CHEMISTRY

BOOKS - MODERN PUBLICATION CHEMISTRY (KANNADA ENGLISH)

EQUILIBRIUM

Multiple Choice Questions Level I

1. When a system is at equilibrium.

A. 1. The concentration of reactants and products becomes equal

B. 2. The opposite reactions (forward and backward) stop

C. 3. The rate of backward reaction becomes very low

D. 4. The rate of forward and backward reactions become equal.

Answer: D

Watch Video Solution

2. If concentration is expressed as mol L^{-}, the equilibrium constant, K for the reaction :

$2N_2O_5(g) \Leftrightarrow 4NO_2(g) + O_2(g)$

has the units :

A. mol^3L^{-3}

B. $molL^{-1}$

C. $mol^3 L^{-1}$

D. no units.

Answer: A

Watch Video Solution

3. The ratio of K_p / K_c for the reaction :

$CO(g) + \frac{1}{2}O_2(g) \Leftrightarrow CO_2(g)$ is :

A. 1

B. RT

C. $(RT)^{1/2}$

D. $(RT)^{-1/2}$

Answer: D

Watch Video Solution

4. At equilibrium the free energy change (ΔG) is :

A. $\Delta G = 0$

B. $\Delta G > 0$

C. $\Delta G < 0$

D. May have any value but is not equal to zero

Answer: A

Watch Video Solution

5. The equilibrium constant for the reaction :

$Fe^{3+}(aq) + SCN^{-}(aq) \Leftrightarrow FeSCN^{2+}(aq)$ is 140 at 298 K.

The equilibrium constant for the reaction :

$2Fe^{3+}(aq) + 2SCN^{-}(aq) \Leftrightarrow 2FeSCN^{2+}(aq)$ is :

A. 280

B. 140

C. 19600

D. 70

Answer: C

Watch Video Solution

6. In the lime kilns, the reaction :

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

goes to completion because :

A. of high temerature

B. CaO is more stable than $CaCO_3$

C. CO_2 escapes continuously

D. CaO is not dissociated

Answer: C

Watch Video Solution

7. Equilibrium constants K_1 and K_2 for the following equilibria

$(a) NO_{(g)} + \frac{1}{2} O_{2(g)} \Leftrightarrow NO_{2(g)}$

(b) $2NO_{2(g)} \Leftrightarrow 2NO_{(g)} + O_{2(g)}$ are related as :

A. $K_2 = \frac{1}{K_1}$

B. $K_2 = \frac{K_1}{2}$

C. $K_2 = \frac{1}{K_1^2}$

D. $K_2 = K_1^2$

Answer: C

Watch Video Solution

8. The system $PCl_5(s) \Leftrightarrow PCl_3(g) + Cl_2(g)$ attains equilibrium. If the equilibrium concentration of $PCl_3(g)$ is doubled, the concentration of $Cl_2(g)$ would become :

A. 1/4 of its initial value

B. 1/2 of its initial value

C. Twice of its initial value

D. unpredictable

Answer: B

Watch Video Solution

9. The equilibrium constant of the reaction,

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

is 64. If the volume of the container is reduced to half of its original volume, the value of equilibrium constant will be :

A. 64

B. $\frac{1}{64}$

C. 32

D. 16

Answer: A

Watch Video Solution

10. The equilibrium constant in a reversible chemical reaction at a given temperature :

A. depends on the initial concentration of the reactants.

B. does not depend upon the initial concentration of the reactants.

C. depends on the presents.

D. is characteristic of the duration of time till the equilibrium is maintained.

Answer: B

Watch Video Solution

11. The equilibrium constant at 717 K for the reaction

$H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$ is 50.

The equilibrium constant for the reaction

$2HI(g) \Leftrightarrow H_2(g) + I_2(g)$ is :

A. 0.50

B. 2×10^{-2}

C. 4.0

D. 1×10^{-1}

Answer: B

Watch Video Solution

12. In which of the following case, does the reaction go farthest to completion ?

A. $K = 10^{10}$

B. $K = 10^{-20}$

C. K = 10

D. K = 1

Answer: A

Watch Video Solution

Watch Video Solution

13. For the reaction :

$CO(g) + 2H_2(g) \Leftrightarrow CH_3OH(g)$

A. $K_p = K_c$

B. $K_p > K_c$

C. $K_p < K_c$

D. $K_c = 0$ but $K_p \neq 0$

Answer: C

Watch Video Solution

14. In a reversible chemical reaction having two reactants in equilibrium, if the concentrations of reactants are doubled,

then the equilibrium constant will :

A. also be doubled

B. be halved

C. become one - fourth

D. remains the same

Answer: D

Watch Video Solution

15. For the reaction :

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

Two moles each of A and B are taken in a 2L flask. The following must always be true at equilibrium :

A. $[A] = [B]$

B. $[A] < [B]$

C. $[B] = [C]$

D. $[A] > [B]$

Answer: B

Watch Video Solution

16. If α is the degree of dissociation of N_2O_4 in the reaction :

$N_2O_4 \Leftrightarrow 2NO_2$

then at equilibrium, the total number of moles of N_2O_4 and NO_2 present is :

A. 2

B. $1-\alpha$

C. $(1-\alpha)^2$

D. $1+\alpha$

Answer: D

Watch Video Solution

17. For the reaction :

$CO(g)+1/2O_2(g) \Leftrightarrow CO_2(g)$

the partial pressures are :

$p(O_2)=0.24$ atm, $p(CO)=0.4$ atm and $p(CO)=0.04$ atm. The equilibrium constant K_p is :

A. 0.3

B. 3.0

C. 9.0

D. 0.03

Answer: B

Watch Video Solution

18. Two moles of ammonia gas are introduced into a previously evacuated 1 L flask in which it partially dissociates at high temperature as :

$2NH_3(g) \Leftrightarrow N_2(g) + 3H_2(g)$

At equilibrium 1.0 mole of $NH_3(g)$ is found. What is K_c ?

A. 0.75

B. 1.5

C. `1.68

D. 0.46

Answer: C

Watch Video Solution

19. For the reaction at 800 K

$N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

the ratio of K_p and K_c is :

(R = 0.082 L atm $mol^{-1}K^{-1}$)

A. 2.3×10^{-4}

B. 3.2×10^{-6}

C. 2.3×10^4

D. 3.2×10^6

Answer: A

Watch Video Solution

20. For the reaction :

$N_2O_4(g) \Leftrightarrow 2NO_2(g)$

the concentration of the equilibrium mixture at 300 K are $[N_2O_4] = 4.8 \times 10^{-2} molL^{-1}$ and $[NO_2] = 1.2 \times 10^{-2} molL^{-1}$. K_c for the reaction is :

A. 0.25

B. $3 \times 10^{-1} molL^{-1}$

C. $3 \times 10^{3} molL^{-1}$

D. $3 \times 10^{-3} molL^{-1}$

Answer: D

Watch Video Solution

21. For the gaseous reaction :

$N_2 + 3H_2 \Leftrightarrow 2NH_3$

the partial pressure of H_2 and N_2 are 0.4 and 0.8 atm respectively. The total pressure of the entire system is 2.8 atm. What will be the value of K_p if all concentrations are given in atmospheres ?

A. 50

B. 0.02

C. 250

D. 31.25

Answer: A

Watch Video Solution

22. For the reaction :

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

the value of K_c at $250^\circ C$ is 26. The value of K_p at this temperature will be : (R = 0.082 L atm $mol^{-1}K^{-1}$)

A. 0.61

B. 0.46

C. 0.92

D. 0.57

Answer: A

Watch Video Solution

23. One mole of N_2 and 3 moles of H_2 are mixed in a litre flask. If $50\ \%\ N_2$ is converted into ammonia by the reaction.

$N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

then the total number of moles of gas at equilibrium is :

A. 1.5

B. 3.0

C. 4.5

D. 6.0

Answer: B

Watch Video Solution

24. Iodine gets 5% dissociated into atoms when 1.0 mole of $I_2(g)$ is introduced into an evacuated flask of 1L capacity at 150 K. The K_c for the reaction.

$I_2(g) \Leftrightarrow 2I(g)$ at 1500 K is :

A. 1.05×10^{-2}

B. 2.1×10^{-2}

C. 10.5

D. 21

Answer: A

Watch Video Solution

25. The equilibrium constant, K_p for the reaction :

$A \Leftrightarrow 2B$

is related to degree of dissociation α of A and total pressure P as :

A. $\frac{4\alpha^2 P}{1-\alpha^2}$

B. $\frac{4\alpha^2 P^2}{1-\alpha^2}$

C. $\frac{4\alpha^2 P^2}{1-\alpha}$

D. $\frac{4\alpha^2 P}{1-\alpha}$

Answer: A

Watch Video Solution

26. For the equilibrium system :

$2HCl(g) \Leftrightarrow H_2(g) + Cl_2(g)$

the equilibrium constant is 1.0×10^{-5}. What is the concentration of HCl if the equilibrium concentration of H_2 and Cl_2 are 1.2×10^{-3} M and 1.2×10^{-4} M respectively ?

