Date Planned : __ / __ / __	Daily Tutorial Sheet-1	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level-1	Exact Duration :_____

1. A vessel at 1000 K contains CO_2 with a pressure of 0.5 atm. Some of the CO_2 is converted into CO on the addition of graphite. If the total pressure at equilibrium is 0.8 atm, the value of K_p is:

(A) 1.8 atm **(B)** 3 atm **(C)** 0.3 atm **(D)** 0.18 atm

2. Four moles of PCl_5 are heated in a closed 4 dm^3 container to reach equilibrium at 400 K. At equilibrium 50% of PCl_5 is dissociated. What is the value of K_c for the dissociation of PCl_5 into PCl_3 and Cl_2 at 400 K ?

(A) 0.50 **(B)** 1.00 **(C)** 1.15 **(D)** 0.05

3. Consider the following gaseous equilibria with equilibrium constant K_1 and K_2 respectively.

$$SO_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons SO_3(g); \qquad 2SO_3(g) \rightleftharpoons 2SO_2(g) + O_2(g)$$

The equilibrium constant are related as :

(A) $2K_1 = K_2^2$ **(B)** $K_1^2 = \frac{1}{K_2}$ **(C)** $K_2^2 = \frac{1}{K_1}$ **(D)** $K_2 = \frac{2}{K_1^2}$

4. $NH_4HS(s) \rightleftharpoons NH_3(g) + H_2S(g)$

In the above reaction, if the pressure at equilibrium and at 300 K is 100 atm then what will be the equilibrium constant K_p?

(A) 2500 atm^2 **(B)** 50 atm^2 **(C)** 100 atm^2 **(D)** 200 atm^2

5. 3 moles of A and 4 moles of B are mixed together and allowed to come into equilibrium according to the following reaction.

$$3A(g) + 4B(g) \rightleftharpoons 2C(g) + 3D(g)$$

When equilibrium is reached, there is 1 mole of C. The equilibrium constant of the reaction is :

(A) $\left(\frac{1}{4}\right)^4$ **(B)** $\left(\frac{1}{3}\right)^3$ **(C)** $\left(\frac{1}{2}\right)^4$ **(D)** 1

6. Which of the following is a wrong statement about equilibrium state ?

(A) Rate of forward reaction = Rate of backward reaction

(B) Equilibrium is dynamic

(C) Catalysts increase value of equilibrium constant

(D) Free energy change is zero

7. $A + B \rightleftharpoons C + D$

Initially moles of A and B are equal. At equilibrium, moles of C are three times of A. The equilibrium constant of the reaction will be :

(A) 1 **(B)** 2 **(C)** 4 **(D)** 9

8. Which of the following is not a physical equilibrium ?

(A) Ice $\rightleftharpoons$ Water **(B)** $I_2(s) \rightleftharpoons I_2(g)$

(C) $S(\ell) \rightleftharpoons S(g)$ **(D)** $3O_2(g) \rightleftharpoons 2O_3(g)$

9. $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$

The equilibrium constant of the above reaction is 6.4 at 300 K. If 0.25 mole each of H_2 and I_2 are added to the system, the equilibrium constant will be :

(A) 6.4 **(B)** 0.8 **(C)** 3.2 **(D)** 1.6

10. For a reaction at equilibrium which of the following is correct ?

(A) Concentration of reactant = concentration of product

(B) Concentration of reactant is always greater than product

(C) Rate of forward reaction = rate of backward reaction

(D) $Q_c = k$

11. For the following three reactions I, II, and III, equilibrium constants are given

I. $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g); K_1$

II. $CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g); K_2$

III. $CH_4(g) + 2H_2O(g) \rightleftharpoons CO_2(g) + 4H_2(g); K_3$

Which of the following relations is correct ?

(A) $K_1\sqrt{K_2} = K_3$ **(B)** $K_2K_3 = K_1$ **(C)** $K_3 = K_1K_2$ **(D)** $K_3K_2^3 = K_1^2$

12. For the following reaction in gaseous phase $CO(g) + \frac{1}{2}O_2(g) \rightleftharpoons CO_2(g)$ K_p / K_c is :

(A) $(RT)^{1/2}$ **(B)** $(RT)^{-1/2}$ **(C)** (RT) **(D)** $(RT)^{-1}$

13. Three moles of PCl_5, three moles of PCl_3 and two moles of Cl_2 are taken in a closed vessel. If at equilibrium the vessel has 1.5 moles of PCl_5, the number of moles of PCl_3 present in it is :

(A) 5 **(B)** 3 **(C)** 6 **(D)** 4.5

14. 1 mole of H_2 and 2 moles of I_2 are taken initially in a 0.2 L container. Then, the number of moles of H_2 at equilibrium is 0.2. Then, the number of moles of I_2 and HI at equilibrium are :

(A) 1.2, 1.6 **(B)** 1.8, 1.0 **(C)** 0.4, 2.4 **(D)** 0.8, 2.0

15. On doubling P and V at constant temperature, the equilibrium constant will :

(A) Remain constant **(B)** Become double

(C) Become one-fourth **(D)** None of these