INDIAN SCHOOL NIZWA - WORKSHEET

CHEMISTRY

CH 7: EQUILIBRIUM

Name: _____ Date: 13.01.2025 Class: XI Sec: A

Answer the following

1. What is meant by the conjugate acid-base pair? Find the conjugate acid/base pair for the following species: HNO_2, CN^-, $HClO_4$, F^-, OH^- CO_3^{2-} and S^{2-}.
2. What is the effect of increasing pressure on the equilibrium?

   $N_2\ (g) + 3H_2\ (g) \leftrightarrow 2NH_3\ (g)$
3. Write the expression for the equilibrium constant (Kc) for the reaction:

   $CH_3COOC_2H_5\ (aq) + H_2O\ (l) \leftrightarrow CH_3COOH\ (aq) + C_2H_5OH\ (aq)$
4. Write Kp in terms of Kc for the following chemical reaction:

   $2SO_2\ (g) + O_2\ (g) \leftrightarrow 2SO_3\ (g)$
5. The equilibrium constant Kc for the reaction:

   $H_2\ (g) + I_2\ (g) \leftrightarrow 2HI\ (g)$ at 700K is 49.

   The K for the reaction $HI\ (g) \leftrightarrow \frac{1}{2} H_2\ (g) + \frac{1}{2} I_2\ (g)$ at same temperature will be?
6. The ionization constant of HF, HCOOH and HCN at 298 K are 6.8×10^{-4}, 1.8×10^{-4} and 4.8×10^{-9} respectively. Calculate the ionization constants of the corresponding conjugate bases.
7. The value of Kc for the reaction $3O_2\ (g) \leftrightarrow 2O_3\ (g)$ is 2.0×10^{-50} at 25^0C. if the equilibrium concentrations of O_2 in air at 25^0C is 1.6×10^{-2}, what is the concentration of O_3?
8. The species: H_2O, HCO_3^-, HSO_4^- and NH_3 can act both as bronsted acids and bases. For each case give the corresponding conjugate acid and base.
9. Consider the following equilibrium CO2(g) +C (graphite) ↔ 2CO(g). write the equilibrium expression for Kc and calculate its units.
10. How does a catalyst affect the equilibrium constant? Explain.
11. Write the conjugate acid for NH_2^- and NH_3.
12. Write the relationship between pK_a and pK_b values.
13. Explain the following:
    a. Common Ion effect

b. Bronsted Lowry concept of acids and bases
c. Le-Chatelier's Principle

14. Why is NH_4Cl is added before addition of NH_4OH in qualitative analysis of third group?
15. Consider the reaction:
    N_2 (g) + $3H_2$ (g) ↔ $2NH_3$ (g) + Heat. Indicate the direction in which the equilibrium will shift when: (a) temperature is increased and (b) pressure is increased.
16. The value of Kc in the reaction: 2A ↔ B +C is $2.0x10^{-3}$. At a given time, the composition of reaction mixture is [A]=[B]=[C]=$3x10^{-4}$ M. In which direction the reaction will proceed?
17. Write expression of Kp for the reaction: N_2O_4 (g) ↔ $2NO_2$ (g)
18. Write an expression for Ka, for ionization of HCN in aqueous solution. Give equation also.
19. Find the conjugate base for the species H_2O and NH_4^+.
20. Which of the following is not Lewis base, Ag^+, H_2O, CN^- and NH_3?
21. Write conjugate acid and conjugate base of H_2O.
22. How does common ion affect the solubility of electrolyte?