A. $12 \times 10^{-4} M$

B. $12 \times 10^{-3} M$

C. $12 \times 10^{-2} M$

D. $12 \times 10^{-1} M$

Answer: C

Watch Video Solution

27. In a chemical reaction, the rate constant for the backward reaction is 7.5×10^{-4} and the equilibrium constant is 1.5. The rate constant for the forward reaction is :

A. 5×10^{-4}

B. 2×10^{-3}

C. 1.125×10^{-3}

D. 9.0×10^{-4}

Answer: C

Watch Video Solution

28. 1.1 mole of A are mixed with 2.2 mole of B and the mixture is then kept in a 1 L vessel till the equilibrium :

$A + 2B \Leftrightarrow 2C + D$

is reached. At equilibrium 0.2 moles of C are formed. The equilibrium constant for the reaction is :

A. 0.001

B. 0.002

C. 0.003

D. 0.004

Answer: A

Watch Video Solution

29. The equilibrium $N_2 + O_2 \Leftrightarrow 2NO$ is established in a reaction vessel of 2.5 L capacity. The amounts of N_2 and O_2 taken at the start were respectively 2 moles and 4 moles. Half

a mole of nitrogen has been used up at equilibrium. The molar concentration of nitric oxide is :

A. 0.2

B. 0.4

C. 0.6

D. 0.1

Answer: B

Watch Video Solution

30. For the reaction :

$2NO_2(g) \Leftrightarrow 2NO(g) + O_2(g)$

$K_c = 1.8 \times 10^{-6}$ at $185^\circ C$, the value of K_c for the reaction $NO + \frac{1}{2}O_2 = NO_2$ is :

A. 0.9×10^6

B. 7.5×10^2

C. 1.95×10^{-3}

D. 1.95×10^3

Answer: B

Watch Video Solution

31. The degree of dissociation of dinitrogen tetroxide

$N_2O_4(g) \rightarrow 2NO_2(g)$

at temperature T and total pressure P is α. Which one of the following expressions is correct for the equilibrium constant at this temperature ?

A. $\frac{2\alpha}{1-\alpha^2}$

B. $\frac{\alpha^2 P}{1-\alpha}$

C. $\frac{4\alpha^2}{1-\alpha^2}$

D. $\frac{4\alpha^2 P}{1-\alpha^2}$

Answer: D

Watch Video Solution

32. The equilibrium :

$P_4(g) + 6Cl_2(g) \Leftrightarrow 4PCl_3(g)$

is attained by mixing equal moles of P_4 and Cl_2 in an evacuated vessel. Then at equilibrium :

A. $[Cl_2] > [PCl_3]$

B. $[Cl_2] > [P_4]$

C. $[P_4] > [Cl_2]$

D. $[PCl_3] > [P_4]$

Answer: C

Watch Video Solution

33. In a reaction : $A + B \Leftrightarrow C + D$, the initial concentrations of A and B were 0.9 mol dm^{-3} each. At equilibrium, the concentration of D was found to be 0.6 mol dm^{-3}. What is the value of equilibrium constant for the reaction ?

A. 3

B. 9

C. 4

D. 8

Answer: C

Watch Video Solution

34. For the reaction :

$2NO(g) + Cl_2 \Leftrightarrow 2NOCl(g)$:

which is true :

A. $K_p = K_c \times RT$

B. $K_p = K_c(RT)^2$

C. $K_p = \frac{K_c}{RT}$

D. $K_p = \frac{K_c}{(RT)^2}$

Answer: C

Watch Video Solution

35. The value of K_p for the reaction at 500 K is $1.8 \times 10^{-2} \text{bar}^{-1}$.

$2NOCl(g) \Leftrightarrow 2NO(g) + Cl_2(g)$

K_c for the reaction is

A. 4.3×10^{-4}

B. 4.3×10^{-2}

C. 4.3×10^{-6}

D. 1.8×10^{-2}

Answer: A

Watch Video Solution

36. For the equilibrium :

$$MgCO_3(s) \Leftrightarrow MgO(s) + CO_2(g)$$

which of the following expressions is correct ?

A. $K_p = \frac{P_{MgO} \times P_{CO_2}}{P_{MgCO_3}}$

B. $K_p = \frac{[MgO][CO_2]}{[MgCO_3]}$

C. $K_p = pMgO + pCO_2$

D. $K_p = pCO_2$

Answer: D

Watch Video Solution

37. In which of the following reaction, pressure has no effect on equilibrium ?

A. $N_2O_4(g) \Leftrightarrow 2NO_2(g)$

B. $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$

C. $CO_2(g) + H_2(g) \Leftrightarrow CO(g) + H_2O(g)$

D. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

Answer: C

Watch Video Solution

38. In which of the following reaction, the equilibrium is shifted to the right by increasing temperature ?

A. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g), \Delta H = -ve$

B. $CaCl_2(s) + aq \Leftrightarrow CaCl_2(aq) +$ Heat

C. $2NO(g) -$ Heat $\Leftrightarrow N_2(g) + O_2(g)$

D. $NH_4Cl(s) + H_2O \Leftrightarrow NH_4 + (aq) + Cl^-(aq).$

Answer: D

Watch Video Solution

39. For which of the following reactions is a combination of high pressure and high temperature helpful in obtaining a high yield of products ?

A. $2NF_3(g) \rightarrow N_2(g) + 3F_2(g) - 54.40$ Kcal

B. $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g) + 22.08$ Kcal

C. $Cl_2(g) + 2O_2 \rightarrow 2ClO_2(g) - 49.40$ Kcal

D. $2Cl_2O_7(g) \rightarrow 2Cl_2(g) + 7O_2(g) + 126.8$ Kcal

Answer: C

Watch Video Solution

40. For the equilibrium system.

$N_2(g) + O_2(g) +$ Heat $\Leftrightarrow 2NO(g)$

Which of the following factors would cause the value of equilibrium constant to decrease ?

A. Adding a catalyst.

B. Decreasing the temperature

C. Adding N_2 gas

D. Adding NO(g).

Answer: B

Watch Video Solution

41. In a system.

$A(s) + B(g) +$ Heat $\rightarrow 2C(s) + 2D(g)$

equilibrium is established. The pressure of B vapour is doubled to re - stablish the equilibrium. The factor by which D is changed is :

A. 2

B. 3

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: C

Watch Video Solution

42. Consider the following equilibrium in a closed container :

$N_2O_4(g) \Leftrightarrow 2NO_2(g)$

At a fixed temperature, the volume of the reaction container is halved. For this change, which of the following statements, holds true regarding the equilibrium constant (K_p) and the degree of dissociation (α) ?

A. neither K_p nor α changes.

B. both K_p and change

C. K_p changes but α does not changes

D. K_p does not change but α changes.

Answer: C

Watch Video Solution

43. When each of the following species are transferred to a flask having double volume of the earlier flask, in which of the following cases, equilibrium constant is affected ?

I. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

II. $2NO(g) \Leftrightarrow N_2(g) + O_2(g)$

III. $C(s) + O_2(g) \Leftrightarrow CO_2(g)$

IV. $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$

A. I, III

B. II, III

C. I, IV

D. I, III, IV

Answer: C

Watch Video Solution

44. Which of the following can act as Lowry - Bronsted acid as well as a base ?

A. Cl^-

B. HCO_3^-

C. H_3O^+

D. SO_4^{2-}

Answer: B

Watch Video Solution

45. In the acid - base reaction,

$$HCl + CH_3COOH \Leftrightarrow Cl^- + CH_3COOH_2^+$$

the conjugate acid of acetic acid is

A. $CH_3COOH_2^+$

B. HCl

C. H_3O^+

D. Cl^-

Answer: A

Watch Video Solution

46. In the reaction :

$HCN + H_2O \Leftrightarrow H_3O^+ + CN^-$

the conjugate acid - base pair is

A. 1. HCN, H_3O^+

B. 2. HCN, CN^-

C. 3. H_2O, CN^-

D. 4. CN^-, H_3O^+

Answer: B

Watch Video Solution

47. Conjugate acid of NH_2^- is :

A. NH_4OH

B. NH_4^+

C. NH^{2-}

D. NH_3

Answer: D

Watch Video Solution

48. The pH value is maximum for :

A. $0.1MNH_4OH$

B. `0.1 M CH_(3)COOH

C. 0.1 M NaOH

D. 0.1 M HCl

Answer: C

Watch Video Solution

49. At $90^\circ C$, pure water has $\left[H_3O^+\right] = 10^{-6} molL^-$. The value of K_w at $90^\circ C$ is :

A. 1×10^{-6}

B. 1×10^{-8}

C. 1×10^{-12}

D. 1×10^{-14}

Answer: C

Watch Video Solution

50. The pH of 10^{-8} M solution of HCl in water is :

A. 8

B. 6

C. 7.06

D. 6.96

Answer: D

Watch Video Solution

51. The pH of an aqueous solution at $25^{\circ} C$ is 6.1 its p(OH) is :

A. 12.2

B. 7.9

C. 3.9

D. 6.1

Answer: B

Watch Video Solution

52. The pH of 10^{-10} M NaOH solution is nearest to :

A. 10

B. 4

C. 7

D. -4

Answer: C

Watch Video Solution

53. Which of the following acids is the strongest ?

A. $HCN\left(K_a = 4 \times 10^{-10}\right)$

B. $HS^{-}\left(K_a = 1 \times 10^{-14}\right)$

C. $HCO_3^{-}\left(K_a = 4.8 \times 10^{-11}\right)$

D. $HAsO_4^{2-}\left(K_a = 3 \times 10^{-13}\right)$

Answer: A

Watch Video Solution

54. The pH of 10^{-7} HCl aqueous solution of HCl at $25^{\circ}C$ is :

A. 7.0

B. less than 7

C. more than 7

D. None of the above (A-C)

Answer: B

Watch Video Solution

55. Which of the following acids is stronger than benzoic acid $\left(K_a = 6.3 \times 10^{-5}\right)$?

A. $A\left(K_a = 1.62 \times 10^{-7}\right)$

B. $B(pK_a = 6)$

C. $C(pK_a = 4)$

D. $D(Ka) 1.0 \times 10^{-5}$

Answer: C

Watch Video Solution

56. At $100^\circ C$, $K_w = 10^{-12}$, pH of pure water at $100^\circ C$ will be

A. 6.0

B. 7.0

C. 8.0

D. 12.0

Answer: A

Watch Video Solution

57. The pH of a solution is 5. Its hydrogen ion concentration is increased 100 times. Its pH will be :

A. 7

B. 3

C. nearly 7

D. does not change.

Answer: B

Watch Video Solution

58. The pH of H_2SO_4 is 2. Its molar concentration is :

A. 0.01

B. 0.005

C. 0.02

D. 0.05

Answer: B

Watch Video Solution

59. What will be the pOH of a neutral solution at $50^{\circ}C$ if its pK_w is 13.38 at $50^{\circ}C$.

A. 6.6

B. 7.0

C. 6.69

D. 7.31

Answer: C

Watch Video Solution

60. The pH of 0.001 M NaOH solution is

A. 3

B. 10

C. 12

D. 11

Answer: D

Watch Video Solution

61. For 100 times increase in concentration of H^+ ions :

A. pH increases by 2 units

B. pH decreases by 2 units

C. pH remains unaltered

D. pH decreases by 1 unit.

Answer: B

Watch Video Solution

62. The pH of $0.10MNH_3$ solution $\left(K_b = 1.8 \times 10^{-5}\right)$ is :

A. 2.87

B. 11.13

C. 1

D. 13

Answer: B

Watch Video Solution

63. The pH of 2.5×10^{-1} M HCN solution $\left(K_a = 4 \times 10^{-10}\right)$ is :

A. 2×10^{-5}

B. 2.0

C. 4.7

D. 5.0

Answer: D

Watch Video Solution

64. The ionisation constant for acetic acid is 1.8×10^{-5}. At what concentration will it be dissociated to 2% ?

A. 1 M

B. 0.018 M

C. 0.18 M

D. 0.045 M

Answer: D

Watch Video Solution

65. The pH of an aqueous solution of a 0.1 M solution of a weak monoprotic acid which is 1% ionised is :

A. 1

B. 2

C. 3

D. 11

Answer: C

Watch Video Solution

66. 50 ml of 0.1 N HCl and 50 ml of 0.1 N NaOH are mixed. The pH of the resulting solution is :

A. 1

B. 2

C. 7

D. 9

Answer: C

Watch Video Solution

67. 1 ml of 0.1 N HCl is added to 1 L solution of sodium chloride. The pH of the resulting solution is

A. 7

B. 1

C. 4

D. 2

Answer: C

Watch Video Solution

68. 100 ml of 0.1 N NaOH are mixed with 100 ml of 0.2 N HCl solution and the whole solution is made upto 1 litre. The pH of the resulting solution is :

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

69. The pH of a solution whose $\left[OH^{-}\right] = 10^{-7}$ M is :

A. 14

B. zero

C. 7

D. -7

Answer: C

Watch Video Solution

70. Which of the following will have highest pH value in water solution ?

A. NaCl

B. Na_2CO_3

C. NH_4Cl

D. $NaHCO_3$

Answer: B

Watch Video Solution

71. 0.2 molar solution of formic acid is ionized to 3.2 %. Its ionisation constant is :

A. 9.6×10^{-3}

B. 2.05×10^{-4}

C. 1.25×10^{-6}

D. 4.8×10^{-5}

Answer: B

Watch Video Solution

72. A certain sample of beer has a pH of 10. The concentration of hydrogen ions in the beer is :

A. $10^{10} M$

B. $10^{-2} M$

C. $10^{-4} M$

D. $10^{-10} M$

Answer: D

Watch Video Solution

73. A 0.01 M ammonia solution is 5% ionized, the concentration of OH^- ion is :

A. 0.005 M

B. 0.0001 M

C. 0.0005 M

D. 0.05 M

Answer: C

Watch Video Solution

74. Which of the following aqueous salt solutions is expected to have pH less than 7 ?

A. CH_3COOK

B. CH_3COONH_4

C. NaCl

D. NH_4Cl

Answer: D

Watch Video Solution

75. The pH of 2.5×10^{-1} M HCN solution $\left(K_a = 4 \times 10^{-10}\right)$ is :

A. 2×10^{-5}

B. 2.0

C. 4.7

D. 5.0

Answer: D

Watch Video Solution

76. An acid solution of pH = 6 is diluted 1000 times, the pH of the final solution becomes :

A. 6.95

B. 6

C. 3

D. 9

Answer: A

Watch Video Solution

77. 50 ml of solution of pH = 1 is mixed with 50 ml of solution of pH = 2. The pH of the mixture is nearly :

A. 2

B. 1.74

C. 1.26

D. 0

Answer: C

Watch Video Solution

78. The concentration of H^+ ion in a sample of soft drink is $3.8 \times 10^{-3} M$. Its pH is :

A. 3.42

B. 4.58

C. 2.42

D. 3.82

Answer: C

Watch Video Solution

79. ionisation constant of CH_3COOH is 1.7×10^{-5} and concentration of H^+ is 3.4×10^{-4}. Then the initial concentration of CH_3COOH molecules is :

A. 3.4×10^{-4}

B. 3.4×10^{-3}

C. 6.8×10^{-3}

D. 1.7×10^{-3}

Answer: C

Watch Video Solution

80. A weak acid, HA has a K_a of 1.00×10^{-5}. If 0.100 mol of this acid is dissolved in one litre of water, the percentage of acid dissociated at equilibrium is closest to :

A. $1.00\ \%$

B. $99.9\ \%$

C. $0.100\ \%$

D. $99.0\ \%$

Answer: A

Watch Video Solution

81. Calculate the pOH of a solution at $25^{\circ}C$ that contains $1 \times 10^{-10}M$ of hydronium ions i.e H_3O^+ :

A. 4.00

B. 9.00

C. 1.00

D. 7.00

Answer: A

Watch Video Solution

82. When a strong acid is titrated using a weak base, the pH value at equivalence point is :

A. 7

B. > 7

C. < 7

D. ≈ 7

Answer: C

Watch Video Solution

83. An acid solution of pH = 6 is diluted 1000 times, the pH of the final solution becomes :

A. between 5 and 6

B. between 6 and 7

C. between 10 and 11

D. between 7 and 8

Answer: D

Watch Video Solution

84. An acidic buffer solution can be prepared by mixing solution :

A. CH_3COOH and CH_3COONa

B. CH_3CONH_2 and KOH

C. CH_3COOH and NaOH

D. CH_3NH_2 and K_2CO_3

Answer: A

Watch Video Solution

85. The buffer solution contains equal concentration of X^- and HX. The K_b for X^- is 10^{-10}. The pH of the buffer solution is :

A. 4

B. 7

C. 10

D. 14

Answer: A

Watch Video Solution

86. The common example of buffer having pH of about 7.4 is :

A. Milk

B. Blood

C. Water

D. Lime water

Answer: B

Watch Video Solution

87. Which of the following is a buffer ?

A. HCl and NaCl

B. NaOH and $NaNO_3$

C. KOH and KCl

D. NH_4OH and NH_4Cl

Answer: D

Watch Video Solution

88. The pH of a buffer solution containing a weak acid (pK_a) and its salt is :

A. $pH = pK_a + \log\frac{[\text{Salt}]}{[\text{Acid}]}$

B. $pH = pK_a + \log\frac{[\text{Acid}]}{[\text{Salt}]}$

C. $pH = \frac{1}{2}pK_a + \log\frac{[\text{Acid}]}{[\text{Salt}]}$

D. $pH = \log pK_a + \log \frac{[\text{Acid}]}{[\text{Salt}]}$

Answer: A

Watch Video Solution

89. Which of the following combinations would not result in the formation of a buffer solution ?

A. $NH_4Cl + NH_3$

B. $CH_3COONa + CH_3COOH$

C. $HCl + CH_3COOH$

D. $HCOONa + HCOOH$

Answer: C

Watch Video Solution

Watch Video Solution

90. The aqueous solution of aluminium chloride is acidic due to :

A. Anion hydrolysis

B. Formation of $Al(OH)_3$

C. Hydrolysis of cation and anion

D. Cationic hydrolysis

Answer: D

Watch Video Solution

91. For the salt of weak acid and strong base, the hydrolysis constant is given by the expression :

A. $K_h = \frac{K_w}{K_b}$

B. $K_h = \frac{K_w}{K_a K_b}$

C. $K_h = K_a$

D. $K_h = \frac{K_w}{K_a}$

Answer: D

Watch Video Solution

92. Which of the following undergoes hydrolysis ?

A. CH_3COOK

B. HNO_3

C. Na_2SO_4

D. K_2SO_4

Answer: A

Watch Video Solution

93. Which of the following aqueous solutions has pH greater than 7 ?

A. $CuSO_4$

B. $FeCl_3$

C. NaCl

D. CH_3COONa

Answer: D

Watch Video Solution

94. The pH of a buffer solution containing ratio of concentration of salt of weak acid and weak acid equal to 2 is $(pK_a = 4.75, \log 2 = 0.3010)$:

A. 4.45

B. 5.05

C. 1.425

D. 13.699

Answer: B

Watch Video Solution

95. Which of the following relation is correct for degree of hydrolysis of CH_3COONH_4 ?

A. $h = \sqrt{\frac{K_h}{c}}$

B. $h = \sqrt{\frac{K_a}{K_b}}$

C. $h = \sqrt{\frac{K_w}{K_a K_b}}$

D. $h = \sqrt{\frac{K_a K_b}{K_h}}$

Answer: C

Watch Video Solution

96. The solubility product of $Mg(OH)_2$ may be written as :

A. $[Mg^{2+}][OH^-]$

B. $[Mg^{2+}][OH^-]^2$

C. $[Mg^{2+}][2OH^-]$

D. $\left[Mg^{2+}/2\right]\left[OH^{-}\right]$

Answer: B

Watch Video Solution

97. If x is the solubility in mol L^{-1} of $Ca_3(PO_4)_2$. Its K_{sp} is equal to :

A. x^5

B. $108x^5$

C. $6x^5$

D. $4x^4$

Answer: B

Watch Video Solution

Watch Video Solution

98. At a certain temperature, the solubility of the salt M_mA_n in water is s moles per litre. The solubility product of the salt is :

A. M^mA^n

B. $(m+n)s^{m+n}$

C. $m^mn^ns^{m+n}$

D. M^mA^ns

Answer: C

Watch Video Solution

99. Which of the following metal sulphides will be precipitated first from a solution having almost equal concentration of metal ion ?

