CHEMISTRY

BOOKS - SURA CHEMISTRY (TAMIL ENGLISH)

IONIC EQUILIBRIUM

Mcqs Evaluation

1. Concentration of the Ag^+ ions in a saturated solution of $Ag_2C_2O_4$ is $2.24 \times 10^{-4} molL^{-1}$ solubility product of $Ag_2C_2O_4$ is

A. $2.42 \times 10^{-8} mol^3 L^{-3}$

B. $2.66 \times 10^{-12} mol^3 L^{-3}$

C. $4.5 \times 10^{-11} mol^3 L^{-3}$

D. $5.619 \times 10^{-12} mol^3 L^{-3}$

Answer: D

Watch Video Solution

2. Following solutions were prepared by mixing different volumes of NAOH of HCL different concentrations.

(i) $60mL \frac{M}{10} HCI + 40mL \frac{M}{10} NaOH$

(ii) $55mL\frac{M}{10}HCI + 45mL\frac{M}{10}NaOH$

(iii) $75mL\frac{M}{5}HCI + 25mL\frac{M}{5}NaOH$

(iv) $100mL\frac{M}{10}HCI + 100mL\frac{M}{10}NaOH$

pH of which one of them will be equal to I?

A. iv

B. i

C. ii

D. iii

Answer: D

Watch Video Solution

3. The solubility of $BaSO_4$ in water is $2.42 \times 10^{-3} gL^{-1}$ at 298K. The value of its solubility product (K_{sp}) will be, (Given molar mass of $BaSO_4 = 233 gmol^{-1}$)

A. $1.08 \times 10^{-14} mol^2 L^{-2}$

B. $1.08 \times 10^{-12} mol^2 L^{-2}$

C. $1.08 \times 10^{-10} mol^2 L^{-2}$

D. $1.08 \times 10^{-8} mol^2 L^{-2}$

Answer: C

Watch Video Solution

4. pH of saturated solution of $Ca(OH)_2$ is 9. The solubility product (K_{sp}) of $Ca(OH)_2$

A. 0.5×10^{-15}

B. 0.25×10^{-10}

C. 0.125×10^{-15}

D. 0.5×10^{-10}

Answer: A

Watch Video Solution

5. Conjugate base of Bronsted acids H_2O and HF are

A. OH^- and H_2FH^+, respectively

B. H_3O^+ and F^-, respectively

C. OH^- and F^-, respectively

D. H_3O^+ and H_2F^+, respectively

Answer: C

Watch Video Solution

6. Which will make basic buffer?

A. $50mL$ of $0.1M$ $NaOH + 25mL$ of $0.1M$ CH_3COOH

B. $100mL$ of $0.1M$ $CH_3COOH + 100mL$ of $0.1M$ NH_4OH

C. $100mL$ of $0.1M$ $HCI + 200mL$ of $0.1M$ NH_4OH

D. $100mL$ of $0.1M$ $HCI + 100mL$ of $0.1M$ $NaOH$

Answer: C

Watch Video Solution

7. Which of the following fluoro- compounds is most likely to behave as a Lewis base ?

A. BF_3

B. PF_3

C. CF_4

D. SiF_4

Answer: B

Watch Video Solution

8. Which of these is not likely to act as Lewis base?

A. BF_3

B. PF_3

C. CO

D. F^-

Answer: A

View Text Solution

9. What is the decreasing order of strength of bases?

$OH^-, NH_2^-, H-C\equiv C$ and CH_3-H_2

A. $OH^- > NH_2^- > H-C\equiv CH_3-CH_2$

B.

$$NH_2^- > OH^- > CH_3 - CH_2^- > H - C \equiv C$$

C.

$$CH_3 - CH_2 > NH_2^- > H - C \equiv C^- > OH^-$$

D.

$$OH^- > H - C \equiv C^- > CH - CH_2^- > NH_2^-$$

Answer: C

Watch Video Solution

10. The aqueous solutions of sodium formate, anilinium chloride and potassium cyanide are

respectively

A. acidic, acidic, basic

B. basic, acidic, basic

C. basic, neutral, basic

D. none of these

Answer: B

Watch Video Solution

11. The percentage of pyridine (C_5H_5NH) that forms pyridinium ion (C_5H_5NH) in a 0.10M aqueous

pyridine solutions

$\left(K_b \text{for} C_5H_5N = 1.7 \times 10^{-9}\right)$ is

A. $0.006\ \%$

B. $0.013\ \%$

C. $0.77\ \%$

D. $1.6\ \%$

Answer: B

Watch Video Solution

12. Equal volumes of three and acid solutions of pH 1,2 and 3 are mixed in a vessel, What will be the H^+

ion concentration in the mixture?

