CHEMISTRY

BOOKS - ARIHANT CHEMISTRY (HINGLISH)

CHEMICAL AND IONIC EQUILIBRIUM

Practice Exericese

1. An aqueous solution of $HCI is 10^{-9} M HCI.$

The pH of the solution should be

A. 8

B. -8

C. between 7 and 8

D. between 6 and 7

Answer: D

 Watch Video Solution

2. The following concentrations were obtained

for the formation of NH_3 from N_2 and H_2 at

equilibrium   at $500K$.

$[N_2] = 1.5 \times 10^{-2}M$, $[H_2] = 3.0 \times 10^{-2}M$, and $[NH_3] = 1.2 \times 10^{-2}M$. Calculate the equilibrium constant.

A. 1.08×10^4

B. 3.98×10^2

C. 1.06×10^3

D. 2.93×10^4

Answer: B

▶ Watch Video Solution

3. Which of the following relations represent correct relation between standard electrode potential and equilibrium constant ?

I. $\log K = \dfrac{nFE^{\circ}}{2303RT}$ II. $K = e^{-\frac{nFE^{\circ}}{RT}}$

III. $\log K = \dfrac{-nFE^{\circ}}{2303RT}$ IV.

$\log K = 0.4342\dfrac{nFE^{\circ}}{RT}$

   A. I,II and III

   B. II and III

   C. I, II and IV

   D. I and IV

Answer: C

4. If the ionisation constant of acetic acid is 1.8×10^{-5}, at what concentration will it be dissociated to 2% ?

A. $1M$

B. $0.018M$

C. $0.18M$

D. $0.045M$

Answer: D

5. The dissociation constant of acetic acid at a given temperature is 1.69×10^{-5}.The degree of dissociation of 0.01 M acetic acid in presence of 0.01 M HCl is equal to :

A. 0.41

B. 0.13

C. 0.169×10^{-2}

D. 0.013

Answer: C

6. The concentration of hydrogen ion in a sample of soft drink is $3.8 \times 10^{-3} M$. What is its pH?

A. 4.32

B. 5.12

C. 3.31

D. 2.42

Answer: D

▶ **Watch Video Solution**

---

7. The pK_a of acetic acid and pK_b of ammonium hydroxide are 4.76 and 4.75 respectively. Calculate the pH of ammonium acetate solution.
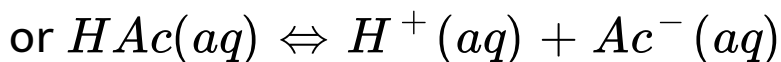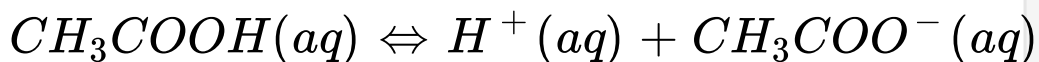
A. 4.765

B. 5.012

C. 7.005

D. 6.098

Answer: C

▶ **Watch Video Solution**

8. For a reaction,

$$CH_3COOH(aq) \Leftrightarrow H^+(aq) + CH_3COO^-(aq)$$

or $HAc(aq) \Leftrightarrow H^+(aq) + Ac^-(aq)$

Evaluate the pH of the solution resulting on addition of $0.05M$ acetata ion to $0.05M$ acid solution $\left(K_a = 1.8 \times 10^{-5}\right)$

A. 5.72

B. 3.87

C. 4.24

D. 4.74

Answer: D

▶ Watch Video Solution

9. pH of an acidic buffer is given by

A. $pH = pK_a + \log. \dfrac{[\text{salt}]}{[\text{acid}]}$

B. $pH = pK_a - \log. \dfrac{[\text{salt}]}{[\text{acid}]}$

C. $pH = \dfrac{1}{2}pK_a + \log. \dfrac{[\text{salt}]}{[\text{acid}]}$

D. $pH = \log K_a + \log. \dfrac{[\text{salt}]}{[\text{acid}]}$

Answer: A

▶ **Watch Video Solution**

10. The pH of buffer solution containing 4×10^{-3} and 0.4 mole of acetic acid and sodium acetate respectively $(pK_a = 4.76)$ and sodium acetate respectively will be

