CHEMISTRY

JEE (MAIN AND ADVANCED) CHEMISTRY

IONIC EQUILIBRIUM

LECTURE SHEET (EXERCISE -I LEVEL -I(MAIN)) (Straight Objective Type Questions))

1. Which of the following is an Arrhenius acid?

A. NH_3

B. SO_2

C. $AlCl_3$

D. HNO_3

Answer: D

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2. The conjugate base of hydrazoic acid is

A. N^{3-}

B. N_3^-

C. NH_2^-

D. NH_4^+

Answer: B

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3. 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

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4. O_2^{2-} is the conjugate base of

A. OH^-

B. H_2O

C. H_2O_2

D. HO_2^-

Answer: D

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

A. HCl

B. SO_4^{2-}

C. HPO_4^{2-}

D. Br^-

Answer: C

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6. Which of the following is an acidic salt?

A. Na_3PO_4

B. $NaHPO_3$

C. NaH_2PO_2

D. NaH_2PO_4

Answer: D

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7. Which is the correct order of decreasing basicity of halide ions?

A. $I^{-} > Br^{-} > Cl^{-} > F^{-}$

B. $F^{-} > Cl^{-} > Br^{-} > I^{-} > F^{-}$

C. $Cl^{-}Br^{-} > I^{-}F^{-}$

D. $F^{-} > I^{-} > Br^{-} > Cl^{-}$

Answer: B

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8. Which of the following is a Bronsted neutralisation reactions?

A. $H^{+} + OH^{-} \rightarrow H_2O$

B. $HCl + NH_3 \rightarrow NH_4^{+} + Cl^{-}$

C. $NH_3 + BF_3 \rightarrow \left[H_3N \rightarrow BF_3\right]$

D. $NaOH + HCl \rightarrow NaCl + H_2O$

Answer: B

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9. The solution of acetic acid in benzene conains

A. CH_3COO^-

B. H^+

C. H_3O^+

D. $(CH_3COOH)_2$

Answer: D

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10. Which of the following is a Lewis acid ?

A. CCl_4

B. BF_3

C. H_2O

D. SO_4^{2-}

Answer: B

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11. Which of the following is a Lewis acid ?

A. C_2H_2

B. C_2H_4

C. Pyridine

D. All the above

Answer: D

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12. Which of the following acts as Lewis acid ?

A. H

B. He

C. S

D. B

Answer: C

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13. Which of the following species acts as a Lewis acid and also as a Lewis base ?

A. SO_2

B. SCl_4

C. both SO_2 and SCl_4

D. SO_3

Answer: C

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14. In the reactions $AlCl_3 + Cl \rightarrow AlCl_4^- Cl^-$ acts as

A. Bronsted acid

B. Bronsted base

C. Lewis base

D. Lewis acid

Answer: C

Watch Video Solution

15. Which of the following is an Arrhenius acid?

A. NH_3

B. SO_2

C. $AlCl_3$

D. HNO_3

Answer: D

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16. The conjugate base of hydrazoic acid is

A. N^{3-}

B. N_3^-

C. NH_2^-

D. NH_4^+

Answer: B

Watch Video Solution

17. 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

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18. O_2^{2-} is the conjugate base of

A. OH^-

B. H_2O

C. H_2O_2

D. HO_2^-

Answer: D

Watch Video Solution

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

A. HCl

B. SO_4^{2-}

C. HPO_4^{2-}

D. Br^-

Answer: C

Watch Video Solution

20. Which of the following is an acidic salt ?

A. Na_3PO_4

B. $NaHPO_3$

C. NaH_2PO_2

D. NaH_2PO_4

Answer: D

Watch Video Solution

21. Which is the correct order of decreasing basicity of halide ions?

A. $I^- > Br^- > Cl^- > F^-$

B. $F^- > Cl^- > Br^- > I^- > F^-$

C. $Cl^- Br^- > I^- F^-$

D. $F^- > I^- > Br^- > Cl^-$

Answer: B

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22. Which of the following is a Bronsted neutralisation reactions?

A. $H^{+} + OH^{-} \rightarrow H_2O$

B. $HCl + NH_3 \rightarrow NH_4^{+} + Cl^{-}$

C. $NH_3 + BF_3 \rightarrow [H_3N \rightarrow BF_3]$

D. $NaOH + HCl \rightarrow NaCl + H_2O$

Answer: B

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23. The solution of acetic acid in benzene conains

A. CH_3COO^{-}

B. H^{+}

C. H_3O^{+}

D. $(CH_3COOH)_2$

Answer: D

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24. Which of the following is a Lewis acid ?

A. CCl_4

B. BF_3

C. H_2O

D. SO_4^{2-}

Answer: B

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25. Which of the folowing is a Lewis acid ?

A. C_2H_2

B. C_2H_4

C. Pyridine

D. none of the above

Answer: D

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26. Which of the following acts as Lewis acid ?

A. H

B. He

C. S

D. B

Answer: C

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27. Which of the following species acts as a Lewis acid and also as a Lewis base ?

A. SO_2

B. SCl_4

C. both SO_2 and SCl_4

D. SO_3

Answer: C

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28. In the reactions $AlCl_3 + Cl \rightarrow AlCl_4^- Cl^-$ acts as

A. Bronsted acid

B. Bronsted base

C. Lewis base

D. Lewis acid

Answer: C

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LECTURE SHEET (EXERCISE -I LEVEL -I(MAIN)) (Matrix Type Questions))

1.

Column-I	Column-II (In the aqueous medium the ion can be)
A) HPO_4^{-2}	P) Arrhenius acid
B) CO_3^{-2}	Q) Bronsted base
C) $H_2PO_3^{-1}$	R) Amphoteric
D) $H_2PO_2^{-1}$	S) Bronsted acid

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2.

Column-I	Column-II (In the aqueous medium the ion can be)
A) HPO_4^{-2}	P) Arrhenius acid
B) CO_3^{-2}	Q) Bronsted base
C) $H_2PO_3^{-1}$	R) Amphoteric
D) $H_2PO_2^{-1}$	S) Bronsted acid

Watch Video Solution

LECTURE SHEET (EXERCISE -I LEVEL -I(MAIN) (Integer Type Questions))

1. How many of the following are Lewis acids ?

$$\left[CCl_4, SiF_4, BF_4^-, NH_4^+, \ddot{C}Cl_2, Mg^{+2}, O, HCHO\right]$$

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2. How many of the following are Lewis acids ?

$$\left[CCl_4, SiF_4, BF_4^-, NH_4^+, \ddot{C}Cl_2, Mg^{+2}, O, HCHO\right]$$

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LECTURE SHEET (EXERCISE -II LEVEL -I (MAIN) (Straight Objective Type Questions))

1. Dissociation constant of water at 25° C is

A. 1.0×10^{-14}

B. 1×10^{14}

C. 14

D. 1.8×10^{-16}

Answer: D

Watch Video Solution

2. At any temperature, $P^{H} + P^{OH}$ is equal to

A. 7

B. 0

C. 14

D. P^{K_W}

Answer: D

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3. At any temperature ,the proton concentration of water is

A. $10^{7}M$

B. $< 10^{-7}M$

C. $> 10^{-7}M$

D. $\sqrt{K_W}$

Answer: D

Watch Video Solution

4. At certain temperature, the H^+ ion concentration of water is 4×10^{-7} 'M then the value of K_w, at the same temperature is

A. $10^{-14}M^2$

B. $4 \times 10^{-14}M^2$

C. $1.6 \times 10^{-13}M^2$

D. $4 \times 10^{-7} M^2$

Answer: C

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5. At 298 K, the $\left[H_2, O^+\right]$ of a solution is 2×10^{-9} M. The nature of the solution is

A. Acidic

B. Basic

C. Neutral

D. Can not be predicted

Answer: B

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6. At a given temperature, When an acid is added to water then the value of K_w

A. Decreases

B. Increases

C. Remains same

D. First decreases then increases.

Answer: C

Watch Video Solution

7. At $100^\circ C$, the P^H of pure water is

A. 7

B. Greater than 7

C. Less than 7

D. Zero

Answer: C

Watch Video Solution

8. At some high temperature, K_w of water is 10^{-13} Then the P^H of the water at the same temperature is

A. 7.0

B. 6.5

C. 7.5

D. 7.23

Answer: B

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9. Among the following

(a) P^H of water decreases with increase in temperature

(b) P^H of water decrease by the addition of base

© P^H of water increases by the addition of acid

(d) At any temperature P^H of water is equal to $P^{K_w/2}$

A. All are correct

B. b,c,d are correct

C. a and d are correct

D. a, b and c are correct

Answer: C

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10. The H^+ ion concentration of a solution is 4×10^{-5} M. Then the OH^- ion concentration of the same solution is

A. $4 \times 10^{-5} M$

B. $2.5 \times 10^{-9} M$

C. $1.0 \times 10^{-7} M$

D. $2.5 \times 10^{-10} M$

Answer: D

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11. $0.004g$ of NaOH is present in 1L of a solution. The pH of the solution is

A. 14.0

B. 12.0

C. 10.0

D. 8.0

Answer: C

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12. The P^H of 0.005 M Ba $(OH)_2$ is

A. 2.301

B. 11.699

C. 12

D. 7

Answer: C

Watch Video Solution

13. The $[OH]^{-}]$ of 0.005 M H_2SO_4 is

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

B. $5 \times 10^{-3} M$

C. $10^{-2} M$

D. $10^{-12} M$

Answer: D

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14. The P^H of a dibasic acid is 3.699. Its molarity is

A. $2 \times 10^{-4} M$

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

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

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

Answer: D

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15. The P^H of 10^{-8} M HCl is

A. 8

B. 6

C. 7

D. 6.98

Answer: D

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16. The p^H of 0.1 M NaCl solution is

A. 1

B. 13

C. 7

D. zero

Answer: C

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17. The P^H of a solution is 3.0. This solution is diluted by 100 times. Then the P^H of the resulting solution is

A. 5

B. 7

C. 1

D. 11

Answer: A

Watch Video Solution

18. The P^H of HCl is 3. Then the P^H of NaOH solution having same molar concentration is

A. 3

B. 6

C. 9

D. 11

Answer: D

Watch Video Solution

19. For weak acid (α is very small)

A. $K_a = C.\alpha^{\circ}$

B. $\alpha = \sqrt{\frac{K_a}{c}}$

C. $pH^{+}\big] = C.\alpha$

D. All the above

Answer: D

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20. At infinite dilution , the percentage ionisation of both strong and weak electrolytes is

A. 1%

B. 20%

C. 50%

D. 100%

Answer: D

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21. Which of the following is the best conductor of electricity ?