A. 3.7×10^{-2}

B. 10^{-6}

C. 0.111

D. none of these

Answer: A

Watch Video Solution

13. The solubility of $AgCI(s)$ with solubility product 1.6×10^{-10} in 0.1M NaCI solution would be

A. $1.26 \times 10^{-5} M$

B. $1.6 \times 10^{-9} M$

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

D. Zero

Answer: B

Watch Video Solution

14. If the solubility product of lead iodide is 3.2×10^{-8}, its solubility will be

A. $2 \times 10^{-3} M$

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

C. $1.6 \times 10^{-5} M$

D. $1.8 \times 10^{-5} M$

Answer: A

Watch Video Solution

15. Using Gibb's free energy change, $AG^{\circ} = 57.34 kJmol^{-1}$, for the reaction, $X_2Y_{(s)} \Leftrightarrow 2X^{+} + Y^{2-}_{(aq)^3}$ calculate the solubility product of X_2Y in water at 300 K $\left(R = 8.3 JK^{-1}Mol^{-1}\right)$

A. 10^{-10}

B. 10^{-12}

C. 10^{-14}

D. can not calculated from the given data.

Answer: A

Watch Video Solution

16. MY and NY_3, are insoluble salts and have the same K_{sp} value of 6.2×10^{-13} at room temperature. Which statement would be true with regard to MY and NY_3 ?

A. The salts MY and NY_3 are more soluble in 0.5 M KY than in pure water.

B. The addition of the salt of KY to the suspension of MY and NY_3 will have no effect on their solubility's

C. The molar solubility of MY and NY_3 in water are identical

D. The molar solubility of MY in water is less than that of NY_3

Answer: D

Watch Video Solution

17. What is the PH of the resulting solutions when equal volumes of 0.1 M NaOH and 0.01M HCI are mixed?

A. 2.0

B. 3

C. 7.0

D. 12.65

Answer: D

Watch Video Solution

18. The dissociation constant of a week acid is 1×10^{-3}. In order to prepare a buffer solution and with a $pH = 4$, the $[\text{Acid}] / [\text{Salt}]$ ratio should be