    A. 6.76

    B. 4.76

    C. 2.76

    D. 0.76

Answer: A

11. For the pair of reactions given below,

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

II. $\frac{1}{2}N_2(g) + \frac{3}{2}H_2(g) \Leftrightarrow NH_3(g)$
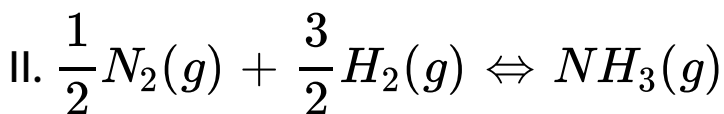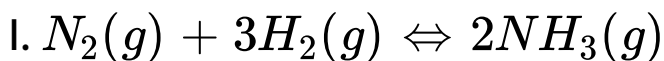
If at a particular temperature, K_{p1} and K_{p2} are the equilibrium constants for reaction I and II respectively. then

A. $K_{p1} = 2K_{p2}$

B. $K_{p1} = K_{p2}^2$

C. $2K_{p1} = K_{p2}$
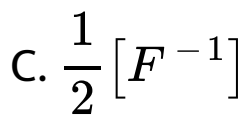
D. $K_{p1} = K_{p2}$

Answer: B

> ▶ **Watch Video Solution**

---

12. Solubility of BaF_2 in a solution of $Ba(NO_3)_2$, will be represented by the concentration term:

A. $\left[Ba^{2+}\right]$

B. $\left[F^{-1}\right]^2$

C. $\dfrac{1}{2}\left[F^{-1}\right]$

D. $2\left[NO_3^-\right]$

Answer: C

▶ **Watch Video Solution**

---

13. pH for the solution of salt undergoing anionic hydrolysis (say CH_3COONa) is given by:

A. $pH = \dfrac{1}{2}pK_a - \dfrac{1}{2}pK_b + \dfrac{1}{2}\log C$

B. $pH = \dfrac{1}{2}pK_w + \dfrac{1}{2}pK_a - \dfrac{1}{2}pK_b$

C. $pH = \dfrac{1}{2}pK_w + \dfrac{1}{2}pK_a + \dfrac{1}{2}\log C$

D. $pH = -\dfrac{1}{2}pK_w + \dfrac{1}{2}pK_a + \dfrac{1}{2}pK_b$

Answer: C

▶ **Watch Video Solution**

14. The solubility of $AgBrO_3$ in an aqueous solution of $NaBrO_3$ (as compared to that in water) is
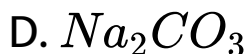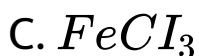
A. the same

B. more

C. less

D. unpredicted due to a new chemical

reaction

Answer: C

▶ Watch Video Solution

15. Which of the following salts undergoes anionic hydrolysis ?

A. $CuSO_4$

B. NH_4CI

C. $FeCI_3$

D. Na_2CO_3

Answer: D

▶ **Watch Video Solution**

16. How do we differentiate between Fe^{3+} and Cr^{3+} in group III?

A. By taking excess of NH_4OH

B. By increasing NH_4^+ ion concentration

C. By decreasing OH^- ion concentration

D. Both (a) and (c)

Answer: D

▶ **Watch Video Solution**

17. Calculate the degree of ionisation of $0.05M$ acetic acid if its pK_a value is 4.74. How is the degree of dissociation affected when its solution also contains

a. $0.01M$, b. $0.1M$ in HCl?

    A. $0.019\,\%$

    B. $1.9\,\%$

    C. $3.0\,\%$

    D. $4.74\,\%$

Answer: B

18. A certain buffer solution contains equal concentartion of $X^{\ominus}$ and HX. The K_b for $X^{\ominus}$ is 10^{-10}. The pH of the buffer is