A. $1MHNO_3$

B. $1MH_2CO_3$

C. $1MH_3PO_4$

D. IMH_2SO_4

Answer: D

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22. Strength of a weak acid or a weak base depends upon its

A. Temperature

B. Nature of solvent

C. Degree of dissociation

D. All the above

Answer: D

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23. The P^H of 0.001 M CH_3,COOH is

A. 3

B. 11

C. Between 3 and 7

D. 7

Answer: C

Watch Video Solution

24. Which of the following is relatively stronger acid? K, values are given in brackets

A. $HA\left(2 \times 10^{-4}\right)$

B. $HB\left(3 \times 10^{-5}\right)$

C. $HC\left(1.8 \times 10^{-3}\right)$

D. $HD\left(9.6 \times 10^{-10}\right)$

Answer: C

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25. A monoprotic acid in a $0.1M$ solution ionizes to 0.001 % . Its ionization constant is

A. 1.0×10^{-3}

B. 1.0×10^{-6}

C. 1.0×10^{-8}

D. 1.0×10^{-11}

Answer: D

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26. The hydrogen ion concentration of $0.2MCH_3COOH$ which is 4% ionised is

A. $0.008N$

B. $0.12N$

C. $0.8N$

D. $0.08N$

Answer: A

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27. pH of a weakacid in 0.1 M solution is 4.3. Which statements are correct ?

A. 4.1

B. 4.8

C. 5.3

D. 7.3

Answer: B

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28. Dissociation constant of water at 25° C is

A. 1.0×10^{-14}

B. 1×10^{14}

C. 14

D. 1.8×10^{-16}

Answer: D

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29. At any temperature, $P^{H} + P^{OH}$ is equal to

A. 7

B. 0

C. 14

D. P^{K_W}

Answer: D

Watch Video Solution

30. At any temperature ,the proton concentration of water is

A. $10^{7}M$

B. $< 10^{-7}M$

C. $> 10^{-7}M$

D. $\sqrt{K_{W}}$

Answer: D

Watch Video Solution

31. At certain temperature, the H^{+} ion concentration of water is 4×10^{-7} 'M then the value of K_{w}, at the same temperature is

A. $10^{-14}M^2$

B. $4 \times 10^{-14}M^2$

C. $1.6 \times 10^{-13}M^2$

D. $4 \times 10^{-7}M^2$

Answer: C

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32. At 298 K, the $\left[H_2, O^+\right]$ of a solution is 2×10^{-9} M. The nature of the solution is

A. Acidic

B. Basic

C. Neutral

D. Can not be predicted

Answer: B

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33. At a given temperature, When an acid is added to water then the value of K_w

A. Decreases

B. Increases

C. Remains same

D. First decreases then increases.

Answer: C

Watch Video Solution

34. At $100^{\circ} C,$ the P^H of pure water is

A. 7

B. Greater than 7

C. Less than 7

D. Zero

Answer: C

Watch Video Solution

35. At some high temperature, K_w of water is 10^{-13} Then the P^H of the water at the same temperature is

A. 7.0

B. 6.5

C. 7.5

D. 7.23

Answer: B

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36. Among the following

(a) P^H of water decreases with increase in temperature

(b) P^H of water decrease by the addition of base

© P^H of water increases by the addition of acid

(d) At any temperature P^H of water is equal to $P^{K_w}/2$

A. All are correct

B. b,c,d are correct

C. a and d are correct

D. a, b and c are correct

Answer: C

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37. The H^+ ion concentration of a solution is 4×10^{-5} M. Then the OH^- ion concentration of the same solution is

A. $4 \times 10^{-5} M$

B. $2.5 \times 10^{-9} M$

C. $1.0 \times 10^{-7} M$

D. $2.5 \times 10^{-10} M$

Answer: D

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38. $0.004 g$ of NaOH is present in 1L of a solution. The pH of the solution is

A. 14.0

B. 12.0

C. 10.0

D. 8.0

Answer: C

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39. The P^H of 0.005 M Ba $(OH)_2$ is

A. 2.301

B. 11.699

C. 12

D. 7

Answer: C

Watch Video Solution

40. The $[OH]^-]$ of 0.005 M H_2SO_4 is

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

B. $5 \times 10^{-3} M$

C. $10^{-2} M$

D. $10^{-12} M$

Answer: D

Watch Video Solution

41. The P^H of a dibasic acid is 3.699. Its molarity is

A. $2 \times 10^{-4} M$

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

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

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

Answer: D

Watch Video Solution

42. The P^H of 10^{-8} M HCl is

A. 8

B. 6

C. 7

D. 6.98

Answer: D

Watch Video Solution

43. The p^H of 0.1 M NaCl solution is

A. 1

B. 13

C. 7

D. zero

Answer: C

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44. The P^H of a solution is 3.0. This solution is diluted by 100 times. Then the P^H of the resulting solution is

A. 5

B. 7

C. 1

D. 11

Answer: A

Watch Video Solution

45. The P^H of HCl is 3. Then the P^H of NaOH solution having same molar concentration is

A. 3

B. 6

C. 9

D. 11

Answer: D

Watch Video Solution

46. For weak acid (α is very small)

A. $K_a = C.\alpha^{\circ}$

B. $\alpha = \sqrt{\frac{K_a}{c}}$

C. $pH^{+}] = C.\alpha$

D. All the above

Answer: D

Watch Video Solution

47. At infinite dilution , the percentage ionisation of both strong and weak electrolytes is

A. 1%

B. 20%

C. 50%

D. 100%

Answer: D

Watch Video Solution

48. Which of the following is the best conductor of electricity ?

A. $1MHNO_3$

B. $1MH_2CO_3$

C. $1MH_3PO_4$

D. IMH_2SO_4

Answer: D

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49. Strength of a weak acid or a weak base depends upon its

A. Temperature

B. Nature of solvent

C. Degree of dissociation

D. All the above

Answer: D

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50. The P^H of 0.001 M CH_3,COOH is

A. 3

B. 11

C. Between 3 and 7

D. 7

Answer: C

Watch Video Solution

51. Which of the following is relatively the weakest acid

A. $HA(2 \times 10^{-4})$

B. $HB(3 \times 10^{-5})$

C. $HC(1.8 \times 10^{-3})$

D. $HD(9.6 \times 10^{-10})$

Answer: C

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52. A monoprotic acid in a $0.1M$ solution ionizes to 0.001 % . Its ionization constant is

A. 1.0×10^{-3}

B. 1.0×10^{-6}

C. 1.0×10^{-8}

D. 1.0×10^{-11}

Answer: D

Watch Video Solution

53. The hydrogen ion concentration of $0.2MCH_3COOH$ which is 4% ionised is

A. $0.008N$

B. $0.12N$

C. $0.8N$

D. $0.08N$

Answer: A

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54. pH of a weakacid in 0.1 M solution is 4.3. Which statements are correct ?

A. 4.1

B. 4.8

C. 5.3

D. 7.3

Answer: B

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LECTURE SHEET (EXERCISE -II LEVEL -II (ADVANCED) (Straight Objective Type Questions))

1. Liquid ammonia ionises to a slight extent. Its self ionisation constant is $10^{-30} at - 50^{\circ} C$, then the number of amide iona present per 1 cc of it at -50° C is

A. 6×10^{12}

B. 3×10^{12}

C. 6×10^{5}

D. 3×10^{3}

Answer: C

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2. The $P^{H}$of a solution is 6. Its $\left[H_3, O^4\right]$ is decreased by 1000 times. Its P^{H} will be

A. 9

B. 6.96

C. 7.04

D. 8

Answer: A

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3. The P^H of a solution is 11. It is diluted by 1000 times. Then the P^H of resulting solution is

A. 8

B. 14

C. 7

D. 7.04

Answer: A

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4. The P^H of 40 ml of 0.02 M HCl will not be changed by adding

A. $1 ml of 1 M HCl$

B. $2 ml of 1 M NaOH$

C. $20 ml of 0.1 M NaCl$

D. 36 ml of same concentrated HCl solution

Answer: B

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5. The P^H of HCl is 1. The amount of NaOH to be added to 100 ml of such a HCl solution to get p^H of 7 is

A. 4g

B. 0.4 g

C. 4 mg

D. `0.4 mg

Answer: B

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6. How many grams of NaOH can neutralise 100 ml of H_2SO_4 solution with P^H solution with P^H value 3.301?

A. 2mg

B. 3 mg

C. 4 mg

D. 0.4 mg

Answer: A

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7. 20 ml of 0.4 MH_2, SO_4 , and 80 ml of 0.2 M NaOH are mixed. Then the p^H of the resulting solution is

A. 7

B. 1.097

C. 12.903

D. 11.903

Answer: A

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8. $x \times 10^{-2}$ gm of NaOH should be used up to prepare 200ml of a solution with P^H= 12. Find the value of x

A. All are correct

B. 1, 4 are only correct

C. 1,2,3 are only correct

D. All are wrong

Answer: A

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9. What is the concentration of CN^{-} ions in a solution with 0.1 M HCl and 0.01 M HCN where K_a of HCN is 10^{-6} ?