A. $FeS\left(K_{sp}=11\times10^{-20}\right)$

B. $HgS\left(K_{sp}=3.2\times10^{-55}\right)$

C. $ZnS\left(K_{sp}=1.1\times10^{-22}\right)$

D. $CdS\left(K_{sp}=3.6\times10^{-31}\right)$

Answer: B

Watch Video Solution

100. When NH_4Cl is added to a solution of NH_4OH,

A. The dissociation of NH_4OH increases

B. The concentration of OH^- ions increases

C. Dissociation of NH_4Cl decreases

D. The concentration of OH^- ions decreases

Answer: D

Watch Video Solution

101. The concentration of Ag^+ ion in a given saturated solution of AgCl at $25^\circ C$ is $1.06 \times 10^{-5} g$ ion per litre. Thus, the solubility product of AgCl is :

A. 0.353×10^{-10}

B. 0.530×10^{-10}

C. 1.12×10^{-10}

D. 2.12×10^{-10}

Answer: C

Watch Video Solution

102. The solubility product of a sparingly soluble salt AB at room temperature is $1.21 \times 10^{-6} M^2$. Its molar solubility is :

A. $1.21 \times 10^{-6} M$

B. $1.1 \times 10^{-4} M$

C. $1.1 \times 10^{-3} M$

D. $1.1 \times 10^{-5} M$

Answer: C

Watch Video Solution

103. The solubility product of a compound MX_2 is 3.2×10^{-11}. Its solubility is :

A. 0.8×10^{-4}

B. 2×10^{-3}

C. 2×10^{-4}

D. 1.6×10^{-6}

Answer: C

Watch Video Solution

104. Solubility product of $PbCl_2$ at 298 K is 1.0×10^{-6}. At this temperature solubility of $PbCl_2$ in moles per litre is :

A. $\left(1.0 \times 10^{-6}\right)^{1/2}$

B. $\left(1.0 \times 10^{-6}\right)^{1/3}$

C. $\left(0.25 \times 10^{-6}\right)^{1/3}$

D. $\left(0.25 \times 10^{-6}\right)^{1/2}$

Answer: C

Watch Video Solution

105. When equal volume of the following solutions are mixed, precipitation of $AgCl\left(K_{sp} = 1.8 \times 10^{-10}\right)$ will occur only with :

A. $10^{-4} MAg^{+}$ and $10^{-4} MCl^{-}$

B. $10^{-5} MAg^{+}$ and $10^{-5} MCl^{-}$

C. $10^{-6} MAg^{+}$ and $10^{-6} MCl^{-}$

D. $10^{-10} MAg^{+}$ and $10^{-10} MCl^{-}$

Answer: A

Watch Video Solution

106. The precipitate of calcium fluoride $\left(K_{sp} = 1.7 \times 10^{-10}\right)$ is obtained when equal volumes of the following are mixed :

A. $10^{-4} MCa^{2+}$ and $10^{-4} MF^{-}$

B. $10^{-2} MCa^{2+}$ and $10^{-3} MF^{-}$

C. $10^{-5} MCa^{2+}$ and $10^{-3} MF^{-}$

D. $10^{-3} MCa^{2+}$ and $10^{-5} MF^{-}$

Answer: B

Watch Video Solution

107. The solubility of CaF_2 is $2 \times 10^{-4} molL^{-1}$. Its solubility product is :

A. 2.0×10^{-8}

B. 4.0×10^{-12}

C. 8.0×10^{-12}

D. 3.2×10^{-11}

Answer: D

Watch Video Solution

Watch Video Solution

108. Which of the following is most soluble ?

A. $Bi_2S_3\left(K_{sp}=1\times10^{-17}\right)$

B. $MnS\left(K_{sp}=7\times10^{-16}\right)$

C. $CuS\left(K_{sp}=8\times10^{-37}\right)$

D. $Ag_2S\left(K_{sp}=6\times10^{-51}\right)$

Answer: B

Watch Video Solution

109. The solubility product of strontium fluoride is 8.0×10^{-11}. At what concentration of Sr^{2+} ion the

precipitation of strontium fluoride would start from a solution containing $0.01MF^-$ ion ?

A. $8. \times 10^{-9}M$

B. $8 \times 10^{-13}M$

C. $8.0 \times 10^{-7}M$

D. $1.25 \times 10^{-9}M$

Answer: C

Watch Video Solution

110. A solution contains 0.01 M metal ion (Zn^{2+} and Cu^{2+}). It is saturated by passing H_2S gas in the M. The solubility products of ZnS and CuS are 3.0×10^{-22} and 8.0×10^{-36} respectively. Which of the following will occur ?

A. ZnS will precipitate

B. CuS will precipitate

C. Both ZnS and CuS will precipitate

D. Both Zn^{2+} and Cu^{2+} will remain in the solution.

Answer: B

Watch Video Solution

Multiple Choice Questions Level Ii

1. Which of the following statements is not correct ?

A. The solubility of NH_4Cl increases with increase of temperature.

B. The equilibrium constant value depends upon the presence of catalyst.

C. The equilibrium can be attained only if the system is closed.

D. Both chemical and physical equilibrium are dynamic.

Answer: B

Watch Video Solution

2. Phosphoric acid ionises as :

$$H_3PO_4 \overset{K_1}{\Longleftrightarrow} H^+ + H_2PO_4^-$$

$$H_2PO_4^- \overset{K_2}{\Longleftrightarrow} H^+ + H_PO_2^-$$

$$H_2PO_4^{2-} \overset{K_3}{\Longleftrightarrow} H^+ + PO_3^-$$

The equilibrium constant, K for the reaction :

$H_3PO_4 \Leftrightarrow 3H^+ + PO_4^{3-}$ is :

A. K_1 / K_2K_3

B. $K_1 + K_2 + K_3$

C. K_3 / K_1K_2

D. $K_1K_2K_3$

Answer: D

Watch Video Solution

3. The equilibrium constant for the reaction

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

is 256 at 1000 K. The equilibrium constant for the reaction :

$SO_3(g) \Leftrightarrow SO_2(g) + 1/2O_2(g)$ is :

A. 16

B. $\frac{1}{256}$

C. 256

D. $\frac{1}{16}$

Answer: D

Watch Video Solution

4. The equilibrium constant, K_p for the reaction

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

is $4.0atm^{-1}$ at 1000 K. What would be the partial pressure of SO_2 if at equilibrium the amount of SO_2 and SO_3 is the same ?

A. 16.0 atm

B. 0.25 atm

C. 1 atm

D. 0.75 atm

Answer: B

Watch Video Solution

5. At $30^{\circ}C$, K_p for the dissociation reaction :

$SO_2Cl_2(g) \Leftrightarrow SO_2(g) + Cl_2(g)$

is 2.9×10^{-2} atm. If the total pressure is 1 atm, the degree of dissociation of SO_2Cl_2 is : (assume $1 - \alpha^2 = 1$).

A. $87\ \%$

B. $13\ \%$

C. $17\ \%$

D. $29\ \%$

Answer: C

Watch Video Solution

6. At a given temperature, the equilibrium constant for the reaction :

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

is 2.4×10^{-3}. At the same temperature, the equilibrium constant for the reaction :

$PCl_3(g) + Cl_2(g) \leftrightarrow PCl_5(g)$ is :

A. 2.4×10^{-3}

B. -2.4×10^{-3}

C. 4.2×10^{2}

D. 4.8×10^{-2}

Answer: C

Watch Video Solution

7. If K_{a_1} and K_{a_2} of sulphuric acid are 1×10^{-2} and 1×10^{-6} respectively, then concentration of sulphate ions in $0.01 M H_2SO_4$ solution will be :

A. 1×10^{-2}

B. 0.01×10^{-8}

C. 1×10^{-6}

D. 0.01×10^{-10}

Answer: A

Watch Video Solution

8. The pH of a solution is 6. Sufficient amount of acid is added to decrease the pH to 2. The increase in hydrogen ion concentration is :

A. 1. four times

B. 2. $1/4$ times

C. 3. hundred times

D. 4. Ten thousand times

Answer: D

Watch Video Solution

9. In a buffer solution of weak acid and its salt, when the concentration of salt to acid is increased by 10 times, the pH of the solution,

A. decreases 10 times

B. increases 10 times

C. increases by 1

D. decreases by 1

Answer: C

Watch Video Solution

10. What will be the pOH of $0.5 \times 10^{-4} M H_2SO_4$ solution ?

A. 4

B. 10.5

C. 10

D. 6

Answer: C

Watch Video Solution

11. Given that K_a for acetic acid is 1.8×10^{-5} and K_b for NH_4OH is 1.8×10^{-5} at $25^\circ C$. Predict the nature of aqueous solution of ammonium acetate.