A. 4

B. 6

C. 7

D. 14

Answer: A

19. The buffering action of an acidic buffer is maximum when its pH equals to

A. 5

B. 7

C. 1

D. pK_a

Answer: D

20. The expression for the solubility product of

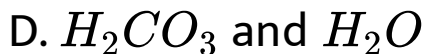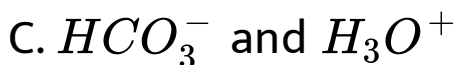Ag_2CrO_3 will be
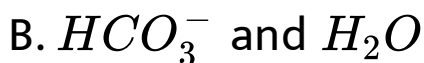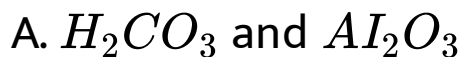
A. $K_{sp} = S^2$

B. $K_{sp} = 4S^3$

C. $K_{sp} = 27S^4$

D. $K_{sp} = S$

Answer: B

21. Amphoteric behaviour is shown by

A. H_2CO_3 and AI_2O_3

B. HCO_3^- and H_2O

C. HCO_3^- and H_3O^+

D. H_2CO_3 and H_2O

Answer: B

▶ Watch Video Solution

22. The value of pK_w of water

A. increases with increase in temperature

B. decreases with rise in temperature

C. does not change with variation in temperature

D. increases till $50°C$ and there after decreases

Answer: B

▶ Watch Video Solution

23. The $[Ag^+]$ ion in a saturated solution of Ag_2CrO_4 at $25^\circ C$ is $1.5 \times 10^{-4} M$. Determine K_{SP} of Ag_2CrO_4 at $25^\circ C$.

A. 3.3750×10^{-12}

B. 1.6875×10^{-10}

C. 1.6875×10^{-12}

D. 1.6875×10^{11}

Answer: C

▶ **Watch Video Solution**

24. If the solubility of Ag_2CrO_4 is S mol/L, its solubility product will be

A. S^2

B. S^3

C. $4S^3$

D. $2S^3$

Answer: C

▶ Watch Video Solution

1. Calculate the pH at the equivalence point during the titration of $0.1M, 25mL CH_3COOH$ with $0.05M NaOH$ solution. $\left[K_a(CH_3COOH) = 1.8 \times 10^{-5}\right]$

A. 9.63

B. 8.63

C. 10.63

D. 11.63

Answer: B

---

2. The pK_a of acteylsalicylic acid (aspirin) is 3.5. The pH of gastric juice in human stomach is about $2-3$ and the pH in the small intestine is about 8. Aspirin will be:

A. ionised in the small intestine and stomach

B. ionised in the stomach and almost

   unionised in the small intestine

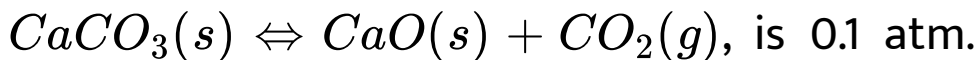C. unionised in small intensity and stomach

D. completely ionised in small intestine and

   stomach

Answer: A

▶ Watch Video Solution

3. At $27^\circ C$, K_p value for the reaction

$CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$, is 0.1 atm.

K_C value for this reaction is

    A. 4×10^{-3}

    B. 6×10^{-3}

    C. 2×10^{-3}

    D. 9×10^{-3}

Answer: A

▶ **Watch Video Solution**

4. In the titration of $NaOH$ and HCl, which of the following indicators will be used ?

A. Methyl organe

B. Methyl red

C. Both (a) and (b)

D. None of (a) and (b)

Answer: C

▶ **Watch Video Solution**

5. For the equilibrium

$2NOBr(g) \Leftrightarrow 2NO + Br_2(g)$, calculate the

ratio $\dfrac{K_p}{P}$, where P is the total pressure and

$P_{Br_2} = \dfrac{P}{9}$ at a certain temperature

A. $\dfrac{1}{3}$

B. $\dfrac{1}{9}$

C. $\dfrac{1}{27}$

D. $\dfrac{1}{81}$

Answer: D

▶ **Watch Video Solution**

6. For the reaction,

$N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$, the units of K_p

are ....