A. $10^{-4}M$

B. $10^{-5}M$

C. $10^{-6}M$

D. $10^{-7}M$

Answer: D

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10. P^H of a solution of the mixture of $0.1 HCl$ and $0.1 NCH_3COOH$ is ($K_a = 2 \times 10^{-5}$)

A. 1

B. 2

C. 1.7

D. 0.7

Answer: A

Watch Video Solution

11. Given $HF + H_2O \overset{K_a}{\Leftrightarrow} H_3O^+ + F^-, F^- + H_2O \overset{K_a}{\Leftrightarrow} HF + OH^-$ Which relation is correct:

A. $K_a \times K_b = K_W$

B. $K_b = 1/K_W$

C. $K_a = K_b = K_W$

D. $K_a / K_b = K_W$

Answer: A

Watch Video Solution

12. Liquid ammonia ionises to a slight extent. Its self ionisation constant is $10^{-30} at - 50\ ^{\circ}C$, then the number of amide iona present per 1 cc of it at $-50\ ^{\circ}$ C is

A. 6×10^{12}

B. 3×10^{12}

C. 6×10^{5}

D. 3×10^{3}

Answer: C

Watch Video Solution

13. The $P^{H}$of a solution is 6. Its $\left[H_{3}, O^{4}\right]$ is decreased by 1000 times. Its P^{H} will be

A. 9

B. 6.96

C. 7.04

D. 8

Answer: A

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14. The P^{H} of a solution is 11. It is diluted by 1000 times. Then the P^{H} of resulting solution is

A. 8

B. 14

C. 7

D. 7.04

Answer: A

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15. The P^H of 40 ml of 0.02 M HCl will not be changed by adding

A. $1 ml of 1 M HCl$

B. $2 ml of 1 M NaOH$

C. $20 ml of 0.1 M NaCl$

D. 36 ml of same concentrated HCl solution

Answer: B

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16. The P^H of HCl is 1. The amount of NaOH to be added to 100 ml of such a HCl solution to get p^H of 7 is

A. 4g

B. 0.4 g

C. 4 mg

D. `0.4 mg

Answer: B

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17. How many grams of NaOH can neutralise 100 ml of H_2SO_4 solution with P^H solution with P^H value 3.301?

A. 2mg

B. 3 mg

C. 4 mg

D. 0.4 mg

Answer: A

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18. 20 ml of 0.4 MH_2, SO_4 , and 80 ml of 0.2 M NaOH are mixed. Then the p^H of the resulting solution is

A. 7

B. 1.097

C. 12.903

D. 11.903

Answer: A

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19. Among the following

(a) On dilution the P^H of an acid increases

(b) A solution withP^H = 5 is 100 times more basic than a solution with p^H =3

(3) A solution with P^H =8 is 1000 times more acidic than a solution with P^H =11

(4) The $P^H of 10^{-9}$ M KOH is slightly greater than

A. All are correct

B. 1, 4 are only correct

C. 1,2,3 are only correct

D. All are wrong

Answer: A

Watch Video Solution

20. What is the concentration of CN^{-} ions in a solution with 0.1 M HCl and 0.01 M HCN where K_a of HCN is 10^{-6} ?

A. $10^{-4}M$

B. $10^{-5}M$

C. $10^{-6}M$

D. $10^{-7}M$

Answer: D

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21. P^{H} of a solution of the mixture of $0.1 HCl$ and $0.1 NCH_3COOH$ is $\left(K_a = 2 \times 10^{-5}\right)$

A. 1

B. 2

C. 1.7

D. 0.7

Answer: A

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22. Given $HF + H_2O \overset{K_a}{\Leftrightarrow} H_3O^+ + F^-, F^- + H_2O \overset{K_a}{\Leftrightarrow} HF + OH^-$ Which relation is correct:

A. $K_a \times K_b = K_W$

B. $K_b = 1/K_W$

C. $K_a = K_b = K_W$

D. $K_a/K_b = K_W$

Answer: A

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LECTURE SHEET (EXERCISE -II LEVEL -II (ADVANCED) (More than One correct answer Type Questions))

1. pH of a weakacid in 0.1 M solution is 4.3. Which statements are correct ?

A. its 0.01 M Solution has $PH > 4.3$

B. its 0.01 M solution has $pH < 4.3$

C. its 0.01 M solution degree of dissociation is less than in 0.1 M solution

D. its 0.01M solution degree of dissociation in less than in 0.1 M solution

Answer: A::C

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2. 100ml of 0.1 M HCl and 100 ml of 0.1 M HOCN are mixed then $\left(K_a = 1.2 \times 10^{-6}\right)$

A. OCN^- concentration in the solution is 1.2×10^{-6}

B. pH of the solution is 1.3

C. solution is a buffer

D. H^+ in the solution is 10^6

Answer: A::B

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3. pH of a weakacid in 0.1 M solution is 4.3. Which statements are correct ?

A. its 0.01 M Solution has $PH > 4.3$

B. its 0.01 M solution has $pH < 4.3$

C. its 0.01 M solution degree of dissociation is less than in 0.1 M solution

D. its 0.01M solution degree of dissociation in less than in 0.1 M solution

Answer: A::C

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4. 100ml of 0.1 M HCl and 100 ml of 0.1 M HOCN are mixed then $\left(K_a = 1.2 \times 10^{-6}\right)$

A. OCN^- concentration in the solution is 1.2×10^{-6}

B. pH of the solution is 1.3

C. solution is a buffer

D. H^+ in the solution is 10^6

Answer: A::B

Watch Video Solution

LECTURE SHEET (EXERCISE -II LEVEL -II (ADVANCED) (Linked comprehension Type Questions))

1. Weak acids and bases are not completely ionised when dissolved in polar medium like water

$H \rightarrow H^{+} + A^{-}$

$t_0 \quad C \qquad O \quad O$

$t_{eq} \quad C - C\alpha \quad C\alpha \quad C\alpha$

$$K_a = \frac{C\alpha^2}{1 - \alpha} = C\alpha^2, \alpha\sqrt{\frac{K_a}{C}}$$

$$\therefore \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{Ka_1}{Ka_2}}, \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{C_2}{C_1}}$$

(For two acids at same conc.) (for same acid at diff conc.)

$\alpha$and α are in the ratio 1:2 at same conc. $Ka_1, = 2 \times 10^{-4}$, what will be Ka_2 ,?

A. 8×10^{-4}

B. 2×10^{-4}

C. 4×10^{-4}

D. 1×10^{-4}

Answer: A

Watch Video Solution

2. Weak acids and bases are not completely ionised when dissolved in polar medium like water

$H \rightarrow H^{+} + A^{-}$

$t_0 \quad C \qquad O \quad O$

$t_{eq} \quad C - C\alpha \quad C\alpha \quad C\alpha$

$$K_a = \frac{C\alpha^2}{1 - \alpha} = C\alpha^2, \alpha\sqrt{\frac{K_a}{C}}$$

$$\therefore \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{Ka_1}{Ka_2}}, \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{C_2}{C_1}}$$

(For two acids at same conc.) (for same acid at diff conc.)

0.01M $CH_3, COOH$ is 4.24% ionised. What will be the pereentage ionisation of 0.1 $MCH_3, COOH.$

A. 1.33 %

B. 4.24 %

C. 5.24 %

D. 0.33 %

Answer: A

Watch Video Solution

3. Weak acids and bases are not completely ionised when dissolved in polar medium like water

$H \rightarrow H^+ + A^-$

$t_0 \quad C \qquad O \quad O$

$t_{eq} \quad C - C\alpha \quad C\alpha \quad C\alpha$

$$K_a = \frac{C\alpha^2}{1 - aplha} = C\alpha^2, \alpha\sqrt{\frac{K_a}{C}}$$

$$\therefore \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{Ka_1}{Ka_2}}, \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{C_2}{C_1}}$$

(For two acids at same conc.) (for same acid at diff conc.)

Relative strength of two weak monoprotic acids may be given as

A. $\frac{\left[H^+\right]}{\left[H^+\right]_2}$

B. $\frac{\alpha_1}{\alpha_2}$

C. $\sqrt{\frac{Ka1}{Ka_2}}$

D. All of the above

Answer: D

Watch Video Solution

4. Weak acids and bases are not completely ionised when dissolved in polar medium like water

$H \rightarrow H^{+} + A^{-}$

$t_0 \quad C \qquad O \quad O$

$t_{eq} \quad C - C\alpha \quad C\alpha \quad C\alpha$

$K_a = \frac{C\alpha^2}{1 - \alpha} = C\alpha^2, \alpha\sqrt{\frac{K_a}{C}}$

$\therefore \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{Ka_1}{Ka_2}}, \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{C_2}{C_1}}$

(For two acids at same conc.) (for same acid at diff conc.)

$\alpha$and α are in the ratio 1:2 at same conc. $Ka_1, = 2 \times 10^{-4}$, what will be Ka_2 ,?

A. 8×10^{-4}

B. 2×10^{-4}

C. 4×10^{-4}

D. 1×10^{-4}

Answer: A

Watch Video Solution

5. Weak acids and bases are not completely ionised when dissolved in polar medium like water

$H \rightarrow H^{+} + A^{-}$

$t_0 \quad C \qquad O \quad O$

$t_{eq} \quad C - C\alpha \quad C\alpha \quad C\alpha$

$$K_a = \frac{C\alpha^2}{1 - \alpha} = C\alpha^2, \alpha\sqrt{\frac{K_a}{C}}$$

$$\therefore \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{Ka_1}{Ka_2}}, \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{C_2}{C_1}}$$

(For two acids at same conc.) (for same acid at diff conc.)

0.01M $CH_3, COOH$ is 4.24% ionised. What will be the pereentage ionisation of 0.1 $MCH_3, COOH$.

A. $1.33\ \%$

B. 4.24 %

C. 5.24 %

D. 0.33 %

Answer: A

Watch Video Solution

6. Weak acids and bases are not completely ionised when dissolved in polar medium like water

$H \rightarrow H^+ + A^-$

$t_0 \quad C \quad O \quad O$

$t_{eq} \quad C - C\alpha \quad C\alpha \quad C\alpha$

$$K_a = \frac{C\alpha^2}{1 - aplha} = C\alpha^2, \alpha\sqrt{\frac{K_a}{C}}$$

$$\therefore \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{Ka_1}{Ka_2}}, \frac{\alpha_1}{\alpha_2} = \sqrt{\frac{C_2}{C_1}}$$

(For two acids at same conc.) (for same acid at diff conc.)