A. acidic

B. basic

C. slighty acidic

D. neutral

Answer: D

Watch Video Solution

12. The dissociation constant of two acids are K_1 and K_2. The relative strengths of two acids are given by :

A. $\left(\frac{K_1}{K_2}\right)^{1/2}$

B. $\log\frac{K_1}{K_2}$

C. $\frac{K_1+\sqrt{K_2}}{K_2+\sqrt{K_1}}$

D. $\left(\frac{K_1}{K_2}\right)^{3/2}$

Answer: A

Watch Video Solution

13. The addition of solid sodium carbonate to pure water causes :

A. increase in H^+ ion concentration

B. decrease in pH

C. an increase in pH

D. no change in pH

Answer: C

Watch Video Solution

Watch Video Solution

14. The solubility product of a compound MX is 2.5×10^{-9} at $25^{\circ} C$. Its solubility at $25^{\circ} C$ is :

A. 2.5×10^{-5}

B. 5×10^{-5}

C. 2.5×10^{-6}

D. 5×10^{-4}

Answer: B

Watch Video Solution

15. What would be the solubility of AgCl in 0.1 M NaCl solution ? $\left(K_{sp} \text{ for } \mathrm{AgCl} = 1.2 \times 10^{-10}\right)$

A. 0.1 M

B. $1.2 \times 10^{-6} M$

C. $1.2 \times 10^{-9} M$

D. $1.2 \times 10^{-10} M$

Answer: C

Watch Video Solution

16. A 0.1 M solution of a weak acid HA is 1% dissociated. The approximate value of dissociation constant is :

A. $1.0 \times 10^{-4} molL^{-1}$

B. $0.1 \times 10^{-2} molL^{-1}$

C. $1 \times 10^{-3} molL^{-1}$

D. $0.1 \times 10^{-4} molL^{-1}$

Answer: D

Watch Video Solution

17. The solubility of a compound MX_2 at $25^\circ C$ is 5.0×10^{-3} mol/L. Its solubility product at that temperature is :

A. 25×10^{-6}

B. 5.0×10^{-11}

C. 5.0×10^{-7}

D. 1.25×10^{-9}

Answer: C

Watch Video Solution

Watch Video Solution

18. When a 0.1 M solution of an acid at room temperature has degree of ionisation of 10%, the concentration of hydroxyl ions is :

A. 10^{-2}

B. 10^{-12}

C. 10^{-11}

D. 10^{-9}

Answer: B

Watch Video Solution

19. Which of the following mixture solution has $pH \approx 1.0$?

A. 100 ml of $\frac{M}{10} HCl + 100$ ml of $\frac{M}{10}$ NaOH

B. 55 ml of $\frac{M}{10} HCl + 45$ ml of $\frac{M}{10}$ NaOH

C. 10 ml of $\frac{M}{10} HCl + 90$ ml of $\frac{M}{10}$ NaOH

D. 75 ml of $\frac{M}{5} HCl + 25$ ml of $\frac{M}{5}$ NaOH.

Answer: D

Watch Video Solution

20. A buffer solution contains 0.1 M each of acetic acid and sodium acetate. The pH of the buffer solution is $(pK_a(CH_3COOH) = 4.75)$:

A. 4.75

B. 5.75

C. 6.75

D. 9.25

Answer: A

Watch Video Solution

21. Ammonium cyanide is a salt of $NH_4OH\left(K_b = 1.8 \times 10^{-5}\right)$ and HCN $\left(K_a = 4.0 \times 10^{-10}\right)$. The hydrolysis constant of 0.1 M NH_4CN at $25^\circ C$ is :

A. 1.4

B. 7.2×10^{-15}

C. 7.2×10^{-1}

D. 1.4×10^{-6}

Answer: A

Watch Video Solution

22. When 0.01 moles of sodium hydroxide are added to a buffer solution, its pH changes from 4.745 to 4.815. The buffer capacity of the buffer solution is :

A. 0.07

B. 0.14

C. 0.28

D. 0.07

Answer: B

Watch Video Solution

23. Let the solubilities of AgCl in water, in 0.01 M $CaCl_2$, in 0.01 M NaCl and $0.05MAgNO_3$ be S_1, S_2, S_3 and S_4 respectively. Which of the following relationship between these quantities is correct ?

A. $S_1 > S_2 > S_3 > S_4$

B. $S_1 > S_2 = S_3 > S_4$

C. $S_4 > S_2 > S_3 > S_1$

D. $S_1 > S_3 = S_2 > S_4$

Answer: B

Watch Video Solution

24. In which of the following solvents will AgBr has highest solubility ?

A. 10^{-3} M NaBr

B. $10^{-3} MNH_4OH$

C. Pure water

D. 10^{-3} M HBr.

Answer: B

Watch Video Solution

25. For the equilibrium :

$HCO_3^- \Leftrightarrow H^+ + CO_3^{2-}$

$K = 4.8 \times 10^{-11}$, $[CO_3^{2-}]$=1.1xx10^(-3)M,

$[HCO_{(3)}^{(-)}]=9.8xx10^{(-3)}M$`

The pH of the solution is :

A. 8.37

B. 9.37

C. 6.0

D. 8.0

Answer: A

Watch Video Solution

26. The pH of solution obtained by mixing equal volumes of two aqueous solutions of pH 5 and pH 3 of the same substance is :

A. 3.5

B. 4.5

C. 3.3

D. 4

Answer: C

Watch Video Solution

27. The conjugate acid of NH_2^- is :

A. NH_3

B. NH_2OH

C. NH_4^+

D. N_2H_4

Answer: A

Watch Video Solution

28. 50 ml of 0.1 M HCl and 50 ml of 0.2 M NaOH are mixed. The pH of the resulting solution is :

A. 1.30

B. 4.2

C. 12.70

D. 11.70

Answer: A

Watch Video Solution

29. Solubility of AgCl will be minimum in :

A. 0.01 M NaCl

B. $0.01MCaCl_2$

C. Pure water

D. $0.001MAgNO_3$

Answer: B

Watch Video Solution

30. The pH of an aqueous solution of $Mg(OH)_2$ is 9.0. If the solubility product of $Mg(OH)_2$ is 1×10^{-11}, what is $\left[Mg^{2+}\right]$?

A. 1×10^{-5}

B. 1.0×10^{-4}

C. 1×10^{-2}

D. 0.1

Answer: D

Watch Video Solution

31. Equal volumes of two solutions of pH 4 and pH 11 are mixed. The pH of the resulting solution will be :

A. 7.5

B. 3.35

C. 13

D. 3.04

Answer: B

Watch Video Solution

32. At 298 K, the solubility product of MI is 10^{-6} (conc. Are expressed as mol kg^{-1}). The solubility of MI in 0.1 molal KI solution is :

A. $10^{-6} molkg^{-1}$

B. $10^{-5} molkg^{-1}$

C. $10^{-4} molkg^{-1}$

D. $10^{-3} molkg^{-1}$

Answer: B

Watch Video Solution

33. The pKa of HCN is 9.30. The pH of a solution prepared by mixing 2.5 moles of KCN and 2.5 moles of HCN in water and making up the total volume of 500 ml is :

A. 9.30

B. 7.30

C. 10.30

D. 8.30

Answer: A

Watch Video Solution

34. If the solubility of lithium sodium hexafluoro aluminate $Li_3Na_3(AlF_6)_2$ is x mol L^{-1}, then its solubility product is equal to :

A. $18x^3$

B. $12x^3$

C. x^8

D. $2916x^8$

Answer: D

Watch Video Solution

35. The K_{sp} of $BaCrO_4$ is $2.4 \times 10^{-10} M^2$. The maximum concentration of $Ba(NO_3)_2$ possible without precipitation

in a $6 \times 10^{-4} M K_2CrO_4$ solution is

A. $4 \times 10^{-7} M$

B. $1.2 \times 10^{10} M$

C. $6 \times 10^{-4} M$

D. $3 \times 10^{-4} M$

Answer: A

Watch Video Solution

36. The K_{sp} of CuS, Ag_2S and HgS are 10^{-31}, 10^{-44} and 10^{-54} respectively. The solubility of these hydrides are in the order :

A. $Ag_2S > CuS > HgS$

B. $Ag_2S > HgS > CuS$

C. $HgS > Ag_2S > CuS$

D. $CuS > Ag_2S > HgS$

Answer: D

Watch Video Solution

37. In a saturated solution of calcium phosphate, the concentration of PO_4^{3-} ions is $3.3 \times 10^{-7} M$. The K_{sp} of $Ca_3(PO_4)_2$ will be :

A. 1.32×10^{-31}

B. 1.32×10^{-32}

C. 1.32×10^{-33}

D. 1.32×10^{-35}

Answer: B

Watch Video Solution

38. How many grams of CaC_2O_4 will be dissolved in 1L of distilled water to make its saturated solution ? (K_{sp} of $CaC_2O_4 = 2.5 \times 10^{-9}$ and mol. wt. of $CaC_2O_4 = 128$) :

A. 0.0064 g

B. 0.0128 g

C. 0.0032 g

D. 0.0640 g

Answer: A

Watch Video Solution

39. For the reaction :

$NH_2COONH_4(g) \Leftrightarrow 2NH_3(g) + CO_2(g)$

equilibrium pressure was found to be 3 atm at 1000 K. K_p is :

A. $\frac{4}{27}$

B. 4

C. 27

D. $\frac{27}{4}$

Answer: B

Watch Video Solution

40. It has been found that the pH of a 0.01 M solution of an organic acid is 4.15. The concentration of the anion of the acid is :

A. 4.15

B. 3.85

C. 7.08×10^{-5}

D. 7.08×10^{-4}

Answer: C

Watch Video Solution

41. Solubility product of silver bromide is 5.0×10^{-13}. The quantity of potassium bromide (molar mass taken as 120 g mol^{-1}) to be added to 1 litre of 0.05 M solution of silver nitrate to start the precipitation of AgBr is :

A. $2.5 \times 10^{-14} g$

B. $1.2 \times 10^{-9} g$

C. $1.2 \times 10^{-11} g$

D. $2.5 \times 10^{-9} g$

Answer: B

Watch Video Solution

42. The following equilibrium are given :

$N_2 + 3H_2 \Leftrightarrow 2NH_3 : K_1$

$N_2 + O_2 \Leftrightarrow 2NO : K_2$

$H_2 + \frac{1}{2}O_2 \Leftrightarrow H_2O : K_3$

The equilibrium constant of the reaction :

$2NH_3 + \frac{5}{2}O_2 \Leftrightarrow 2NO + 3H_2O$

in terms of K_1, K_2 and K_3 is :