A. $Lmol^{-1}$

B. L^2mol^{-2}

C. $molL^{-1}$

D. No units

Answer: B

▶ **Watch Video Solution**

7. A sulphuric acid solution has $pH = 3$. Its normality is

A. $1/1000$

B. $1/200$

C. $1/2000$

D. $1/100$

Answer: A

▶ Watch Video Solution

8. The pH of $0.01 M HCN$ solution for which pK_a is 4 is

    A. 0.47

    B. 1.2

    C. 3.0

    D. 4.0

Answer: C

▶ Watch Video Solution

9. If dissociation constant of ammonia is 10^{-5}, its pK_b and pK_4 value respectively are

A. 5 and 9

B. 9 and 5

C. 7 and 7

D. 4 and 10

Answer: A

▶ **Watch Video Solution**

10. $[H^+]$ of $0.02NCH_3COOH$ which is 4% dissociated, is

   A. $0.08M$

   B. $0.12M$

   C. $0.008M$

   D. $0.8M$

Answer: C

▶ Watch Video Solution

11. 50 mL of H_2O is added to $50mL$ of $1 \times 10^{-3}M$ barium hydroxide solution. What is the pH of the resulting solution?

A. 3.0

B. 3.3

C. 11.0

D. 11.7

Answer: C

▶ **Watch Video Solution**

12. Assertion (A) The aqueous solution of CH_3COONa is alkaline in nature.

Reason (R) Acetate ion undergoes atomic hydrolysis.

    A. Both (A) and (R) are true and (R) is the correct explanation of (A)

    B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

    C. (A) is true but (R) is not true

    D. (A) is not true but (R) is true

Answer: A

13. In a 500mL falsk, the degree of dissociation of PCI_5 at equilibrium is 40% and the initial amount is 5 moles. The value of equilibrium constant in mol L^{-1} for the decomposition of PCI_5 is

A. 2.33

B. 2.66

C. 5.32

D. 4.66

Answer: B

> ▶ **Watch Video Solution**

---

14. For an equilibrium reaction, $N_2O_4(g) \Leftrightarrow 2NO_2(g)$, the concentrations of N_2O_4 and NO_2 at equilibrium are 4.8×10^{-2} and $1.2 \times 10^{-2} mol/L$ respectively. The value of K_c for the reaction is

A. $3 \times 10^{-3} mol/L$

B. $3.3 \times 10^{-3} \times 10^{-3} mol/L$

C. $3 \times 10^{-1} mol/L$

D. $3.3 \times 10^{-1} mol/L$

Answer: A

▶ **Watch Video Solution**

15. In $2HI \Leftrightarrow H_2 + I_1$, the forward reaction is

not affected by change in

A. catalyst
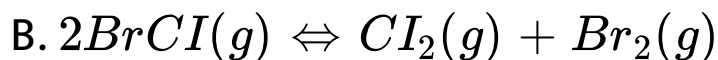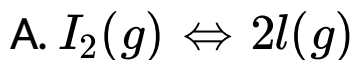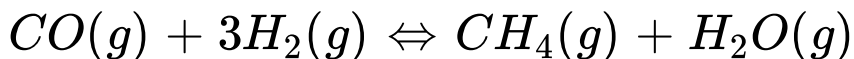
B. pressure

C. volume

D. temperature

Answer: A

▶ **Watch Video Solution**

16. In which of the following reactions is

$K_p < K_C$?

A. $I_2(g) \Leftrightarrow 2l(g)$

B. $2BrCI(g) \Leftrightarrow CI_2(g) + Br_2(g)$
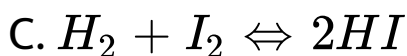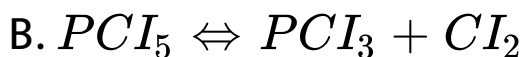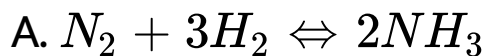
C.

$$CO(g) + 3H_2(g) \Leftrightarrow CH_4(g) + H_2O(g)$$

D. All of the above

Answer: C

▶ **Watch Video Solution**

17. The change in pressure will not affect the equilibrium constant for

    A. $N_2 + 3H_2 \Leftrightarrow 2NH_3$

    B. $PCI_5 \Leftrightarrow PCI_3 + CI_2$

    C. $H_2 + I_2 \Leftrightarrow 2HI$

    D. All of these

Answer: D

▶ **Watch Video Solution**