Relative strength of two weak monoprotic acids may be given as

A. $\dfrac{\left[H^{+}\right]}{\left[H^{+}\right]_2}$

B. $\dfrac{\alpha_1}{\alpha_2}$

C. $\sqrt{\dfrac{Ka1}{Ka_2}}$

D. All of the above

Answer: D

Watch Video Solution

LECTURE SHEET (EXERCISE -II LEVEL -II (ADVANCED) (Matrix Matching Type Questions))

1.

Column-I (In H_3PO_4 solution)	Column-II $(C = [H_3PO_4])$
A) $[H^+]$	P) $\sqrt{K_1 C}$
B) $[H_2PO_4^-]$	Q) K_2
C) $[HPO_4^{-2}]$	R) $\sqrt{K_1 K_2}$
D) $[PO_4^{-3}]$	S) $\dfrac{K_2 K_3}{\sqrt{K_1 C}}$

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2.

Column-I (In H_3PO_4 solution)	Column-II ($C = [H_3PO_4]$)
A) $[H^+]$	P) $\sqrt{K_1 C}$
B) $[H_2PO_4^-]$	Q) K_2
C) $[HPO_4^{-2}]$	R) $\sqrt{K_1 K_2}$
D) $[PO_4^{-3}]$	S) $\frac{K_2 K_3}{\sqrt{K_1 C}}$

Watch Video Solution

LECTURE SHEET (EXERCISE -II LEVEL -II (ADVANCED) (Integer Type Questions))

1. Calculate the change in pH of water when 0.01 mole of NaOH are added in 10 litre water.

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2. Find the precentage degree of dissociation of 0.05 M $NH_3 at 25^\circ$ C in a solution of pH = 11

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3. The degree of dissociation of 0.1 M weak acid is 10^{-2} and the degree of dissociation of the same acid in 0.025M concentration is '*', then find 100x. _________ ?

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4. Calculate the change in pH of water when 0.01 mole of NaOH are added in 10 litre water.

Watch Video Solution

5. Find the precentage degree of dissociation of 0.05 M $NH_3 at 25^\circ$ C in a solution of pH = 11

Watch Video Solution

6. The degree of dissociation of 0.1 M weak acid is 10^{-2} and the degree of dissociation of the same acid in 0.025M concentration is '*', then find 100x. _________ ?

Watch Video Solution

LECTURE SHEET (EXERCISE -III LEVEL -I (MAIN) (Straight Objective Type Questions))

1. Which of the following pair of solutions does not form a buffer solution?

A. NaH_2PO_4 and Na_2HPO_4

B. H_2CO_3 and $NaHCO_3$

C. NH_4OH and H_4Cl

D. KOH and K_2SO_4

Answer: D

Watch Video Solution

2. IM NaCl and IM HCI are present in an aqueous solution. The solution is

A. Not a buffer solution with $P^H < 7$

B. Not a buffer solution with $P^H > 7$

C. A buffer solution with $P^H < 7$

D. A buffer solution with $P^H = 7$

Answer: A

Watch Video Solution

3. A buffer solution contains a weak acid HA and A . When small quantity of NaOH is added, to keep p^H as constant. which of the following reaction takes place?

A. $HA \rightarrow H^+A^-$

B. $H^{+}A^{-} \rightarrow HA$

C. $HA + OH^{-} \rightarrow H_2O + A^{-}$

D. $A^{-} + H_2O \rightarrow HA + OH^{-}$

Answer: C

Watch Video Solution

4. Which of the following is correct for acid buiter? [salt = S, acid = A]

A. $P^{K_4} = P^{H} + \log\frac{[S]}{[A]}$

B. $P^{H} = P^{K_a} + \log\frac{[S]}{[A]}$

C. $\left[H^{+}\right] = 10^{-P^{K_a}}$

D. $P^{H} = -\log\frac{[S]}{[A]}$

Answer: B

Watch Video Solution

5. On diluting a buffer solution, its pH :

A. is increased

B. is decreased

C. remains constant

D. will change which be predicted unless dissociation of its weak acid (or base)is provided.

Answer: C

Watch Video Solution

6. For the buffer solution containing NH_4OH and NH_4CI, P^H of the buffer solution can be increased by

A. Adding some more NH_4Cl

B. Adding some more NH_4OH

C. Removing NH_4Cl

D. Both 2 and 3

Answer: D

Watch Video Solution

7. An acidic buffer contains equal concentration of acid and salt . The dissociation constant of acid is 10^5 The P^H of the buffer solution is

A. 5

B. 9

C. 4.49

D. 5.5

Answer: A

Watch Video Solution

8. K_a for HCN is 5×10^{-10} at $25^{\circ}C$. For maintaining a constant pH of 9, the volume of 5M KCN solution required to be added to 10 ml of 2M HCN solution is

A. 4ml

B. 8ml

C. 2ml

D. 10ml

Answer: C

Watch Video Solution

9. pH of a mixture of HA and A^{-} buffer is 5. $K_b of A^{-} = 10^{-10}. Hence \frac{HA}{A^{-}}$ will be

A. 1

B. 10

C. 0.1

D. 100

Answer: C

Watch Video Solution

10. A buffer solution contains 0.2 mole of NH_4OH and 0.2mole of NH_4Cl per litre. The PK_b of NH_4OH is `4.75 The pH of the buffer will be

A. 4.75

B. 5.75

C. 9.25

D. 2.25

Answer: C

Watch Video Solution

11. From the following table

Buffer solution	Vol .of 0.1 M weak acid	Vol. of . 0.1 M sodium salt of weak ac
I	4.0	4.0
II	4.0	40.0
III	40.0	4.0
IV	0.1	10

Which of the two sets of buffer solutions have least pH ?

A. $I\&II$

B. $I\&III$

C. $II\&III$

D. $II\&IV$

Answer: B

Watch Video Solution

12. Which buffer solution has maximum pH?

A. mixture which is 0.1 M in

CH_3COOH and $0.1 M is CH_3COONa \left[pK_a\left(CH_3COOH\right) = 4.74\right.$

B. mixture which is $0.2 M CH_3COOH$ and $0.2 M is CH_3COONa$

C. mixture which is $0.1M$ in NH_4Cl and $0.1M$ in

$NH_4OH\left[pK_a\left(NH_4^+\right) = 9.26\right]$

D. all the solution have equal pH which is 4.74

Answer: C

Watch Video Solution

13. Buffer capacity of acidic buffer solution is maximum when

(1) $P^H = P^k$ (2) [salt]= [acid] (3) $p^K = 7$ (4) $\left[H^+\right] = P^k$

A. all are correct

B. b,c,d, are correct

C. a and b are correct

D. c and b are correct

Answer: C

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14. When 0.02 mole of an alkali is added to an acid buffer , the pH changes from 4.75 to 4.8 the buffer capacity is

A. 2.5

B. 0.25

C. 0.4

D. 0.025

Answer: C

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15. Aqueous solution of KCl is neutral because

A. K^{+} undergoes hydrolysis

B. Cl^{-} undergoes hydrolysis

C. Both K^{+} and Cl^{-} undergoes hydrolysis

D. No hydrolysis takes places

Answer: D

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16. Assertion (A) : Aqueous solutions of $ZnSO_4$ is neutral.

Reason (R) : Salt of strong base and weak acid undergoes anionic 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 false

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

Answer: D

Watch Video Solution

17. Assertion (A) : Aqueous solution of Na_2CO_3 show $p^H > 7$.

Reason (R) : Salt of strong base and weak acid undergoes anionic 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 false

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

Answer: A

Watch Video Solution

18. The no.of hydroxyl ions produced by one molecule of Na_2, CO_3 , on hydrolysis is

A. 4

B. 2

C. 3

D. 0

Answer: B

Watch Video Solution

19. The nature of 0.1 M solution of sodium bisulphate is

A. Acidic

B. Alkaline

C. Neutral

D. Amphoteric

Answer: A

Watch Video Solution

20. In the titration of acetic acid versus sodium hydroxide , the pH of the solution at equivalence point (whene temperature is $25^{\circ}C\Big)$ is :

A. about 5.5

B. about 6.5

C. about 7

D. about 8.5

Answer: D

Watch Video Solution

21. The P^H of an aqueous solution of $NH_4CN\left(K_a ofHCNis9.2 \times 10^{-10} \& K_b ofNH_4OHis1.8 \times 10^{-5}\right)$

A. > 7

B. < 7

C. 7

D. 14

Answer: A

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22. The hydrolysis constant of CH_3COONa is given by

A. $K_b = \frac{K_W}{K_a}$

B. $K_b = \frac{K_W}{K_b}$

C. $K_h = \frac{K_W}{K_a, K_b}$

D. $K_h = K_a / K_b$

Answer: A

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23. Hydrolysis constant of salt derived from strong acid and weak base is 2×10^{-5} .The dissociation constant of the weak base is

A. 5×10^{-8}

B. 5×10^{-9}

C. 5×10^{-10}

D. 2×10^{-19}

Answer: C

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24. The hydrolysis constant of NaX $(K_a of HX is 2 \times 10^{-6})$ is

A. 5×10^{-9}

B. 2×10^{10}

C. 2×10^{-6}

D. 10^{-7}

Answer: A

Watch Video Solution

25. The P^H of 0. 1M solution of the following compounds increases in the order

A. $NaCl < NH_4Cl < NaCN < HCl$

B. $HCl < NH_4Cl < NaCl < NaCN$

C. $NaCN < NH_4Cl < NaCl < HCl$

D. $HCl < NaCl < NH_4Cl < NaCN$

Answer: B

Watch Video Solution

26. Assertion (A): Aqueous solution of ammonium acetate is neutral

Reason(R): Dissociation constants of $NH_4, OH\left(K_6\right)$ and that of $CH_3, COOH\left(K_a\right)$ are nearly equal.

