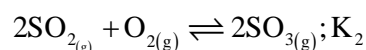
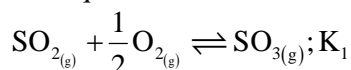


SECTION-I (Multiple Choice Questions)

This section contains **30 multiple choice questions**. Each question has 4 choices (1), (2), (3) and (4) for its answer, out which **ONLY ONE** is correct. **(+3, -1)**

1. The equilibrium constants for the reactions:-



The relationship between K_1 & K_2 is:-

- (1) $K_1 = K_2$ (2) $K_2^2 = K_1$ (3) $K_1^2 = K_2$ (4) $K_2 = \sqrt{K_1}$

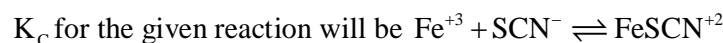
2. The equilibrium constant for the synthesis of HI at 490°C is 50. The value of K for dissociation of HI will be:-

- (1) 0.02 (2) 50 (3) 0.50 (4) 0.20

3. For the reaction $\text{AB}_{(g)} \rightleftharpoons \text{A}_{(g)} + \text{B}_{(g)}$, AB is 33% dissociated at a total pressure of P; Therefore P is related to K_p by which of the following option:

- (1) $P = K_p$ (2) $P = 3K_p$ (3) $P = 4K_p$ (4) $P = 8K_p$

4. 3.1 mole of FeCl_3 & 3.2 mole of NH_4SCN are added to 1 L of water. At equilibrium, 3 mole of FeSCN^{+2} are formed

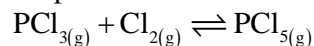


- (1) 6.66×10^{-3} (2) 0.30 (3) 3.30 (4) 150

5. In which of the following, the reaction almost proceeds towards completion?

- (1) $K = 1$ (2) $K = 10^{-2}$ (3) $K = 10$ (4) $K = 10^{-3}$

6. For the following reaction at 250°C , the value of K_c is 26, then the value of K_p at the same temperature will be:-



- (1) 0.57 (2) 0.61 (3) 0.83 (4) 0.91

7. In which of the following K_p is less than K_c

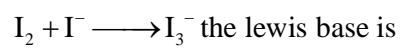
- (1) $\text{N}_2\text{O}_4(g) \rightleftharpoons 2\text{NO}_2(g)$ (2) $2\text{HI}(g) \rightleftharpoons \text{H}_{2(g)} + \text{I}_{2(g)}$
(3) $2\text{SO}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{SO}_{3(g)}$ (4) $\text{PCl}_{5(g)} \rightleftharpoons \text{PCl}_{3(g)} + \text{Cl}_{2(g)}$

8. Le chatelier's principle is applicable to:-
 (1) Only homogeneous chemical reversible reactions.
 (2) Only heterogeneous chemical reversible reactions.
 (3) Only physical equilibria.
 (4) All systems, chemical or physical in equilibrium.
9. In the melting of ice at 0°C , which are favorable conditions?
 (1) High T & High P (2) Low T & Low P
 (3) Low T & High P (4) High T & Low P
10. The yield of the product in the reaction, $\text{A}_{2(\text{g})} + 2\text{B}_{(\text{g})} \rightleftharpoons \text{C}_{(\text{g})} + \text{Heat}$, would be higher at:-
 (1) Low T, High P (2) High T, High P
 (3) Low T, Low P (4) High T, Low P
11. The reaction:-
 $\text{C}_2\text{H}_{4(\text{g})} + \text{H}_{2(\text{g})} \rightleftharpoons \text{C}_2\text{H}_{6(\text{g})}; \Delta\text{H} = -32.7\text{Kcal}$.
 is carried out in a vessel. The equilibrium concentration of C_2H_4 can be increased by:-
 (1) Increasing the temperature (2) Decreasing the pressure
 (3) Removing some hydrogen (4) All of these
12. For the reaction $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$ K_p is expressed as:-
 $\log K_p = 7.282 - \frac{8500}{T}$. For complete decomposition of $\text{CaCO}_3(\text{s})$ at 1 atm external pressure the temperature in Celsius required will be:-
 (1) 1167°C (2) 894°C (3) 8500°C (4) 850°C
13. Which of the following will be favored at low pressure?
 (1) $\text{N}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$ (2) $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
 (3) $\text{PCl}_{5(\text{g})} \rightleftharpoons \text{PCl}_{3(\text{g})} + \text{Cl}_{2(\text{g})}$ (4) $\text{N}_{2(\text{g})} + \text{O}_{2(\text{g})} \rightleftharpoons 2\text{NO}(\text{g})$
14. Densities of Diamond & graphite are 3.5 & 2.3 gm/ml respectively. Increase in pressure on the equilibrium
 $\text{C}_{\text{diamond}} \rightleftharpoons \text{C}_{\text{graphite}}$
 (1) Favors backward reaction (2) favors forward reaction
 (3) has no effect (4) Increases the reaction rate.
15. Equilibrium constants for different reactions are given as:-
 $K_1 = 10^6, K_2 = 10^{-4}, K_3 = 10, K_4 = 1$ which reaction will take place to a negligible extent?
 (1) K_1 (2) K_2 (3) K_3 (4) K_4
16. A certain weak acid has a dissociation constant of 1×10^{-4} . The equilibrium constant for its reaction with strong base is:
 (1) 1×10^{-4} (2) 1×10^{-10} (3) 1×10^{10} (4) 1×10^{14}
17. What will be the solubility of AgCl in a 0.1M NaCl solution?
 ($K_{\text{sp}} \text{AgCl} = 1.20 \times 10^{-10}$)
 (1) 0.1M (2) $1.2 \times 10^{-4}\text{M}$ (3) $1.2 \times 10^{-9}\text{M}$ (4) $1.2 \times 10^{-10}\text{M}$