A. $4:3$

B. $3:4$

C. $10:1$

D. $1:10$

Answer: D

Watch Video Solution

19. The pH of 10^{-5} M KOH solution will be

A. 9

B. 5

C. 19

D. none of these

Answer: A

Watch Video Solution

20. $H_2PO_4^-$ the conjugate base of

A. PO_4^{3-}

B. P_2O_3

C. H_3PO_4

D. HPO_4^{2-}

Answer: C

View Text Solution

21. Which of the following can act s Lowery-Bronsted and well as base?

A. HCI

B. SO_4^{2-}

C. HPO_4^{2-}

D. Br^-

Answer: C

Watch Video Solution

22. The pH of an aqueous solution is Zero. The solution is

A. slightly acidic

B. strongly acidic

C. neutral

D. basic

Answer: B

Watch Video Solution

23. The hydrogen ion concentration of a buffer solution consisting of a week acid and its salts is given by

A. $\left[H^{+}\right] = \frac{K_a[\text{acid}]}{[\text{salt}]}$

B. $\left[H^{+}\right] = K_a[\text{salt}]$

C. $\left[H^{+}\right] = K_a[\text{acid}]$

D. $\left[H^{+}\right] = \dfrac{K_a[\text{acid}]}{[\text{salt}]}$

Answer: A

Watch Video Solution

24. Which of the following relation is correct for degree of hydroprolysis of ammonium acetate?

A. $h = \sqrt{\dfrac{K_h}{C}}$

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

C. $h = \left(\dfrac{K_a}{K_e . K_b}\right)$

D. $h = \left(\frac{K_a . K_b}{K_b} \right)$

Answer: C

View Text Solution

25. Dissociation constant of NH_4OH is 1.8×10^{-5} the hydrolysis constant of NH_4CI would be

A. 1.8×10^{-19}

B. 5.55×10^{-10}

C. 5.55×10^{-5}

D. 1.80×10^{-5}

Answer: B

Watch Video Solution

Exercise Answer The Following Questions

1. What are Lewis acids and bases? Give two example for each.

Watch Video Solution

2. Discuss the Lowery - Bronsted concept of acids and bases.

View Text Solution

3. Identify the conjugate acid base pair for the following reaction in aqueous solution.

i) $HS_{aq}^{-} + HF \Leftrightarrow F_{aq}^{-} + H_2S_{aq}$

Watch Video Solution

4. Indentify the conjugate acid base pair for the following reaction in aqueous solution.

ii) $HPO_4^{2-} + SO_3^{2-} \Leftrightarrow PO_4^{3-} + HSO_3^{-}$

Watch Video Solution

5. Indentify the conjugate acid base pair for the following reaction in aqueous solution.

iii) $NH_4^+ + CO_3^{2-} \Leftrightarrow NH_3 + HCO_3^-$

Watch Video Solution

6. Account for the acidic nature of $HCIO_4$. In terms of Bronsted - Lowry theory, identify its conjugate base.

View Text Solution

7. When aqueous ammonia is added to $CuSO_4$ solution, the solution turns deep blue due to the formation of tetramminecopper (II) complex, $\left[Cu(H_2O)_4\right]^{2+}_{aq} + 4NH_3(aq) \Leftrightarrow \left[Cu(NH_3)_4\right]^{2+}_{aq}$, among H_2O and NH_3 Which is stronger Lewis base.

View Text Solution

8. The concentration of hydroxide ion in a water sample is found to be $2.5 \times 10^{-6} M$. Identify the nature of the solution.

Watch Video Solution

9. A lab assistant prepared a solution by adding a calculated quantity of HCI gas $25^{\circ}C$ to get a solution with $\left[H_3O^+\right] = 4 \times 10^{-5}$M. Is the solution neutral (or) acidic (or) basic.

Watch Video Solution

10. Calculate the pH of 0.04 M HNO_3 Solution.

Watch Video Solution

11. (i)Define solubility product.

(ii) What is the pH of an aqueous solution obtained

by mixing 6 gram of acetic acid and 8.2 gram of sodium acetate and making the volume equal to 500 ml. (Given: K_a for acetic acid is 1.8×10^{-5})

Watch Video Solution

12. Define the ionic product of water. Give its value at room temperature.

Watch Video Solution

13. Explain common ion effect with an example.

Watch Video Solution

14. State Ostwald's dilution law.

Watch Video Solution

15. Define pH.

Watch Video Solution

16. Calculate the pH of 1.5×10^{-3} M solution of $Ba(OH)_2$.

Watch Video Solution

17. 50 ml of 0.05 M $HNO_3$is added to 50 ml of $0.025MKOH$. Calculate the pH of the resultant solution.

View Text Solution

18. The K_a value for HCN is 10^{-9} . What is the pH of 0.5 M HCN solution ?

Watch Video Solution

19. Calculate the extent of hydrolysis and the pH of 0.1 M ammonium acetate Given that

$K_a = K_b = 1.8 \times 10^{-3}$.

Watch Video Solution

20. Derive an expression for the hydrolysis constant and degree of hydrolysis of salty of strong acid and weak base.

View Text Solution

21. Solubility product of Ag_2CrO_4 is 1×10^{-12} What is the solubility of Ag_2CrO_4 in 0.01 M $AgNO_3$ solution?

Watch Video Solution

22. Write the expression for the solubility product of $Ca_3(PO_4)_2$.

Watch Video Solution

23. A saturated solution, prepared by dissolving $CaF_2(s)$ in water, has $\left[Ca^{2+}\right] = 3.3 \times 10^{-4} M$. What is the K_{sp} of CaF_2?

Watch Video Solution

24. K_{sp} of $AgCI$ is1.8×10^{-10}. Calculate molar solubility in 1M $AgNO_3$.

Watch Video Solution

25. A particular saturated solution of silver chromate Ag_2CrO_4 has $\left[Ag^+\right] = 5 \times 10^{-5}$ and $\left[CrO_4\right]^{2-} = 4.4 \times 10^{-4} M$. What is the value of K_{sp} for Ag_2CrO_4 ?

Watch Video Solution

26. Write the expression for the solubility product of Hg_2Cl_2.

Watch Video Solution

27. K_{sp} of Ag_2CrO_4 is 1.1×10^{-12}. What is solubility of Ag_2CrO_4 in $\otimes .1MK_2CrO_4$.

Watch Video Solution

28. Will a precipitate be formed when $0.150L$ of $0.1MPb(NO_3)_2$ and $0.100L$ of $0.2M$ NaCl are mixed ? $K_{sp}(PbCI_2) = 1.2 \times 10^{-5}$).

Watch Video Solution

29. K_{sp} of $AI(OH)_3$ is $1 \times 10^{-15} M$. At what pH does $1.0 \times 10^{-3} MAI^{3+}$ precipitate on the addition of buffer of NH_4CI and NH_4OH solution.