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 false

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

Answer: A

Watch Video Solution

27. Which of the following pair of solutions does not form a buffer solution?

A. NaH_2PO_4 and Na_2HPO_4

B. H_2CO_3 and $NaHCO_3$

C. NH_4OH and H_4Cl

D. KOH and K_2SO_4

Answer: D

Watch Video Solution

28. IM NaCl and IM HCl are present in an aqueous solution. The solution is

A. Not a buffer solution with $P^H < 7$

B. Not a buffer solution with $P^H > 7$

C. A buffer solution with $P^H < 7$

D. A buffer solution with $P^H = 7$

Answer: A

Watch Video Solution

29. A buffer solution contains a weak acid HA and A . When small quantity of NaOH is added, to keep p^H as constant. which of the following reaction takes place?

A. $HA \rightarrow H^+A^-$

B. $H^+A^- \rightarrow HA$

C. $HA + OH^- \rightarrow H_2O + A^-$

D. $A^- + H_2O \rightarrow HA + OH^-$

Answer: C

Watch Video Solution

30. Which of the following is correct for acid buiter? [salt = S, acid = A]

A. $P^{K_4} = P^H + \log\frac{[S]}{[A]}$

B. $P^H = P^{K_a} + \log\frac{[S]}{[A]}$

C. $\left[H^+\right] = 10^{-P^{K_a}}$

D. $P^H = -\log\frac{[S]}{[A]}$

Answer: B

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31. On diluting a buffer solution, its pH :

A. is increased

B. is decreased

C. remains constant

D. will change which be predicted unless dissociation of its weak acid (or base)is provided.

Answer: C

Watch Video Solution

32. For the buffer solution containing NH_4OH and NH_4CI, P^H of the buffer solution can be increased by

A. Adding some more NH_4Cl

B. Adding some more NH_4OH

C. Removing NH_4Cl

D. Both 2 and 3

Answer: D

Watch Video Solution

33. An acidic buffer contains equal concentration of acid and salt . The dissociation constant of acid is 10^5 The P^H of the buffer solution is

A. 5

B. 9

C. 4.49

D. 5.5

Answer: A

Watch Video Solution

34. K_a for HCN is 5×10^{-10} at $25^{\circ} C$. For maintaining a constant pH of 9, the volume of 5M KCN solution required to be added to 10 ml of 2M HCN solution is

A. 4ml

B. 8ml

C. 2ml

D. 10ml

Answer: C

Watch Video Solution

35. pH of a mixture of HA and A^- buffer is 5. $K_b of A^- = 10^{-10}$. $Hence \frac{HA}{A^-}$ will be

A. 1

B. 10

C. 0.1

D. 100

Answer: C

Watch Video Solution

36. A buffer solution contains 0.2 mole of NH_4OH and 0.2mole of NH_4Cl per litre. The PK_b of NH_4OH is `4.75 The pH of the buffer will be

A. 4.75

B. 5.75

C. 9.25

D. 2.25

Answer: C

Watch Video Solution

37. From the following table

Buffer solution	Vol .of 0.1 M weak acid	Vol. of . 0.1 M sodium salt of weak ac
I	4.0	4.0
II	4.0	40.0
III	40.0	4.0
IV	0.1	10

Which of the two sets of buffer solutions have least pH ?

A. $I \& II$

B. $I \& III$

C. $II \& III$

D. $II \& IV$

Answer: B

Watch Video Solution

38. Which buffer solution has maximum pH?

A. mixture which is 0.1 M in CH_3COOH and $0.1 M is CH_3COONa\left[pK_a\left(CH_3COOH\right) = 4.74\right.$

B. mixture which is $0.2 M CH_3COOH$ and $0.2 M is CH_3COONa$

C. mixture which is $0.1M$ in NH_4Cl and $0.1M$in $NH_4OH\left[pK_a\left(NH_4^+\right) = 9.26\right]$

D. all the solution have equal pH which is 4.74

Answer: C

Watch Video Solution

39. Buffer capacity of acidic buffer solution is maximum when

(1) $P^H = P^k$ (2) [salt]= [acid] (3) $p^K = 7$ (4) $\left[H^+\right] = P^k$

A. all are correct

B. b,c,d, are correct

C. a and b are correct

D. c and b are correct

Answer: C

Watch Video Solution

40. When 0.02 mole of an alkali is added to an acid buffer , the pH changes from 4.75 to 4.8 the buffer capacity is

A. 2.5

B. 0.25

C. 0.4

D. 0.025

Answer: C

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41. Aqueous solution of KCl is neutral because

A. K^{+} undergoes hydrolysis

B. Cl^{-} undergoes hydrolysis

C. Both K^{+} and Cl^{-} undergoes hydrolysis

D. No hydrolysis takes places

Answer: D

Watch Video Solution

42. Assertion (A) : Aqueous solutions of $ZnSO_4$ is neutral.

Reason (R) : Salt of strong base and weak acid undergoes anionic 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 false

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

Answer: D

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43. (A): Aqueous solution of Na_2CO_3 is acidic in nature

(R): Na^+ ion undergoes hydrolysis to produce $NaOH$ and H^+ ions

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 false

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

Answer: A

Watch Video Solution

44. The no.of hydroxyl ions produced by one molecule of Na_2, CO_3 , on hydrolysis is

A. 4

B. 2

C. 3

D. 0

Answer: B

Watch Video Solution

45. The nature of 0.1 M solution of sodium bisulphate is

A. Acidic

B. Alkaline

C. Neutral

D. Amphoteric

Answer: A

Watch Video Solution

46. In the titration of acetic acid versus sodium hydroxide , the pH of the solution at equivalence point (whene temperature is $25^{\circ}C)$ is :

A. about 5.5

B. about 6.5

C. about 7

D. about 8.5

Answer: D

Watch Video Solution

47. The P^H of an aqueous solution of $NH_4CN\left(K_a ofHCNis9.2 \times 10^{-10}\&K_b ofNH_4OHis1.8 \times 10^{-5}\right)$

A. > 7

B. < 7

C. 7

D. 14

Answer: A

Watch Video Solution

48. The hydrolysis constant of CH_3COONa is given by

A. $K_b = \frac{K_W}{K_a}$

B. $K_b = \frac{K_W}{K_b}$

C. $K_h = \frac{K_W}{K_a, K_b}$

D. $K_h = K_a / K_b$

Answer: A

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49. Hydrolysis constant of salt derived from strong acid and weak base is 2×10^{-5} .The dissociation constant of the weak base is

A. 5×10^{-8}

B. 5×10^{-9}

C. 5×10^{-10}

D. 2×10^{-19}

Answer: C

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50. The hydrolysis constant of NaX $\left(K_a of HX is 2 \times 10^{-6}\right)$ is

A. 5×10^{-9}

B. 2×10^{10}

C. 2×10^{-6}

D. 10^{-7}

Answer: A

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51. The P^H of 0. 1M solution of the following compounds increases in the order

A. $NaCl < NH_4Cl < NaCN < HCl$

B. $HCl < NH_4Cl < NaCl < NaCN$

C. $NaCN < NH_4Cl < NaCl < HCl$

D. $HCl < NaCl < NH_4Cl < NaCN$

Answer: B

Watch Video Solution

52. Assertion (A): Aqueous solution of ammonium acetate is neutral

Reason(R): Dissociation constants of $NH_4, OH\left(K_6\right)$ and that of $CH_3, COOH\left(K_a\right)$ are nearly equal.

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 false

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

Answer: A

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LECTURE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (Straight Objective Type Questions))

1. A buffer solution is prepared by mixing 50 mL of 0.2 M of acetic acid with .x. mL of 0.2 M of NaOH solutions. If pH of the resulting buffer solutions is 4. 7 then value of .x. is (Ka= 2×10^{-5})

A. 28 mL

B. 22 m L

C. 24 mL

D. 25 mL

Answer: D

Watch Video Solution

2. Which of the following is an acidic salt that can form an alkaline solution ?

A. $NaHSO_4$

B. $NaHCO_3$

C. Na_2HPO_3

D. $NaCN$

Answer: B

Watch Video Solution

3. If 50 ml of 0.2M KOH is added to 40 ml of 0.5 M $HCOOH$. the pH of the resulting solutions is $\left(Ka = 1.8 \times 10^{-4}\log 18 = 1.26\right)$

A. 3.74

B. 5.64

C. 7. 57

D. 3.42

Answer: A

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4. A mixture of methane and ethylene in the volume ratio $x:y$ has a total volume of 30 ml . On complete combustion it gave 40 ml of CO_2 . If the ratio had been $y:x$, instead of $x:y$, what volume of CO_2 could have been obtained ?

A. $1:1$

B. $1:2$

C. $2:1$

D. $3:1$

Answer: C

Watch Video Solution

5. p^{I} of $H_3\overset{\oplus}{N} - CH_2 - COOK$ is 5

$H_3\overset{\oplus}{N}CH_2COOH \Leftrightarrow H_2NCH_2COO^- + H^+ K_a = 10^{-4}$

$H_2\overset{\oplus}{N}CH_2COO^- \Leftrightarrow H_2NCH_2COO^- + H^+ K_a = 10^{-X}$ What is x ?