A. $K_1 . K_2 . K_3$

B. $K_1 K_2 / K_3$

C. $K_1 K_3^2 / K_2$

D. $K_2 K_3^3 / K_1$

Answer: D

Watch Video Solution

43. Which of the following is true for diprotic acid, H_2X ?

A. $K_{a_2} > K_{a_1}$

B. $K_{a_1} > K_{a_2}$

C. $K_{a_2} = \frac{1}{Ka_1}$

D. $K_{a_2} = K_{a_1}$

Answer: B

Watch Video Solution

44. At $25^\circ C$, the dissociation constant of a base BOH is 1.0×10^{-12}. The concentration of hydroxyl ions in 0.01 M aqueous solution of base would be :

A. $1.0 \times 10^{-5} molL^{-1}$

B. $1.0 \times 10^{-6} molL^{-1}$

C. $2.0 \times 10^{-6} molL^{-1}$

D. $1.0 \times 10^{-7} molL^{-1}$

Answer: D

Watch Video Solution

45. The hydrogen ion concentration of a 10^{-8} M HCl aqueous solution at 298 K $\left(K_w = 10^{-14}\right)$ is :

A. $1.05 \times 10^{-7} M$

B. $9.525 \times 10^{-8} M$

C. $1.0 \times 10^{-8} M$

D. $1.0 \times 10^{-6} M$

Answer: A

Watch Video Solution

46. The following equilibrium constants are given :

$N_2 + 3H_2 \Leftrightarrow 2NH_3, K_1$

$N_2 + O_2 \Leftrightarrow 2NO, K_2$

$H_2 + \frac{1}{2}O_2 \Leftrightarrow H_2O, K_3$

The equilibrium constant for the oxidation of NH_3 by oxygen to give NO is :

A. $K_2 \frac{K_3^2}{K_1}$

B. $K_2^2 K_3 / K_1$

C. $K_1 K_2 / K_3$

D. $K_2K_3^3 / K_1$

Answer: D

Watch Video Solution

47. Consider the reaction where $K_p = 0.497$ at 500 K.

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

If the three gases are mixed in a rigid container so that the partial pressure of each gas is initially 1 atm, which is true ?

A. More PCl_5 will be produced

B. More PCl_3 will be produced

C. Equilibrium will be established when 50% reaction is complete

D. None of the above

Answer: A

Watch Video Solution

48. K_p and K'_p are equilibrium constants of the two reactions given below :

$$\frac{1}{2}N_2(g) + \frac{3}{2}H_2(g) \Leftrightarrow NH_3(g)$$

$$N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$$

Therefore K_p and K'_p are related by :

A. $K_p = K'^2_p$

B. $K_p = \sqrt{K'_p}$

C. $K_p = 2K'_p$

D. $K_p = K'_p$

Answer: B

Watch Video Solution

49. The solubility product of a sparingly soluble metal hydroxide, $M(OH)_2$ at 298 K is $5 \times 10^{-16} mol^3 dm^{-9}$. The ph value of its aqueous and saturated solution is :

A. 5

B. 9

C. 11.5

D. 2.5

Answer: B

Watch Video Solution

50. Determine pH of the solution that results from addition of 20 ml of $0.01MCa(OH)_2$ to 30 ml of 0.01 M HCl.

A. 11.30

B. 10.53

C. 2.70

D. 8.35

Answer: A

Watch Video Solution

51. The solubility product of iron (III) hydroxide is 1.6×10^{-39}. If x is the solubilityof iron (III) hydroxide, then which of the following expressions can be used to calculate x ?

A. $K_{sp} = x^4$

B. $K_{sp} = 9x^4$

C. $K_{sp} = 27x^3$

D. $K_{sp} = 27x^4$

Answer: D

Watch Video Solution

52. When equal volume of the following solutions are mixed, precipitation of $AgCl\left(K_{sp}=1.8\times10^{-10}\right)$ will occur only with :

A. $10^{-3}MAg^{+}$ and $10^{-5}MCl^{-}$

B. $10^{-5}MAg^{+}$ and $10^{-5}MCl^{-}$

C. $10^{-6}MAg^{+}$ and $10^{-5}MCl^{-}$

D. $10^{-4}MAg^{+}$ and $10^{-4}MCl^{-}$

Answer: D

Watch Video Solution

53. Solubility of CaF_2 in terms of its solubility product is given by :

A. $s = (K_{sp})^{\frac{1}{3}}$

B. $s = \left(\frac{K_{sp}}{2}\right)^{\frac{1}{3}}$

C. $s = \left(\frac{K_{sp}}{4}\right)^{\frac{1}{3}}$

D. $s = \left(\frac{K_{sp}}{2}\right)^{\frac{1}{2}}$

Answer: C

Watch Video Solution

54. When 200 ml of aqueous solution of HCl (pH = 2) is mixed with 300 ml of of an aqueous solution of NaOH (pH = 12), the pH of the resulting mixture is :

A. 10

B. 2.7

C. 4.0

D. 11.2

Answer: D

Watch Video Solution

55. The dissociation constants of acetic acid and HCN at $25^\circ C$ are 1.5×10^{-4} and 4.5×10^{-10} respectively. The equilibrium constant for the equilibrium.

$$CN^- + CH_3COOH \Leftrightarrow HCN + CH_3COO^-$$

A. $3 \times 10^{+5}$

B. 3×10^{-4}

C. 3×10^{-5}

D. 3×10^4

Answer: D

Watch Video Solution

56. The ionisation constant of ammonium hydroxide is 1.77×10^{-5} at 298 K. Hydrolysis constant of ammonium chloride is :

A. 6.5×10^{-12}

B. 5.65×10^{-13}

C. 5.65×10^{-12}

D. 5.65×10^{-10}

Answer: D

Watch Video Solution

57. For the reaction $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$, the standard free energy is $\Delta G^\circ > 0$. The equilibrium constant (K) would be

A. K = 0

B. $K > 1$

C. K = 1

D. $K < 1$

Answer: D

Watch Video Solution

58. PCl_5, PCl_3 and Cl_2 are at equilibrium at 500 K in a closed container and their concentrations are $0.8 \times 10^{-3} molL^{-1}, 1.2 \times 10^{-3} molL^{-1}$ respectively. The value of K_c for the reaction

$PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$ will be

A. $1.8 \times 10^{-3} molL^{-1}$

B. 1.8×10^{3}

C. $1.8 \times 10^{-3} Lmol^{-1}$

D. 0.55×10^{4}

Answer: B

Watch Video Solution

59. When hydrochloric acid is added to cobalt nitrate solution at room temperature, the following reaction takes place and the reaction mixture becomes blue. On cooling the mixture it becomes pink. On the basis of this information mark the correct answer.

$$\underset{(\text{pink})}{\left[Co(H_2O)_6\right]^{3+}}(aq) + 4Cl^-(aq) \Leftrightarrow \underset{(\text{blue})}{\left[CoCl_4\right]^{2-}}(aq) + 6H_3O(l)$$

A. $\Delta H > 0$ for the reaction

B. $\Delta H < 0$ for the reaction

C. $\Delta H = 0$ for the reaction

D. The sign of ΔH cannot be predicted on the basis of this information.

Answer: A

Watch Video Solution

60. The pH of neutral water at 25 ^0 C is 7.0. As the temperature increases, ionization of water increases, however the concentration of H + ions and OH − ions are equal. What will be the pH of pure water at 60^0 C?

A. Equal to 7.0

B. Greater than 7.0

C. Less than 7.0

D. Equal to zero

Answer: C

Watch Video Solution

61. K_{a_1}, K_{a_2} and K_{a_3} are the respective ionisation constants for the following reactions.

$H_2S \Leftrightarrow H^+ + HS^-$

$HS^- \Leftrightarrow H^+ + S^{2-}$

$H_2S \Leftrightarrow 2H^+ + S^{2-}$

The correct relationship between K_{a_1}, K_{a_2} and K_{a_3} is

A. $K_{a_3} = K_{a_1} \times K_{a_2}$

B. $K_{a_3} = K_{a_1} = K_{a_1} + K_{a_2}$

C. $K_{a_3} = K_{a_1} - K_{a_2}$

D. $K_{a_3} = K_{a_1} / K_{a_2}$

Answer: A

Watch Video Solution

62. Acidity of BF_3 can be explained on the basis of which of the following concepts ?

A. Arrhenius concept

B. Bronsted Lowry concept

C. Lewis concept

D. Bronsted Lowry as well as Lewis concept.

Answer: C

Watch Video Solution

63. At 500 K, equilibrium constant, K_c, for the following reaction is 5.

$$\frac{1}{2}H_2(g) + \frac{1}{2}I_2(g) \Leftrightarrow HI(g)$$

What would be the equilibrium constant K_c for the reaction

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

A. 0.04

B. 0.4

C. 25

D. 2.5

Answer: A

Watch Video Solution

64. Which of the following options will be correct for the stage of half completion of the reaction $A \Leftrightarrow B$?