Watch Video Solution

Exercise Evaluate Yourself

1. Classify the following as acid (or) base using Arrhenius concept

$(i) HNO_3$

$(ii) Ba(OH)_2$

$(iii) H_3PO_4$

$(iv) CH_3COOH$

View Text Solution

2. Write a balanced equation for the dissociation of the following in water and identify the conjugate acid - base pairs.

(i) NH_4^+

View Text Solution

3. Write a balanced equation for the dissociation of the following in water and identify the conjugate acid - base pairs.

(ii) H_2SO_4

View Text Solution

4. Write a balanced equation for the dissociation of the following in water and identify the conjugate acid - base pairs.

(iii) $CH_3COOH.$

View Text Solution

5. Identify the Lewis acid and the Lewis base in the following reactions.

(i) $CaO + CO_2 \rightarrow CaCO_3$

View Text Solution

6. Identify the Lewis acid and the Lewis base in the following reactions.

View Text Solution

7. H_3BO_3 accepts hydroxide ion from water as shown below

$H_3BO_3(aq) + H_2O(I)B(OH)_4^- + H^+$ Predict the nature of H_3BO_3 using Lewis concept.

View Text Solution

8. At a particular temperature, the K_w of a neutral solution was equal to 4×10^{-14} . Calculate the concentration of $\left[H_3O^+\right]$ and $\left[OH^-\right]$.

Watch Video Solution

9. a) Calculate pH of $10^{-8} M H_2SO_4$

Watch Video Solution

10. b) Calculate the concentration of hydrogen ion in moles per litre of a solution whose pH is 5.4

Watch Video Solution

11. c) Calculate the pH of an aqueous solution obtained by mixing 50 ml of 0.2 M HCI with $50ml 0.1M \quad NaOH.$

Watch Video Solution

Watch Video Solution

12. K_b for NH_4OH is 1.8×10^{-5}. Calculate the percentage of ionisation of $0.06M$ ammonium hydroxide solution.

Watch Video Solution

13. a) Explain the buffer action in a basic buffer containing equimolar ammonium hydroxide and ammonium chloride.

View Text Solution

14. b) Calculate the pH of a buffer solution consisting of $0.04MCH_3COOH$ and $0.4MCH_3COONa$. What is the change in the pH after adding 0.01 mol of HCI to 500 ml of the above buffer solution. Assume that the addition of HCI causes neglible change in the volume . Given $\left(K_s = 1.8 \times 10^{-5}\right)$.

View Text Solution

15. (a) How can you prepare a buffer solution of pH 9. you are provided with 0.1 M NH_4OH solution and ammonium chloride crystals. (Given : pK_b for NH_4OH is 4.7 at $25^\circ C$.

View Text Solution

View Text Solution

16. (b) What volume of 0.6 M sodium formate solution is required to prepare a buffer solution is required to prepare a buffer solution of pH 4.0 by mixing it with 100 ml of 0.8 M formic acid . (Given pK_a for formic acid is 3.75).

Watch Video Solution

17. Calculate the

i) Hydrolysis constant,

Watch Video Solution

18. Calculate the

ii) degree of hydrolysis and

Watch Video Solution

19. Calculate the

iii) pH of 0.05 M sodium carbonate solution pK_a for HCO_3^- is 10.26.