A. $x + y$

B. $(x + y)/2$

C. $(x + y)^{1/2}$

D. $(x + y)^{1/3}$

Answer: B

Watch Video Solution

6. If the buffer capacity of a buffer solutions is x, the volume of 1M NaoH added to 100mL of this solutions to change the pH by 1 is

A. $0.1xmL$

B. $10xmL$

C. $100xmL$

D. xmL

Answer: C

Watch Video Solution

7. A buffer solution is prepared by mixing 50 mL of 0.2 M of acetic acid with .x. mL of 0.2 M of NaOH solutions. If pH of the resulting buffer solutions is 4. 7 then value of .x. is (Ka= 2×10^{-5})

A. 28 mL

B. 22 m L

C. 24 mL

D. 25 mL

Answer: D

Watch Video Solution

8. Which of the following is an acidic salt that can form an alkaline solution ?

A. $NaHSO_4$

B. $NaHCO_3$

C. Na_2HPO_3

D. $NaCN$

Answer: B

Watch Video Solution

9. If 50 ml of 0.2M KOH is added to 40 ml of 0.5 M $HCOOH$. the pH of the resulting solutions is $\left(Ka = 1.8 \times 10^{-4} \log 18 = 1.26\right)$

A. 3.74

B. 5.64

C. 7. 57

D. 3.42

Answer: A

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10. IM NH_4OH and JMHCl are mixed to make total volume of 300 mL. If pH of the mixture is 9.26 and $pK_a\left(NH_4^+\right) = 9.26$ then volume ratio of NH_4 and HCl will be :

A. $1:1$

B. $1:2$

C. $2:1$

D. $3:1$

Answer: C

Watch Video Solution

11. $H_2O + H_3PO_3 \Leftrightarrow H_3O^+ + H_2OPO_3^-, pK_1 = x$

$H_2O + H_2PO_3 \Leftrightarrow H_3O^+ HPO_3^{-2}, pK_2 = y$

Hence , pH of 0.01 M NaH_2PO_3 is :

A. $x + y$

B. $(x + y)/2$

C. $(x + y)^{1/2}$

D. $(x + y)^{1/3}$

Answer: B

Watch Video Solution

12. If the buffer capacity of a buffer solutions is x, the volume of 1M NaoH added to 100mL of this solutions to change the pH by 1 is

A. $0.1xmL$

B. $10xmL$

C. $100xmL$

D. xmL

Answer: C

Watch Video Solution

LECTURE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (More than One correct answer Type Questions))

1. Select the incorrect statement

A. CH_3COOH is a weak acid

B. NH_4Clgives an alkaline solution in water

C. CH_3COONa gives an acidic solution in water

D. NH_4OH is a strong base

Answer: B::C::D

Watch Video Solution

2. Which of the following solution will have no effect on pH dilution?

A. $0.3MCH_3COOK$

B. $0.4MCH_3COONH_4$

C. $0.2MNH_4OH + 0.2MNH_4Cl$

D. $0.3H_2CO_3 + 0.3MNaHCO_3$

Answer: B::C::D

Watch Video Solution

3. Which of the following mixtures can act as buffer?

A. $H_2CO_3 + KOH(2.5:1$molar ratio)

B. $H_2CO_3 + KOH(2:3$ molar ratio)

C. $NH_4OH + HNO_3(6:4$ molar ratio)

D. $NH_4OH + HNO_3(3:5$ molar ratio)

Answer: A::B::C

Watch Video Solution

4. The acid ionization hydrolysis constant of $Zn^{2+} is 1.0 \times 10^{-9}$ which of the following statement are incorrect ?

A. The $\left[H_3O^+\right]$ ion concentration in 0.001 M $ZnCl_2$ solution is

1.0×10^4

B. The pH of 0.001 $MZnCl_2$ solution is 6

C. The basic dissociation constant of $Zn(OH)^+ is 1.0 \times 10^{-5}$

D. The basic dissociation constant of $Zn(OH)^+ is 1.0 \times 10^5$

Answer: A::D

Watch Video Solution

5. Boric acid $B(OH)_3$ is weak monobasic acid reacts with alkali to form borates. The most common borate of boric acid is borax represented as $Na_2\left(B_4O_5(OH)_{4.8}H_2O\right.$ which is made up of two tetrahedral and two triangular units. On dissolution in water, these tetrahedral and triangular units are seperated. Borax is useful primary standard for titra tion against acids

The number of B - O - B linkage in borax is/are

A. All proportions of the above mixing would result in an neutral solution having $pH = 7 at 25^{\circ} C$

B. If aq. NH_3 is exactly half neutralized by HCl, then pOH of resulting solution is equal to pK_a

C. If acetic acid is exactly half neutralized by NaOH, then pH of resulting solutions is equal to pK_a

D. If acetic acid is exactly neutralized by aq. NH_3 then pH of resuling solution is equal $1/2$ pkw

Answer: B::C::D

Watch Video Solution

6. The incorrect statement are

A. CH_3COOH is a weak acid

B. NH_4Clgives an alkaline solution in water

C. CH_3COONa gives an acidic solution in water

D. NH_4OH is a strong base

Answer: B::C::D

Watch Video Solution

7. Which of the following solution will have no effect on pH dilution?

A. $0.3MCH_3COOK$

B. $0.4MCH_3COONH_4$

C. $0.2MNH_4OH + 0.2MNH_4Cl$

D. $0.3H_2CO_3 + 0.3MNaHCO_3$

Answer: B::C::D

Watch Video Solution

8. Which of the following mixtures can act as buffer?

A. $H_2CO_3 + KOH(2.5:1$molar ratio)

B. $H_2CO_3 + KOH(2:3$ molar ratio)

C. $NH_4OH + HNO_3(6:4$ molar ratio)

D. $NH_4OH + HNO_3(3:5$ molar ratio)

Answer: A::B::C

Watch Video Solution

9. The acid ionization hydrolysis constant of $Zn^{2+} is 1.0 \times 10^{-9}$ which of the following statement are incorrect ?

A. The $\left[H_3O^+\right]$ ion concentration in 0.001 M $ZnCl_2$ solution is 1.0×10^4

B. The pH of 0.001 $MZnCl_2$ solution is 6

C. The basic dissociation constant of $Zn(OH)^+ is 1.0 \times 10^{-5}$

D. The basic dissociation constant of $Zn(OH)^+ is 1.0 \times 10^5$

Answer: A::D

Watch Video Solution

10. Accetic acid and aq. NH_3 are weak monobasic acid and weak monoacidic base respectively and K_a of acetic acid is equal to K_b of aq. NH_3 .Which of the following statement are correct?

A. All proportions of the above mixing would result in an neutral solution having $pH = 7 at 25^\circ C$

B. If aq. NH_3 is exactly half neutralized by HCl, then pOH of resulting solution is equal to pK_a

C. If acetic acid is exactly half neutralized by NaOH, then pH of resulting solutions is equal to pK_a

D. If acetic acid is exactly neutralized by aq. NH_3 then pH of resuling solution is equal $1/2$ pkw

Answer: B::C::D

Watch Video Solution

LECTURE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (Linked comprehension Type Questions))

1. Higher the amount of acid or base used to produce a definite change of pH in a buffer solution,higher will be its buffer capacity. Buffer capacity of solution is maximum under the following conditions:

[Salt= [Acid] (in acid buffer), [Salt] = [Base] (in base buffer) pH of a buffer solution lies in the range given below: pH = $pk_a \pm 1$,

In other words, any buffer solution can be used as buffer up to two pH units only, depending upon the value of pK_a, or pK_b,. A buffer is said to be efficient when $pH_a = pK_a$, or pOH= pk_b

Which among the following solution will be the most efficient buffer?

A. $0.1 M CH_3COONa + 0.01 M CH_3COOH$

B. $0.1 M NH_4Cl + 0.1 M NH_4OH$

C. $0.0001 M HCOOH + 0.002 M HCOONa$

D. All of the above

Answer: B

Watch Video Solution

2. Higher the amount of acid or base used to produce a definite change of pH in a buffer solution,higher will be its buffer capacity. Buffer capacity of solution is maximum under the following conditions:

[Salt= [Acid] (in acid buffer), [Salt] = [Base] (in base buffer) pH of a buffer solution lies in the range given below: pH = $pk_a \pm 1$,

In other words, any buffer solution can be used as buffer up to two pH units only, depending upon the value of pK_a, or pK_b, . A buffer is said to be efficient when $pH_a = pK_a$, or pOH= pk_b

The bulfer capacity is equal to :

A. $\frac{\Delta n}{\Delta pH}$

B. $\frac{pH}{\Delta n}$

C. $pK_a = \pm 1$

D. none of these

Answer: A

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3. Higher the amount of acid or base used to produce a definite change of pH in a buffer solution,higher will be its buffer capacity. Buffer capacity of solution is maximum under the following conditions:

[Salt= [Acid] (in acid buffer), [Salt] = [Base] (in base buffer) pH of a buffer solution lies in the range given below: pH = $pk_a \pm 1$,

In other words, any buffer solution can be used as buffer up to two pH units only, depending upon the value of pK_a, or pK_b, . A buffer is said to be efficient when $pH_a = pK_a$, or pOH= pk_b

The bulfer capacity is equal to :

A. one mole of NH_4Cl is added to one mole of NH_4OH

B. one mole of NH_4OH is added to one mole of HCl

C. one mole of NH_4Cl is added to one mole of NaOH

D. one mole of $NaCl$ is added to one mole of NaOH

Answer: A

Watch Video Solution

4. A solution containing a weak acid and its conjugate acts as an acidic buffer. In a buffer the dissociation of the well acid is suppressed by its conjugate base. $\left(K_1, K_2,\right.$ and $K_3,$ of $H_3PO_4,$ are $10_{-4}, 10^{-4}, 10^{-13}$ respectively

What is the P^H of a solution obtained by mixing 100ml of $0.1MH(3)PO_4,$ and 150ml of 0.IM NaOH

A. 8

B. 9

C. 7

D. 6

Answer: A

Watch Video Solution

5. A solution containing a weak acid and its conjugate acts as an acidic buffer. In a buffer the dissociation of the well acid is suppressed by its conjugate base. $\left(K_1, K_2,\right.$ and $K_3,$ of $H_3PO_4,$ are $10_{-4}, 10^{-4}, 10^{-13}$ respectively

Which of the following volume of 0.1 M NaOH added to 100 mlof 0.1M $H_3, PO_4,$ does not form a buffer

A. 50 ml

B. 150 ml

C. 200 ml

D. 250 ml

Answer: C

Watch Video Solution

6. Higher the amount of acid or base used to produce a definite change of pH in a buffer solution,higher will be its buffer capacity. Buffer capacity of solution is maximum under the following conditions:

[Salt= [Acid] (in acid buffer), [Salt] = [Base] (in base buffer) pH of a buffer solution lies in the range given below: pH = $pk_a \pm 1$,

In other words, any buffer solution can be used as buffer up to two pH units only, depending upon the value of pK_a, or pK_b,. A buffer is said to be efficient when $pH_a = pK_a$, or pOH= pk_b

Which among the following solution will be the most efficient buffer?