A. $\Delta G^\circ = 0$

B. $\Delta G^{\circ} > 0$

C. $\Delta G^{\circ} < 0$

D. $\Delta G^{\circ} = -$ RT ln 2

Answer: A

Watch Video Solution

65. The ratio of the forward reaction is two times that of the revers reaction at a given temperature and identical concentration. $K_{\text{equilibrium}}$ is

A. 0.5

B. 1.5

C. 2.5

D. 2.0

Answer: D

Watch Video Solution

66. When rain is accompained by a thunder storm, the collected rainwater will have pH value

A. 1. slightly higher than that when the thunder strom is not there

B. 2. unifluenced by the thunder storm

C. 3. depends upon the amount of dust in air

D. 4. slightly lesser than of rain water without thunder storm.

Answer: D

Watch Video Solution

67. H_2S gas when passed through solution of cations containing HCl precipitates the cations of second group of qualitative analysis but not those belonging to the fourth group. It is because

A. presence of HCl decreases the sulphide ion concentration

B. sulphides of group IV cations are unstable in HCl

C. solubility product of group II sulphides is more than that of group IV sulphides

D. presence of HCl increase the sulphide ion concentration

Answer: A

Watch Video Solution

68. If the concentration of OH^- ions in the reaction

$Fe(OH)_3(s) \Leftrightarrow Fe^{3+}(aq) + 3OH^-(aq)$

is decreased by 1/4 times, then equilibrium concentration of Fe^{3+} will increase by

A. 8 times

B. 16 times

C. 64 times

D. 4 times

Answer: C

Watch Video Solution

69. The dissociation constants of acetic acid and HCN at $25^{\circ}C$ are 1.5×10^{-4} and 4.5×10^{-10} respectively. The equilibrium constant for the equilibrium.

$$CN^{-} + CH_3COOH \Leftrightarrow HCN + CH_3COO^{-}$$

A. 3×10^{-5}

B. 3×10^{-4}

C. 3×10^{4}

D. 3×10^{5}

Answer: C

Watch Video Solution

70. What is the $\left[OH^{-}\right]$ in the final solution prepared by mixing 20 mL of 0.050 M HCl with 30.0 mL of $0.10MBa(OH)_2$?

A. 0.40 M

B. 0.0050 M

C. 0.12 M

D. 0.10 M

Answer: D

Watch Video Solution

71. A buffer solution contains 0.1 mole of sodium acetate dissolved in $1000cm^3$ of 0.1 M acetic acid. To the above buffer solution, 0.1 mole of sodium acetate is further added and dissolved. The pH of the resulting buffer is

A. pK_a

B. $pK_a + 2$

C. $pK_a - \log 2$

D. $pK_a + \log 2$

Answer: D

Watch Video Solution

72. A buffer solution is prepared in which the concentration of NH_3 is 0.30 M and concentration of NH_4^+ is 0.20 M. If equilibrium constant K_b for NH_3 equals 1.8×10^{-5}, what is the pH of the solution ?

A. 9.08

B. 9.43

C. 11.72

D. 8.72

Answer: B

Watch Video Solution

73. In which of the following equilibrium, change in volume of the system does not alter the number of moles ?

A. $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$

B. $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$

C. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

D. $SO_2Cl_2(g) \Leftrightarrow SO_2(g) + Cl_2(g)$

Answer: A

Watch Video Solution

74. The ratio of K_p / K_c for the reaction :

$CO(g) + \frac{1}{2}O_2(g) \Leftrightarrow CO_2(g)$ is :

A. 1

B. RT

C. $1/\sqrt{RT}$

D. $(RT)^{(1/2)}$

Answer: C

Watch Video Solution

75. A solution of $10^{-3}M$ each in Mn^{2+}, Fe^{2+}, Zn^{2+} and Hg^{2+} is heated with 10^{-16} M sulphide ion. If K_{sp} of MnS, FeS, ZnS and HgS are $10^{-15}, 10^{-23}, 10^{-20}$ nd 10^{-54} respectively which one will precipitate first ?

A. FeS

B. MnS

C. HgS

D. ZnS

Answer: C

Watch Video Solution

76. The conjugate base of $H_2PO_4^-$ is :

A. H_3PO_4

B. P_2O_5

C. PO_4^{3-}

D. HPO_4^{2-}

Answer: D

Watch Video Solution

77. What is the equilibrium expression for the reaction :

$$P_4(s) + 5O_2(g) \Leftrightarrow P_4O_{10}(s)$$

A. $K = [O_2]^5$

B. $K_c = \dfrac{[P_4O_{10}]}{5[P_4][O_2]}$

C. $K_c = \dfrac{[P_4O_{10}]}{[P_4][O_2]^5}$

D. $K_c = \dfrac{1}{[O_2]^5}$

Answer: D

Watch Video Solution

78. For the reaction :

$CO(g) + Cl_2(g) \Leftrightarrow COCl_2(g)$

the K_p / K_c is equal to :

A. $\sqrt{RT}$

B. RT

C. 1/RT

D. 1.0

Answer: B

Watch Video Solution

79. The equilibrium constant for the reaction $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$ at temperature T is 4×10^{-4}.

The vlue of K_c for the reaction $NO(g) \Leftrightarrow \frac{1}{2}N_2(g) + \frac{1}{2}O_2(g)$ at the same temperature is :

A. 4×10^{-4}

B. 50

C. 2.5×10^2

D. 0.02

Answer: B

Watch Video Solution

80. The molar solubility (in mol L^{-1}) of a sparingly soluble salt MX_4 is 's'. The corresponding solubility product is K_{sp}. 's' is given in terms of K_{sp} by the relation :

A. $s = (256K_{sp})^{1/5}$

B. $s = (128K_{sp})^{1/4}$

C. $s = (K_{sp}/128)^{1/4}$

D. $s = (K_{sp}/256)^{1/5}$

Answer: D

Watch Video Solution

81. A weak acid HX has the dissociation constant $1 \times 10^{-5} M$. It forms a salt NaX on reaction with alkali. The percentage hydrolysis of 0.1 M solution of NaX is :

A. $0.0001\ \%$

B. $0.01\ \%$

C. $0.1\ \%$

D. $0.15\ \%$

Answer: B

Watch Video Solution

82. The exothermic formation of ClF_3 is represented by the reaction :

$Cl_2(g) + 3F_2(g) \Leftrightarrow 2ClF_3(g) \Delta_r H = -329kJ$

Which of the following will increase the quantity of ClF_3 in an equilibrium mixture of Cl_2, F_2 and ClF_3 ?

A. Increasing the temperature

B. Removing Cl_2

C. Increasing volume of the container

D. Adding F_2

Answer: D

Watch Video Solution

83. For the reaction :

$2NO_2(g) \Leftrightarrow 2NO(g) + O_2(g)$

$\left[K_c = 1.8 \times 10^{-6} \text{at} 184^\circ C, R = 0.0831 \text{kJ (mol, K)}\right]$

When K_p and K_c are compared at $184^\circ C$, it is found that :

A. K_p is greater than K_c

B. K_p is less than K_c

C. $K_p = K_c$

D. whether K_p is greater than, less than or equal to K_c depend upon the total gas pressure.

Answer: A

Watch Video Solution

84. What is the conjugae base of OH^- ?

A. O_2

B. H_2O

C. O^-

D. O^{2-}

Answer: D

Watch Video Solution

85. Hydrogen ion concentration in mol/L in a solution of pH = 5.4 will be :

A. 3.98×10^{-8}

B. 3.88×10^{6}

C. 3.68×10^{-6}

D. 3.98×10^{-6}

Answer: D

Watch Video Solution

86. 0.1 mol of $CH_3NH_2\left(K_b = 5.0 \times 10^{-4}\right)$ is mixed with 0.08 mol of HCl and diluted to one litre. What will be the H^+ ion concentration in the solution ?

A. $8 \times 10^{-2} M$

B. $8 \times 10^{-11} M$

C. $1.6 \times 10^{-11} M$

D. $8 \times 10^{-5} M$

Answer: B

Watch Video Solution

87. Phosphorus pentachloride dissociates as follows in a closed vesselm

$PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$.

If total pressure at equilibrium of the reaction mixture is P and degree of dissociation of PCl_5 is x, the partial pressure of PCl_3 will be :

A. $\left(\frac{2x}{1-x}\right)P$

B. $\left(\frac{x}{x-1}\right)P$

C. $\left(\frac{x}{1-x}\right)P$

D. $\left(\frac{x}{1+x}\right)P$

Answer: D

Watch Video Solution

88. In a saturated solution of the sparingly soluble strong electrolyte. $AgIO_3$ (molecular mass = 283), the equilibrium

which sets in is :

$AgIO_3(s) \Leftrightarrow Ag^+(aq) + IO_3^-(aq)$

If the solubility product constant, K_{sp} of $AgIO_3$ at a given temperature is 1.0×10^{-8}, what is the mass of $AgIO_3$ contained in 100ml of its saturated solution ?

A. $2.83 \times 10^{-3} g$

B. $1.0 \times 10^{-7} g$

C. $1.0 \times 10^{-4} g$

D. $28.3 \times 10^{-2} g$

Answer: A

Watch Video Solution

89. The first and second dissociation constants of an acid H_2A are 1.0×10^{-5} and 5.0×10^{-10} respectively. The overall dissociation constant of the acid will be :

A. 5.0×10^{15}

B. 5.0×10^{-15}

C. 0.2×10^{5}

D. 5.0×10^{-5}

Answer: B

Watch Video Solution

90. The pK_{a0} of a weak acid (HA) is 4.5. The pOH of an aqueous buffered solution of HA in which 50% of the acid is

ionized is :

A. 2.5

B. 9.5

C. 7.0

D. 4.5

Answer: B

Watch Video Solution

Multiple Choice Questions Level Iii

1. Solid $Ba(NO_3)_2$ is gradually dissolved in a $10^{-4}MNa_2CO_3$ solution. At what concentration of Ba^{2+}

will a precipitate begin to form ? (K_{sp} for $BaCO_3 = 5.1 \times 10^{-9}$)

A. $4.1 \times 10^{-5} M$

B. $8.1 \times 10^{-8} M$

C. $5.1 \times 10^{-5} M$

D. $8.1 \times 10^{-7} M$

Answer: C

Watch Video Solution

2. In aqueous solution the ionization constants for carbonic acid are :

$K_1 = 4.2 \times 10^{-7}$ and $K_2 = 4.8 \times 10^{-11}$

Select the correct statement for a saturated 0.034 M solution of carbonic acid.