Watch Video Solution

Mcqs Additional Questions And Answers

1. Which one among the following in the strongest Bronsted base.

A. ClO_4^-

B. ClO_3^-

C. ClO_2^-

D. ClO^-

Answer: D

View Text Solution

2. Which of the following is not a Lewis acid?

A. $SiCI_4$

B. $AICI_3$

C. SO_3

D. CO

Answer: D

View Text Solution

3. Analyses the equilibrium

$$HCIO_4 + H_2O \Leftrightarrow H_3O^+ + CIO_4^-$$

A. H_3O^+ is the conjugate base of H_2O

B. ClO_4^- is the conjugate base of $HClO_4$

C. H_2O is the conjugate acid of H_3O^+

D. $HClO_4$ is the conjugate acid of H_3O^+

Answer: B

View Text Solution

4. Pick the strongest conjugate base among the following

A. Cl^-

B. NO_2^-

C. SO_4^{2-}

D. CH_3COO^-

Answer: D

 Watch Video Solution

5. Pick out the incorrect statement regarding Lewis acids and bases.

A. A Lewis acid is a electron deficient molecule

B. Lewis bases is one which an electron pair

C. Lewis base is cation.

D. Both (a) and (c)

Answer: C

Watch Video Solution

6. Pick the odd one out

A. CI^-

B. CaO

C. SO_2

D. CH_3^-

Answer: C

View Text Solution

7. With regard to the strength of acids and bases. Find the incorrect statement among the following.

A. Strong acid is one that completely dissociates in water

B. K_4 is the dissociation constant

C. CH_3COOH is a weak acid

D. Smaller the K_4 value, greater is the acid strength

Answer: D

View Text Solution

8. K_w represents

A. ionic product constant of water

B. Solubility product of water

C. Equilibrium constant of water

D. Buffer index

Answer: A

View Text Solution

9. HCI is a strong acid since

A. It can be easily oxidised

B. It can be easily ionised

C. It dissociates completely to give H^+ ions in solution

D. Both (a) and (b)

Answer: C

View Text Solution

10. The conjugate base of NH_2^- is

A. NH^-

B. NH_3

C. NH_3^+

D. NH^{2-}

Answer: D

View Text Solution

11. Ionic product of water increases when

A. Pressure decreases

B. H^+ ions are added

C. OH^- ions are added

D. temperature increases`

Answer: D

View Text Solution

12. For two acids A and B, K_a values at $25^\circ C$ are 2×10^6 and 1.8×10^{-4} respectively. Which among the following is true with respect to the above data.

A. A and B are equally acidic

B. A is stronger then B

C. B is stronger than A

D. K_a value is not a measure of acid strength

Answer: B

View Text Solution

13. An aqueous solution with pH value zero is

A. acidic

B. basic

C. amphoteric

D. neutral

Answer: A

View Text Solution

14. Which among the following has the highest pH?

A. $1M \quad NH_4OH$

B. $1M \quad HCI$

C. $1M \quad NaOH$

D. $0.1M \quad NaOH$

Answer: C

View Text Solution

15. The pH of pure water at $25^{\circ} C$ is

A. 0

B. 1

C. 7

D. 14

Answer: C

View Text Solution

16. The relationship between degree of dissociation of a weak acid and its dissociation constant in a very dilute solution is

A. $K_a = \alpha^2 C$

B. $K_a = \dfrac{\alpha^2 C}{(1+\alpha)}$

C. $K_a = \dfrac{\alpha^2}{(1-\alpha)C}$

D. $K_a = \dfrac{\alpha}{C(I-\alpha)}$

Answer: A

View Text Solution

17. Degree of dissociation α is

A. $\alpha = \frac{K_a}{C}$

B. $\alpha = \frac{C^2}{K_a}$

C. $\alpha = \sqrt{\frac{K_a}{C}}$

D. $\alpha = \sqrt{\frac{C}{K_a}}$

Answer: C

View Text Solution

18. Addition of sodium chloride to a saturated solution of silver chloride.

A. dissociation of $AgCI$ increases

B. concentration of CI^- decreases

C. dissociation of $AgCI^-$ decreases

D. concentration of Ag^+ increases

Answer: C

View Text Solution

19. pH of buffer depends upon concentration of

A. acid $\left(H^+\right)$

B. Conjugate base $\left(OH^-\right)$

C. Salt

D. Both (a) and (b)

Answer: D

View Text Solution

20. An example of basic buffer is

A. NH_4OH and NH_4CI

B. NH_4OH and $NaOH$

C. $NaOH$ and NH_4CI

D. $NaOH$ and KOH

Answer: A

View Text Solution

21. The buffer present in human blood is

A. $CH_3COOH + CH_3COONa$

B. $NH_4OH + NH_4CI$

C. $H_2CO_3 + HCO_3^-$

D. Both (a) and (b)

Answer: C

View Text Solution

22. Buffer index is

A. $B\eta = \frac{dB}{pK_a}$

B. $B\eta = \frac{dB}{d(pH)}$

C. $B\eta = \frac{dB}{pH}$

D. $B\eta = \frac{dB}{pOH}$

Answer: B

Watch Video Solution

23. $X_mY_{n(s)} \underset{H_2O}{\Longleftrightarrow} mX^{n+}_{(aq)} + nY^{m-}_{(aq)}$