A. $0.1MCH_3COONa + 0.01MCH_3COOH$

B. $0.1MNH_4Cl + 0.1MNH_4OH$

C. $0.0001MHCOOH + 0.002MHCOONa$

D. All of the above

Answer: B

Watch Video Solution

7. Higher the amount of acid or base used to produce a definite change of pH in a buffer solution,higher will be its buffer capacity. Buffer capacity of solution is maximum under the following conditions:

[Salt= [Acid] (in acid buffer), [Salt] = [Base] (in base buffer) pH of a buffer solution lies in the range given below: pH = $pk_a \pm 1$,

In other words, any buffer solution can be used as buffer up to two pH units only, depending upon the value of pK_a, or pK_b, . A buffer is said to be efficient when $pH_a = pK_a$, or pOH= pk_b

The bulfer capacity is equal to :

A. $\frac{\Delta n}{\Delta pH}$

B. $\frac{pH}{\Delta n}$

C. $pK_a = \pm 1$

D. none of these

Answer: A

Watch Video Solution

8. Higher the amount of acid or base used to produce a definite change of pH in a buffer solutions, higher will be its buffer capacity . Buffer capacity of solution is maximum under the following conditions:

[Salt]= [Acid](in acid buffer) ,[Salt] =[Base] (in base buffer)

pH of a buffer solution lies in the range given below : pH= $pK_a + 1$

In other words any buffer solutions can be used as buffer up two pH units only. depending upon the value of pK_a or pK_b. A buffer is said to be efficient when pH =pK_a or $pOH = pK_b$,

Buffer capacity is maximum when:

A. one mole of NH_4Cl is added to one mole of NH_4OH

B. one mole of NH_4OH is added to one mole of HCl

C. one mole of NH_4Cl is added to one mole of NaOH

D. one mole of $NaCl$ is added to one mole of NaOH

Answer: A

Watch Video Solution

9. A solution containing a weak acid and its conjugate acts as an acidic buffer. In a buffer the dissociation of the well acid is suppressed by its conjugate base. $\left(K_1, K_2,\right.$ and $K_3,$ of $H_3PO_4,$ are $10_{-4}, 10^{-4}, 10^{-13}$ respectively

What is the P^H of a solution obtained by mixing 100ml of $0.1MH(3)PO_4$, and 150ml of 0.IM NaOH

A. 8

B. 9

C. 7

D. 6

Answer: A

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10. A solution containing a weak acid and its conjugate acts as an acidic buffer. In a buffer the dissociation of the well acid is suppressed by its conjugate base. $\left(K_1, K_2,\right.$ and $K_3,$ of $H_3PO_4,$ are $10_{-4}, 10^{-4}, 10^{-13}$ respectively

Which of the following volume of 0.1 M NaOH added to 100 mlof 0.1M $H_3, PO_4,$ does not form a buffer

A. 50 ml

B. 150 ml

C. 200 ml

D. 250 ml

Answer: C

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LECTURE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (Matrix Matching Type Questions))

1. List - I (mixed in equal volumes) | List - II (Nature of solution)

List - I (mixed in equal volumes)	List - II (Nature of solution)
(A)0.2M HCN + 0.1MKOH	(P)Strong base
(B)0.2M HCl + 0.1M KCN	(Q)basic buffer
$(C)0.2MNH_3 + 0.1MHCl$	(R)acidic buffer
$(D)0.2MKOH + 0.1MNH_4Cl$	(S) Strong acid

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2.

Column - I (Vol. of NaOH added)	Column- II (pH of resultant solution)
A) 150 mL of NaOH	P)$pH = p^{ka2}$
B)$75mLofNaOH$	Q) $= pH = p^{KaI}$
C)$25mLofNaOH$	R)$pH = 7 + \left[\frac{pKa_3 + \log c}{2}\right]$
D)$100mLofNaOH$	S)$pH = \frac{P_{k_{a2}} + p_{K_{a3}}}{2}$

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3.

Column-I (mixed in equal volumes)	Column -II (Nature of solution)
A)$0.2MHCN + 0.1MKOH$	P) Strong base
B)$0.2MHCl + 0.1MKCN$	Q) basic buffer
C)$0.2MNH_3 + 0.1MHCl$	R) acidic buffer
D)$0.2MKOH + 0.1MNH_4Cl$	S) Strong acid

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4.

Column - I (Vol. of NaOH added)	Column- II (pH of resultant solution)
A) 150 mL of NaOH	P)$pH = p^{ka2}$
B)$75mLofNaOH$	Q) $= pH = p^{KaI}$
C)$25mLofNaOH$	R)$pH = 7 + \left[\frac{pKa_3 + \log c}{2}\right]$
D)$100mLofNaOH$	S)$pH = \frac{P_{k_{a2}} + p_{K_{a3}}}{2}$

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LECTURE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (Integer Type Questions))

1. A certain buffer solution contains equal concentration of X^- and HX. K_b, for X^- is 10^{-10}. Find the pH of buffer.

Watch Video Solution

2. 0.15 mole of pyridinium chloride has been added into 500 cm^3 of 0.2 M pyridine solution. Calculate pH of the resulting solution, assuming no change in volume. (K, for pyridine = 1.5×10^{-9}M)

Watch Video Solution

3. Calculate the p of solution obtained by mixign 10 ml fo 0.1 M HCl and 40 ml off $0.2MH_2SO_4$.

Watch Video Solution

4. If the equlibrium constant for the reaction of weak acid HA with strong base is 10^9 then calculate the pH of 0.1 M NaA.

Watch Video Solution

5. In a titration to 50mL of 0.2M acetic acid $\left(K_{a'} = 1.8 \times 10^{-5}\right)$, 0.2M of V' mlL of NaOH is added to get a resultant solution of pH=4.74 if V $= x^2$?, what is x?

Watch Video Solution

6. 20 ml of 0.1 M NH, solution is titrated with 0.025M HCI solution. What is the pH of the reaction mixture at equivalence point at $25\,^{\circ}$C ? $\left(K_b \text{of } NH_3 \text{is } 2 \times 10^{-6}\right)$.

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7. The dissociation constant of a substituted benzoic acid at 25^{0}C is 1.0×10^{-4}. Find the pH of a 0.01M Solution of its sodium salt.

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8. If P^{ka} of acetic acid and P^{kb} of ammonium hydroxide are 4.76 each. Find the pH of ammonium acetate.

Watch Video Solution

9. A certain buffer solution contains equal concentration of X^{-} and HX. K_b, for X^{-} is 10^{-10}. Find the pH of buffer.

Watch Video Solution

10. 0.15 mole of pyridinium chloride has been added into 500 cm^3 of 0.2 M pyridine solution. Calculate pH of the resulting solution, assuming no change in volume. (K, for pyridine = 1.5×10^{-9}M)

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11. Calculate the pH of solution prepared by mixing 40 ml of 0.1 M acetic acid with 40 ml of 0.1 M sodium acetate, Given $K_a = 10^{-5}$

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12. If the equlibrium constant for the reaction of weak acid HA with strong base is 10^9 then calculate the pH of 0.1 M NaA.

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13. In a titration to 50mL of 0.2M acetic acid $\left(K_{a}, = 1.8 \times 10^{-5}\right)$, 0.2M of V' mlL of NaOH is added to get a resultant solution of pH=4.74 if V $=x^2$?, what is x?

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14. 20 ml of 0.1 M NH, solution is titrated with 0.025M HCl solution. What is the pH of the reaction mixture at equivalence point at $25\,^{\circ}\mathrm{C}$? $\left(K_b \text{of } NH_3 \text{is } 2 \times 10^{-6}\right)$.

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15. The dissociation constant of a substituted benzoic acid at 25^0C is 1.0×10^{-4}. Find the pH of a 0.01M Solution of its sodium salt.

Watch Video Solution

16. If P^{ka} of acetic acid and P^{kb} of ammonium hydroxide are 4.76 each. Find the pH of ammonium acetate.

Watch Video Solution

LECTURE SHEET (EXERCISE -IV LEVEL -I (MAIN) (Straight Objective Type Questions))

1. Given that the data for neutralization of a weak acid (HA) and strong acid with a strong base is:

$HA + OH^- \Rightarrow A^- + H_2O : \Delta H = -41.80kJ, H^+ + OH^- \Rightarrow H_2O, \Delta H = -55.90kJ$

The enthalpy of dissociation of weak acid would be

A. Phenolphthalein (8,3-10.0)

B. Methyl orange (3,1-4.4)

C. Methyl red (4,2-6,3)

D. Litmus (4.5 -8.3)

Answer: A

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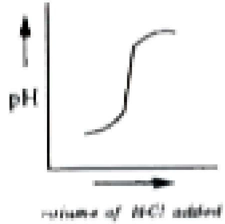
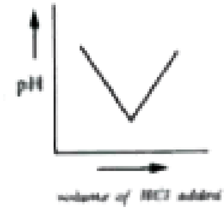
2. Titration curve if a strong base is titrated with srtrong acid is:

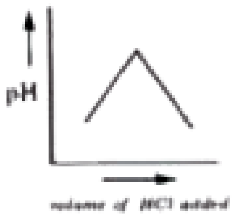


A.



B.

C. ` (##AKS_ELT_AO_CHE_XI_V01_B_C05_E01_117_O03.png" width="30%">



D.

Answer: C

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3. 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. $M^m A^n$

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

C. $m^m n^n S^{m+n}$

D. $M^m A^n s$.

Answer: C

Watch Video Solution

4. The correct representation for solubility product of SnS_2, is

A. $[Sn^{4+}][S^{2-}]^2$

B. $[Sn^{4+}][S^{2-}]$

C. $[Sn^{4+}][2S^{2-}]$

D. $[Sn^{4+}][2S^{2-}]^2$

Answer: A

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5. For the electrolyte of type ,A_2B, K_{sp} is given. Then its solubility is calculated by

A. $K_{sp}/4$

B. $3\sqrt{\frac{K_{sp}}{4}}$

C. $3\sqrt{K_{sp}}$

D. $\sqrt{K_{sp}}/4$

Answer: B

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6. The solubilty product of the electrolyte of the type A_2B_3 is (s is the solubility in mol/ lit)

A. $108s^5$

B. $72s^5$

C. $108s^2$

D. $10s^2$

Answer: A

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7. K_{sp} of a salt , having the general formula MX_2 in water 4×10^{-12} The concentration of M^{2+} ions in the aqueous solution of the salt is

A. 1×10^{-5}

B. 2×10^{-5}

C. $3 \times 10^{-5}M$

D. 5×10^{-11}

Answer: B

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8. Determine the mass by mass percentage concentration of a 100 g salt solution which contains 20 g salt.