18. Buffering action of a mixture of CH_3COOH & CH_3COONa is maximum when the ratio of salt to acid is equal to:-
 (1) 1.0 (2) 100.0 (3) 10.0 (4) 0.1
19. Why is pure NaCl precipitated when HCl gas is passed in saturated solution of NaCl ?
 (1) Impurities dissolve in HCl .
 (2) The product of $[\text{Na}^+]$ & $[\text{Cl}^-]$ products becomes smaller than K_{sp} of NaCl .
 (3) The product of $[\text{Na}^+]$ & $[\text{Cl}^-]$ products becomes higher than K_{sp} of NaCl .
 (4) HCl dissolves in water.
20. The correct increasing order of strengths of following acids is:-
 (1) $\text{H}_2\text{SO}_4, \text{CH}_3\text{COOH}, \text{H}_2\text{CO}_3$ (2) $\text{CH}_3\text{COOH}, \text{H}_2\text{SO}_4, \text{H}_2\text{CO}_3$
 (3) $\text{H}_2\text{CO}_3, \text{CH}_3\text{COOH}, \text{H}_2\text{SO}_4$ (4) $\text{CH}_3\text{COOH}, \text{H}_2\text{CO}_3, \text{H}_2\text{SO}_4$
21. pH of 10^{-8} molar solution of HCl in water is
 (1) 8 (2) 6 (3) between 7 to 8 (4) between 6 and 7
22. The aqueous solution of AlCl_3 is acidic due to:-
 (1) Cation hydrolysis (2) Anion hydrolysis
 (3) Hydrolysis of both ions (4) Dissociation.
23. The buffer capacity of buffer containing acid with $\text{pK}_a = 4$ is highest when its pH is equal to:-
 (1) 6 (2) 5 (3) 4 (4) 3
24. Which of the following statements is correct
 (1) pK_w increases with increase in temperature.
 (2) pK_w decreases with increase in temperature.
 (3) $\text{pK}_w = 14$ at all temperature.
 (4) $\text{pK}_w = \text{pH}$ at all temperature.
25. A weak acid of dissociation constant 10^{-5} is being titrated with aq. NaOH solution. The pH at the point of one – third neutralization of the acid will be:-
 (1) 5.3 (2) 4.7 (3) 5.48 (4) 4.52
26. The dissociation constants of two acids HA_1 & HA_2 are 3×10^{-4} & 1.8×10^{-5} respectively. The relative strengths of acids will be approximately:-
 (1) 1 : 4 (2) 4 : 1 (3) 1 : 16 (4) 16 : 1
27. Which of the following solutions will has pH close to unity?
 (1) $100 \text{ ml}, \text{M} / 10 \text{HCl} + 100 \text{ ml}, \text{M} / 10 \text{NaOH}$
 (2) $55 \text{ ml}, \text{M} / 10 \text{HCl} + 45 \text{ ml}, \text{M} / 10 \text{NaOH}$
 (3) $10 \text{ ml}, \text{M} / 10 \text{HCl} + 90 \text{ ml}, \text{M} / 10 \text{NaOH}$
 (4) $75 \text{ ml}, \text{M} / 5 \text{HCl} + 25 \text{ ml}, \text{M} / 5 \text{NaOH}$
28. An acidic buffer solution can be prepared by mixing the solutions of:-
 (1) Sodium acetate and acetic acid
 (2) Ammonium chloride & Ammonium hydroxide.
 (3) Sulphuric acid and sodium hydroxide.
 (4) Sodium chloride & sodium hydroxide.

29. Phenolphthalein gives a pink colour in alkaline medium due to the fact that:-
- (1) It is a coloured compound
 - (2) It ionizes to give coloured ions.
 - (3) It forms complex with alkali
 - (4) None of these

30. In the reaction:-



- (1) I_2 (2) I^- (3) I_3^- (4) None

PACE-IIT & MEDICAL

ANDHERI / BORIVALI / DADAR / CHEMBUR / THANE / MULUND/NERUL / POWAI

IIT – JEE - 2019

CRASH COURSE (MAIN)

MARKS:90

TIME: 45 MIN.

TOPIC: CHEMICAL & IONIC EQUILIBRIUM

DATE:19/11/18

ANSWER KEY

1. (3) 2. (1) 3. (4)
4. (4)
 $\text{Fe}^{+3} + \text{SCN}^- \rightleftharpoons \text{FeSCN}^{+2}$
$$K_c = \frac{3}{0.1 \times 0.2}$$
$$= 150$$
5. (4) 6. (2) 7. (3) 8. (4) 9. (1)
10. (1) 11. (4)
12. (2)
 $K_p = 1$
 $0 = 7.282 - \frac{8500}{T}$
 $T = 1167\text{K}$
 $= 894^\circ\text{C}$
13. (3) 14. (1) 15. (2) 16. (3) 17. (3)
18. (1) 19. (3) 20. (3) 21. (4) 22. (1)
23. (3) 24. (2) 25. (2) 26. (2) 27. (4)
28. (1) 29. (2) 30. (2)