solubility product K_{sp} is

A. $\left[X^{n+}\right]^m\left[Y^{m-}\right]^n$

B. $\left[X^{n+}\right]\left[Y^{m-}\right]$

C. $\left[X^{n+}\right]^m / \left[Y^{m-}\right]^n$

D. $\left[X^{n+}\right] / \left[Y^{m-}\right]$

Answer: A

View Text Solution

24. The condition for a compound to be precipitated is

A. Ionic product = solubility product

B. Ionic product $<$ solubility procut

C. Ionic product $>$ solubility procut

D. Ionic product $\leq$ solubility procut

Answer: C

View Text Solution

25. Which among the following is incorrect regarding acid?

A. It produces H^+ ions in aqueous solution

B. It can donate a proton to another substance

C. It can accept a proton from another substance

D. It accepts a pair of electrons.

Answer: C

View Text Solution

26. Degree if dissociation is nearly equal to 1 for

A. Strong acids and strong bases

B. Strong acids and weak bases

C. Weak acids and strong bases

D. Weak acids and weak bases

Answer: A

View Text Solution

27. When sodium acetate is added acid, the degree of ionisation of acetic acid

A. increases

B. decreases

C. does not change

D. becomes zero

Answer: B

View Text Solution

28. NH_4OH is a weak base because

A. it has low vapour pressure

B. it is only partially ionised

C. it is completely ionised

D. it has low density

Answer: B

View Text Solution

29. Which one of the following formula represents Ostwald's dilution law for a binary whose degree of dissociation is α and concentration C.

A. $K = \frac{(1-\alpha)C}{\alpha}$

B. $K = \frac{\alpha^2 C}{1-a}$

C. $K = \frac{(1-a)C}{\alpha^2}$

D. $K = \frac{\alpha^2 C}{(1-\alpha)C}$

Answer: B

View Text Solution

30. Ostwald's dilution law is applicable in the case of the solution of

A. CH_3COOH

B. $NaCI$

C. $NaOH$

D. H_2SO_4

Answer: A

View Text Solution

31. Which one of the following relationship is correct ?

A. $pH = \frac{1}{[H^+]}$

B. $pH = \log_{10}[H^+]$

C. $\log_{10} pH = [H^+]$

D. $pH = \log_{10}. \frac{10}{[H^+]}$

Answer: D

View Text Solution

32. When 10^{-6} mole of a monobasic strong acid is dissolved in one litre of solvent, the pH of the solution is

A. 6

B. 7

C. less than 6

D. more than 7

Answer: A

View Text Solution

33. When pH of a solution is 2, the hydrogen ion concentration in moles litre^{-1} is .....

A. 1×10^{-12}

B. 1×10^{-2}

C. 1×10^{-7}

D. 1×10^{-4}

Answer: B

Watch Video Solution

34. The pH of a solution containing 0.1 N NaOH solution is

A. 1

B. 10^{-1}

C. 13

D. 10^{-13}

Answer: C

Watch Video Solution

35. A solution which is resistant to changes of pH on addition of small amounts of an acid or a base is known as

A. buffer solution

B. true solution

C. isohydric solution

D. ideal solution

Answer: A

View Text Solution

36. The hydrogen ion concentration of a buffer solution consisting of a week acid and its salts is given by

A. $\left[H^+\right] = K_a \frac{[\text{Acid}]}{[\text{Salt}]}$

B. $\left[H^+\right] = K_a[\text{salt}]$

C. $\left[H^+\right] = K_a[\text{acid}]$

D. $\left[H^+\right] = \frac{K_a[\text{salt}]}{[\text{Acid}]}$

Answer: A

Watch Video Solution

Exercise Assertion Reason

1. Assertion : HNO_3 is a strong acid.

Reason : HNO_3 is completely ionised in solution and so has high K_a value

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

B. Both (A) and (R) are true but (R) does not explain (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A

View Text Solution

2. Assertion : According to Bronsted concept, H_2O is an a neutral substance.

Reason : H_2O molecules can accept as well as donate a proton .

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

B. Both (A) and (R) are true but (R) does not explain (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A

View Text Solution

3. Assertion : pH of acetic acid decreases with dilution.

Reason : On dilution, degree of ionisation of acetic acid decreases.

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

B. Both (A) and (R) are true but (R) does not explain (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D

View Text Solution

4. Assertion : A solution containing acetic acid and sodium acetate acts as a buffer solution.

Reason : The pH of the above buffer would be equal to pK_a of acetic acid.

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

B. Both (A) and (R) are true but (R) does not explain (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B

View Text Solution

5. Assertion : Solubility of AgCI in water decreases in the presence of NaCI.

Reason : Sodium chloride under goes hydrolysis in water.

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

B. Both (A) and (R) are true but (R) does not explain (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B

View Text Solution

6. Assertion : The dissociation of acetic acid decreases on addition of sodium acetate.

Reason : It is due to common ion effect.

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

B. Both (A) and (R) are true but (R) does not explain (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A

View Text Solution

7. Assertion : Ostwald's dilution law is $K_a = \frac{\alpha^2 C}{1-\alpha}$

Reason : Ostwald's dilution law is applicable only to strong electrolyte.

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

B. Both (A) and (R) are true but (R) does not explain (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C

View Text Solution

8. Assertion : K_w increases with increase in temperature.

Reason : Concentration of H_3O+ and OH^- increases.