A. The concentration of H^+ and HCO_3^- are approzimately equal.

B. The concentration of H^+ is double that of CO_3^{2-}

C. The concentration of CO_3^{2-} is 0.034 M.

D. The concentration of CO_3^{2-} is greater than that of HCO_3^-

Answer: A

Watch Video Solution

3. At $25^{\circ}C$ the solubility product of $Mg(OH)_2$ is 1.0×10^{-11}. At which pH, will Mg^{2+} ions start precipitating in the form of $Mg(OH)_2$ from a solution of $0.001M Mg^{2+}$ ions ?

A. 1

B. 8

C. 9

D. 10

Answer: D

Watch Video Solution

4. Solubility product of silver bromide is 5.0×10^{-13}. The quantity of potassium bromide (molar mass taken as 120 g mol^{-1}) to be added to 1 litre of 0.05 M solution of silver nitrate to start the precipitation of AgBr is :

A. $6.2 \times 10^{-5} g$

B. $5.0 \times 10^{-8} g$

C. $1.2 \times 10^{-10} g$

D. $1.2 \times 10^{-9} g$

Answer: D

Watch Video Solution

5. 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 is :

A. 0.3 atm

B. 0.18 atm

C. 1.8 atm

D. 3 atm

Answer: C

Watch Video Solution

6. The K_{sp} for $Cr(OH)_3$ is 1.6×10^{-30}. The molar solubility of this compound in water is :

A. $\sqrt[3]{1.6 \times 10^{-30}}$

B. $\sqrt[4]{1.6 \times 10^{-30}/27}$

C. $1.6 \times 10^{-30}/27$

D. $\sqrt[2]{1.6 \times 10^{-30}}$

Answer: B

Watch Video Solution

7. An acid HA ionises as

$HA \Leftrightarrow H^+ + A^-$

The pH of 1.0 M solution is 5. Its dissociation constant would be :

A. 5

B. 5×10^{-8}

C. 1×10^{-5}

D. 1×10^{-10}

Answer: D

Watch Video Solution

8. The pH of a 0.1 molar solution of the acid HQ is 3. The value of the ionization constant, K_a of this acid is :

A. 1×10^{-7}

B. 3×10^{-7}

C. 1×10^{-3}

D. 1×10^{-5}

Answer: D

Watch Video Solution

9. The equilibrium constant for the reaction $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$ at temperature T is 4×10^{-4}. The vlue of K_c for the reaction $NO(g) \Leftrightarrow \frac{1}{2}N_2(g) + \frac{1}{2}O_2(g)$ at the same temperature is :

A. 50.0

B. 0.02

C. 2.5×10^2

D. 4×10^{-4}

Answer: A

Watch Video Solution

10. How many litres of water must be added to 1 litre of an aqueous solution of HCl with a pH of 1 to create an aqueous solution with pH of 2 ?

A. 0.1 L

B. 0.9 L

C. 2.0 L

D. 9.0 L

Answer: D

Watch Video Solution

11. For the reaction :

$$SO_2(g) + \frac{1}{2}O_2(g) \Leftrightarrow SO_3(g)$$

If $K_p = K_c(RT)^x$ where the symbols have usual meaning, then the value of x is : (assuming ideality)

A. -1

B. $-\frac{1}{2}$

C. $\frac{1}{2}$

D. 1

Answer: B

Watch Video Solution

12. The following reaction is performed at 298 K

$2NO(g) + O_2(g) \Leftrightarrow 2NO_2(g).$

The standard free energy of formation of NO (g) is 86.6 kJ / mol at 298 K. What is the standard free energy of formation of $NO_2(g)$ at 298 K ? $\left(K_p = 1.6 \times 10^{12}\right).$

A. 1. R (298) ln $\left(1.6 \times 10^{12}\right) - 86600$

B. $86600 + R(298)\ln\left(1.6 \times 10^{12}\right)$

C. $86600 - \dfrac{\ln\left(1.6 \times 10^{12}\right)}{R(298)}$

D. $0.5\left[2 \times 86,600 - R(298)\ln\left(1.6 \times 10^{12}\right)\right].$

Answer: D

Watch Video Solution

13. The standard Gibbs energy change at 300 K for the reaction $2A \Leftrightarrow B + C$ is 2494.2 J. At a given time, the composition of the reaction mixture is $[A] = \frac{1}{2}, [B] = 2$ and $[C] = \frac{1}{2}$. The reaction proceeds in the : [R = 8.314 J/K/mol, e = 2.718]

A. forward direction because $Q > K_c$

B. reverse direction because $Q > K_c$

C. forward direction because $Q < K_c$

D. reverse direction because $Q < K_c$

Answer: B

Watch Video Solution

Recent Examination Questions

1. Consider the following gaseous equilibria with equilibrium constants K_1 and K_2 respectively.

$$SO_{2(g)} + \frac{1}{2}O_{2(g)} \Leftrightarrow SO_{3(g)}$$

$$2SO_{3(g)} \Leftrightarrow 2SO_{2(g)} + O_{2(g)}$$

The equilibrium constants are related as .....

A. $K_1^2 = \frac{1}{K_2}$

B. $2K_1 = K_2^2$

C. $K_2 = \frac{2}{K_1^2}$

D. $K_2^2 = \frac{1}{K_1}$

Answer: A

Watch Video Solution

2. 0.023g of sodium metal is reacted with $100cm^3$ of water. The pH of the resulting solution is :

A. 10

B. 11

C. 9

D. 12

Answer: D

Watch Video Solution

3. A buffer solution contains 0.1 mole of sodium acetate dissolved in $1000cm^3$ of 0.1 M acetic acid. To the above buffer

solution, 0.1 mole of sodium acetate is further added and dissolved. The pH of the resulting buffer is

A. $pK_a - \log 2$

B. pK_a

C. $pK_a + 2$

D. $pK_a + \log 2$

Answer: D

Watch Video Solution

4. One dm^3 solution containing 10^{-5} moles each of Cl^- ions and CrO_4^{2-} ions is treated with 10^{-4} moles of silver nitrate. Which one of the following observations is made ?

$[K_{sp}Ag_2CrO_4 = 4 \times 10^{-12}]$

$[K_{sp}AgCl = 1 \times 10^{-10}]$

A. Precipitation does not occur

B. Silver chromate gets precipitated first

C. Silver chloride gets precipitated first

D. Both silver chromate and silver chloride start precipitating simultaneously.

Answer: A

Watch Video Solution

5. pH value of which one of the following is NOT equal to one ?

A. 1. $0.1MCH_3COOH$

B. 2. $0.1MHNO_3$

C. 3. $0.05MH_2SO_4$

D. 4. $50cm^30.4MHCl + 50cm^30.2MNaOH.$

Answer: A

Watch Video Solution

6. The pH of the solution obtained by mixing 100 mL of a solution of pH = 3 with 400 mL of a solution of pH = 4 is :

A. $3 - \log 2.8$

B. $7 - \log 2.8$

C. $4 - \log 2.8$

D. $5 - \log 2.8$

Answer: C

Watch Video Solution

7. The equilibrium constant of the reaction :

$A_{(s)} + 2B^{+}_{(aq)} \Leftrightarrow A^{2+}_{(aq)} + 2B_{(s)} : E^{\circ}_{cell} = 0.0295V$ is :

A. 10

B. 2×10^2

C. 3×10^2

D. 2×10^5

Answer: A

Watch Video Solution

Watch Video Solution

8. The equilibrium constant of a reaction is 0.008 at 298 K. The standard free energy change of the reaction at the same temperature is :

A. $+11.96kJ$

B. $-11.96kJ$

C. $-5.43kJ$

D. $-8.46kJ$

Answer: A

Watch Video Solution

9. 5 mL of 0.4N NaOH is mixed with 20 mL of 0.1N HCl. The pH of the resulting solution will be :

A. 6

B. 7

C. 8

D. 5

Answer: B

 Watch Video Solution

10. On adding which of the following the pH of 20 mL of 0.1 N HCl will not alter ?

A. 1 mL of 1 N HCl

B. 20 mL of distilled water

C. 1 mL of 0.1 N NaOH

D. 500 mL of HCl of pH = 1.

Answer: D

Watch Video Solution

11. The yield of the products in the reaction,

$A_{2(g)} + 2B_{(g)} \Leftrightarrow C_{(g)} + Q$ kJ would be higher at :

A. 1. high temperature and high pressure

B. 2. high temperature and low pressure

C. 3. low temperature and high pressure

D. 4. low temperature and low pressure

Answer: C

Watch Video Solution

12. The conjugate base of $H_2PO_4^-$ is :

A. HPO_4^-

B. HPO_4^{2-}

C. H_3PO_4

D. PO_4^{3-}

Answer: B

Watch Video Solution

13. Identify a species which is 'NOT' a Bronsted acid but a Lewis acid.

A. BF_3

B. H_3^+O

C. NH_3

D. HCl

Answer: A

Watch Video Solution

14. The pH of 10^{-8} M HCl solution is :

A. 8

B. 6.9586

C. more than 8

D. slightly more than 7.

Answer: B

Watch Video Solution

15. An example for a neutral buffer is :

A. 1. ammonium hydroxide and ammonium chloride

B. 2. acetic acid and sodium acetate

C. 3. acetic acid and ammonium hydroxide

D. 4. citric acid and sodium citrate.

Answer: C

Watch Video Solution

16. For the equilibrium: $CaCO_{3(s)} \Leftrightarrow CaO_{(s)} + CO_{2(g)}$, $K_p = 1.64$ atm at 1000 K, 50 g of $CaCO_3$ in a 10 litre closed vessel is heated to 1000 K. Percentage of $\acute{C}aCO_3$ that remains unreacted at equilibrium is (Given R=0.082 L atm $K^{-1}\text{mol}^{-1}$).

A. 40

B. 50

C. 60

D. 20

Answer: C

Watch Video Solution

17. The number of H^+ ions present in 1 ml of a solution whose pH is 13 is :

A. 6.022×10^{10}

B. 6.022×10^{7}

C. 6.022×10^{20}

D. 6.022×10^{23}

Answer: B

Watch Video Solution