equilibrium.

   D. Concentration HI and I_2 increase as the system re-establishes equilibrium.

4. The equilibrium constant of $PCl_5(g)$ to form $PCl_3(g)$ and $Cl_2(g)$ is 0.04 $moldm^{-3}$ at 250°C. An equilibrium mixture contains 0.02 mol $PCl_3(g)$ and 0.12 mol $Cl_2(g)$ in a 4000 cm^3 container at 250°C. Calculate the mass of PCl_5 in this container.

   A. 3.1275 g C. 0.0375 g

   B. 7.8200 g D. 0.5000 g

5. The value of Kc at 700°C for the equilibrium

   $SO_2(g)+NO_2(g) \rightleftharpoons SO_3(g)+NO(g)$

   is 9.01. Calculate the value of Kp at the same temperature.

   A. 10.0 C. 1.09

   B. 0.19 D. 9,01

6. Calculate the value of Kp for the system

   $CaCO_3(s) \rightleftharpoons CaO(s)+CO_2(g)$

   At 525°C, with the equilibrium pressure of CO_2 at 0.22atm.

   A. 3.36 C. 0.08

   B. 0.22 D. 0.79

7. At a certain temperature, the equilibrium constant, Kc for the reaction

   $2XY(g) \rightleftharpoons X_2(g)+Y_2(g)$

   is 25. What is the equilibrium constant, Kc for the reaction below?

   $\frac{1}{2} X_2(g)+1/2Y_2(g) \rightleftharpoons XY(g)$

   A. 5 C. 12.5

   B. 1/25 D. 1/5

8. Consider the following reaction at 400K.

   $PCl_5(g) \rightleftharpoons PCl_3(g)+Cl_2(g)$

   At equilibrium, the following concentration were obtained:

   $[PCl_5]=0.042M$, $[PCl_3]=1.25M$, and $[Cl_2]=0.4M$

   What is the value of Kp for the reaction?

   A. 0.084 C. 11.90

   B. 0.363 D. 390.6