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

B. Both (A) and (R) are true but (R) does not explain (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A

View Text Solution

9. Assertion : In the reaction , $I_2 + I^- \rightarrow I_3$, I_2 acts as a Lewis base.

Reason : In this reaction I_2 donates a electron pair to I^- .

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

B. Both (A) and (R) are true but (R) does not explain (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D

View Text Solution

10. Assertion : BF_3 is a Lewis acid.

Reason : It accepts a pair of electrons due to the presence of vacant orbital in the valence shell of boron.

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

B. Both (A) and (R) are true but (R) does not explain (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A

View Text Solution

Exercise Very Short Answer

1. What are the limitations of Arrhenius concept?

Watch Video Solution

2. Define Buffer solution.

View Text Solution

3. What are the two types of buffer? Give an example for each.

Watch Video Solution

4. Define neutralisation reaction.

View Text Solution

5. Give a condition for a compound to be precipitated.

View Text Solution

6. When temperature is increased, will ionic product of water increase or decrease? Give reason to justify your answer.

View Text Solution

View Text Solution

7. Magnesium is not precipitated from a solution of its salt by a mixture of NH_4OH and NH_4CI. Explain.

View Text Solution

8. Write down the conjugate acid and base of the following

$(i) NH_3$ $(ii) HSO_4^-$

Watch Video Solution

9. BF_3 is termed as an acid though it does not contain H^+ ions. Explain .

View Text Solution

10. The K_w of neutral solution is 10^{-12} at a particular temperature. What are its pH and pOH values?

View Text Solution

11. Calculate the ionisation constant for the conjugate base of HF. Ionisation constant of HF at

298K is 6.8×10^{-4}.

Watch Video Solution

12. How is common ion effect related to the solubility of the electrolyte?

View Text Solution

13. Why is aqueous solution of $FeCI_3$ acidic?

View Text Solution

14. What are the limitations of Ostwald's dilution law?

View Text Solution

15. Define pH.

Watch Video Solution

16. What are the two types of buffer? Give an example for each.

Watch Video Solution

Exercise Short Answer

1. Based on Arrhenius concept, define acid and bases and give an example for each.

View Text Solution

2. What do you mean by auto ionisation of water?

View Text Solution

3. Buffer index is

Watch Video Solution

4. How will you calculate solubility product from molar solubility ?

Watch Video Solution

5. For an aqueous solution of NH_4CI, prove that $\left[H^+\right] = \sqrt{K_a . C}$

View Text Solution

6. What is Henderson equation ?

View Text Solution

7. What do you mean by buffer action?

View Text Solution

Exercise Long Answer

1. (i) Derive the relation between pH and pOH

(ii) Give three uses of emulsions.

Watch Video Solution

2. Explain buffer action with example.

Watch Video Solution

3. Derive Henderson - Hassel Balch equation.

View Text Solution

4. On hydrolysis of salts of strong acid and strong base, the solution obtained is neutral. Justify your answer with a suitable example.

View Text Solution

5. Derive an expression for the hydrolysis constant for the hydrolysis of salt of weak acid and weak base.

View Text Solution

6. Derive the hydrolysis constant for the hydrolysis of salt of strong base and weak acid. Deduce its pH.

View Text Solution

Exercise Problems For Practice

1. The hydrogen ion concentration of a fruit juice is $3.3 \times 10^{-2} M$. What is the pH of the juice ? Is it acidic or basic ?

Watch Video Solution

2. Calculate the pH of a buffer containing 0.08 mole of acetic acid and 0.12 mole of sodium acetate per dm_2 of the solution. The ionisation constant of acetic acid is 1.8×10^{-5}.

View Text Solution

3. Calculate the pH of 0.1 M CH_3COOH solution. Dissociation constant of acetic acid is $1.8 \times 10^{-5} M$.

View Text Solution

4. Calculate the pH of 0.1 M acetic acid if its ionisation constant $K_a = 1.8 \times 10^{-5}$.

View Text Solution

5. pH of a solution is 5.5 at $25^\circ C$. Calculate its $[OH^-]$

Watch Video Solution

Watch Video Solution

6. Calculate the pH of solution with H_3O^+ concentration in mol dm^{-3}.

(i) 10^{-4}

Watch Video Solution

7. Calculate the pH of solution with H_3O^+ concentration in mol dm^{-3}.

(ii) 10^{-7}

Watch Video Solution

8. Calculate the pH of solution with H_3O^+ concentration in mol dm^{-3}.

(iii) 6.8×10^{-3}

Watch Video Solution

9. Calculate the pH of solution with H_3O^+ concentration in mol dm^{-3}.

(iv) 3.2×10^{-5}

Watch Video Solution

10. Calculate the pH of solution with H_3O^+ concentration in mol dm^{-3}.

(v) 0.035

Watch Video Solution

11. Calculate the pH of solution with H_3O^+ concentration in mol dm^{-3}.

(vi) 0.25

Watch Video Solution

12. Calculate the pH of solution with H_3O^+ concentration in mol dm^{-3}.

(vii) 5.4×10^{-9}

Watch Video Solution

13. Calculate the pH of solution with H_3O^+ concentration in mol dm^{-3}.

(viii) 7.1×10^{-7}

Watch Video Solution

14. Calculate the pH of 0.02 m $Ba(OH)_2$ aqueous solution assuming $Ba(OH)_2$ as a strong electrolyte.

View Text Solution

15. The ionisation constant of 0.2 M formic acid is 1.8×10^{-4}. Calculate its percentage ionisation.

View Text Solution

16. Calculate the pH of $0.001\ \mathrm{M}\ \mathrm{HCl}$ solution

Watch Video Solution

17. Calculate the pH of a buffer mixture which contains 7.5 gms if acetic acid and 10.25 gms of sodium acetate in 1 litre of the solution. K_a for acetic acid is 1.8×10^{-5}.

View Text Solution

18. If a solution has a pH of 7.41, determine its H^+ concentration.

Watch Video Solution

19. Calculate the pH of 0.02 M HCI.

Watch Video Solution

20. The degree of dissociation of acetic acid in 0.1 M solution is 0.04 . Calculate K_a for acetic acid. Where α is the degree of dissociation, C is the concentration of the acid in moles/ lit.

View Text Solution

21. Calculate the K_b for ammonium hydroxide given its degree of dissociation to be 0.042 in 0.01 N solution.

Watch Video Solution

22. A 0.02 M solution of a weak mono basic acid is 5% ionised. Calculate the ionisation constant of the acid.

View Text Solution

23. Calculate the hydrogen ion concentration from the following pH value :

(i) 5.5

Watch Video Solution

24. Calculate the hydrogen ion concentration from the following pH value :

(ii) 8.6 and

Watch Video Solution

25. Calculate the hydrogen ion concentration from the following pH value :

(iii) 3.2

Watch Video Solution

26. A buffer solution containing 0.1 mole of ammonium hydroxide and 0.15 mole of ammonium chloride per litre of the solution. Calculate the pH of the buffer solution. K_b for ammonium hydroxide is 1.8×10^{-5}.

View Text Solution

27. Calculate the pH of 0.01 M NaOH.

Watch Video Solution

28. Calculate the pH of $0.1MNH_4OH$ if

$K_b = 1.75 \times 10^{-5}$.

Watch Video Solution

Exercise Unit Test

1. The solubility of $AgCI(s)$ with solubility product 1.6×10^{-10} in 0.1M NaCI solution would be

A. $1.26 \times 10^{-5}M$

B. $1.6 \times 10^{-9}M$

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

D. Zero

Answer: B

Watch Video Solution

2. Concentration of the Ag^+ ions in a saturated solution of $Ag_2C_2O_4$ is $2.24 \times 10^{-4} mol L^{-1}$ solubility product of $Ag_2C_2O_4$ is

A. $2.42 \times 10^{-8} mol^3 L^{-3}$

B. $2.66 \times 10^{-12} mol^3 L^{-3}$

C. $4.5 \times 10^{-11} mol^3 L^{-3}$

D. $5.619 \times 10^{-12} mol^3 L^{-3}$

Answer: D

Watch Video Solution

3. Assertion : The dissociation of acetic acid decreases on addition of sodium acetate.

Reason : It is due to common ion effect.

A. (A) and (R) are correct and (R) explains (A)

B. (A) and (R) are correct but (R) does not explain (A)

C. (A) is correct but (R) is wrong

D. Both (A) and (R) are false.

Answer: A

View Text Solution

4. The hydrogen ion concentration of a buffer solution consisting of a week acid and its salts is given by

A. $\left[H^{+}\right] = \frac{K_a[\text{acid}]}{[\text{salt}]}$

B. $\left[H^{+}\right] = K_a[\text{salt}]$

C. $\left[H^{+}\right] = K_a[\text{acid}]$

D. $\left[H^{+}\right] = \dfrac{K_a[\text{salt}]}{[\text{acid}]}$

Answer: A

Watch Video Solution

Exercise Short Answet

1. How will you calculate solubility product from molar solubility ?

Watch Video Solution

Exercise Logn Answer

1. State Ostwald's dilution law.

Watch Video Solution