A. $2 \times 10^{-6} M$

B. $1 \times 10^{-4} M$

C. $1.6 \times 10^{-4} M$

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

Answer: B

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9. Let the solubility of an aqueous solution of $Mg(OH)_2$, be "X° then its K_{sp} is

A. $4x^3$

B. $108x^5$

C. $27x^4$

D. $9x$

Answer: A

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10. The solubility product of a rare earth metal hydroxide $M(OH)_3$ at room temperature is 4.32×10^{-14} its solubility is

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

B. $2.0 \times 10^{-4} M$

C. $2 \times 10^{-5} M$

D. $2.0 \times 10^{-6} M$

Answer: B

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11. The volume of water needed to dissolve 1g of $BaSO_4\left(K_{sp} = 1.1 \times 10^{-10}\right)at25^\circ C$ is $\left\{M. WofBaSO_4is233\right\}$

A. 820 L

B. 430 L

C. 205L

D. none of these

Answer: B

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12. Which of the following is wrong ?

A. (1) Degree of dissociations of a weak electrolyte increase with dilution.

B. Increases in temperature increases the ionisation.

C. Strong electrolytes are ionised completely even at moderate concnetrations.

D. Additions of $NH_4Cl \text{to} NH_4OH$ increases the ionisation of the latter.

Answer: D

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13. Assertion (A) : P^H of an aqueous solution of acetic acid remians unchanged on the addition of sodium acetate.

Reason (R) : Dissociation of acetic acid is supressed by the addition of soidum acetate due to common ion effect.

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 false

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

Answer: D

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14. Which pair will show common ion effect ?

A. $BaCl_2 + Ba(NO_3)_2$

B. $NaCl + HCl$

C. $NH_4OH + NH - 4Cl$

D. $AgCN + KCN$

Answer: C

Watch Video Solution

15. The addition of NaCl to AgCl decreases the solubility of AgCl, because

A. $K_{sp} of$AgCl decreases

B. $K_{sp} of AgCl$ increases

C. Solution becomes unsaturated

D. Ionic product exceeds the K_{sp} value

Answer: D

Watch Video Solution

16. In which of the following, the solubility of AgCl will be maximum?

A. $0.1 M AgNO_3$

B. water

C. $0.1 M NaCl$

D. $1 M NaCl$

Answer: B

Watch Video Solution

17. The solubility of $PbSO_4 in 0.01 M Na_2SO_4$ solution is $\left(K_{sp} of PbSO_4 is 1.25 \times 10^{-9}\right)$

A. $1.25 \times 10^{-7} M$

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

C. $1.25 \times 10^{-10} M$

D. $0.1 M$

Answer: A

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18. 100 mL , each of $0.25 M$ NaF and 0.01 5 Ba $(NO)_3$ are mixed $K_{sp} of BaF_2 = 1.7 \times 10^{-6}$

A. A ppt is formed

B. No ppt is formed

C. Cannot say

D. Some more data are needed

Answer: A

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19. The molar solubility of $PbI_2 \in 0.2 M Pb(NO_3)_2$ solution in terms of solubility product, K_{sp}

A. $\left(K_{sp}/0.2\right)^{1/2}$

B. $\left(K_{sp}/0.4\right)^{1/2}$

C. $\left(K_{sp}/0.8\right)^{1/2}$

D. $\left(K_{sp}/0.8\right)^{1/3}$

Answer: C

Watch Video Solution

20. At 298 K , the K_{sp} value of $Fe(OH)_3$ in aqueous solution is 3.8×10^{-38}. The solubility of Fe^{3+} ions will increase when

A. P^H is increased

B. P^H is 7

C. P^H is decreased

D. Saturated solution is exposed to sun light

Answer: C

Watch Video Solution

21. Number of moles of CuI $\left(K_{sp} = 5 \times 10^{-12}\right)$ that will dissolve in 1 L of 0.1 M NaI solution is

A. 2.2×10^6

B. 5×10^{-11}

C. 5×10^{-10}

D. 2.2×10^{-5}

Answer: B

Watch Video Solution

22. The least soluble carbonate among the following is

A. $CsCl\left(K_{sp} = 10^{-12}\right)$

B. $HgS\left(K_{sp} = 1 \times 10^{-52}\right)$

C. $PbCl_2\left(K_{sp} = 1.7 \times 10^{-5}\right)$

D. $Zns\left(K_{sp} = 1.2 \times 10^{-23}\right)$

Answer: B

Watch Video Solution

23. At 298 K , the K_{sp} of M_2SO_4 is 3.2×10^{-5} . The maximum concentration of SO_4^{2-} ion that could be attained in a saturated solution of this solid at 298 K is

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

B. $2 \times 10^{-7}M$

C. $0.001M$

D. $0.01M$

Answer: B

Watch Video Solution

24. Which of the following indicators is best suited in the titration of a weak acid versus a strong base? $(PK_{10}$ values are given in bracket)

A. Phenolphthalein (8,3-10.0)

B. Methyl orange (3,1-4.4)

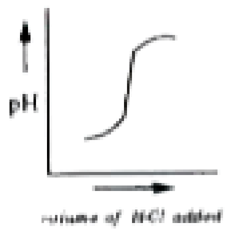
C. Methyl red (4,2-6,3)

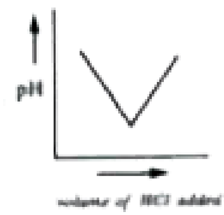
D. Litmus (4.5 -8.3)

Answer: A

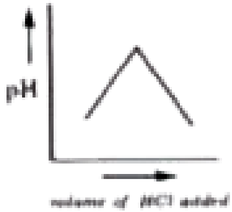
Watch Video Solution

25. Titration curve if a strong base is titrated with srtrong acid is:

A. 

B. 

C. ` (##AKS_ELT_AO_CHE_XI_V01_B_C05_E01_117_O03.png" width="30%">

D. 

Answer: C

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26. 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

27. The correct representation for solubility product of SnS_2 , is

A. $\left[Sn^{4+}\right]\left[S^{2-}\right]^2$

B. $\left[Sn^{4+}\right]\left[S^{2-}\right]$

C. $\left[Sn^{4+}\right]\left[2S^{2-}\right]$

D. $\left[Sn^{4+}\right]\left[2S^{2-}\right]^2$

Answer: A

Watch Video Solution

28. For the electrolyte of type ,A_2B, K_{sp} is given. Then its solubility is calculated by

A. $K_{sp}/4$

B. $3\sqrt{\dfrac{K_{sp}}{4}}$

C. $3\sqrt{K_{sp}}$

D. $\sqrt{K_{sp}}/4$

Answer: B

Watch Video Solution

29. The solubilty product of the electrolyte of the type A_2B_3 is (s is the solubility in mol/ lit)

A. $108s^5$

B. $72s^5$

C. $108s^2$

D. $10s^2$

Answer: A

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30. $K_{sp} of A_2B_3$ in water at $25\,^{\circ}C. is 1.1 \times 10^{-23}$ concentration of A^{+} ions is

A. 1×10^{-5}

B. 2×10^{-5}

C. $3 \times 10^{-5} M$

D. 5×10^{-11}

Answer: B

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31. K_{sp} of a salt , having the general formula MX_2 in water 4×10^{-12} The concentration of M^{2+} ions in the aqueous solution of the salt is

A. $2 \times 10^{-6} M$

B. $1 \times 10^{-4} M$

C. $1.6 \times 10^{-4} M$

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

Answer: B

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32. Let the solubility of an aqueous solution of $Mg(OH)_2$, be "X° then its K_{sp} is

A. $4x^3$

B. $108x^5$

C. $27x^4$

D. $9x$

Answer: A

Watch Video Solution

33. The solubility product of a rare earth metal hydroxide $M(OH)_3$ at room temperature is 4.32×10^{-14} its solubility is

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

B. $2.0 \times 10^{-4} M$

C. $2 \times 10^{-5} M$

D. $2.0 \times 10^{-6} M$

Answer: B

Watch Video Solution

34. The volume of water needed to dissolve 1g of $BaSO_4 \left(K_{sp} = 1.1 \times 10^{-10}\right) at 25 ^\circ C$ is $\left\{M. W of BaSO_4 is 233\right\}$

A. 820 L

B. 430 L

C. 205L

D. none of these

Answer: B

Watch Video Solution

35. Which of the following is wrong ?

A. (1) Degree of dissociations of a weak electrolyte increase with dilution.

B. Increases in temperature increases the ionisation.

C. Strong electrolytes are ionised completely even at moderate concnetrations.

D. Additions of $NH_4Cl \text{to} NH_4OH$ increases the ionisation of the latter.

Answer: D

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36. Assertion (A) : P^H of an aqueous solution of acetic acid remians unchanged on the addition of sodium acetate.

Reason (R) : Dissociation of acetic acid is supressed by the addition of soidum acetate due to common ion effect.

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 false

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

Answer: D

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37. Which pair will show common ion effect ?

A. $BaCl_2 + Ba(NO_3)_2$

B. $NaCl + HCl$

C. $NH_4OH + NH - 4Cl$

D. $AgCN + KCN$

Answer: C

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38. The addition of NaCl to AgCI decreases the solubility of AgCl, because

A. $K_{sp} of$AgCl decreases

B. $K_{sp} of AgCl$ increases

C. Solution becomes unsaturated

D. Ionic product exceeds the K_{sp} value

Answer: D

Watch Video Solution

39. In which of the following, the solubility of AgCl will be maximum?

A. $0.1 M AgNO_3$

B. water

C. $0.1 M NaCl$

D. $1 M NaCl$

Answer: B

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40. The solubility of $PbSO_4$ in $0.01 M Na_2SO_4$ solution is $\left(K_{sp} \text{ of } PbSO_4 \text{ is } 1.25 \times 10^{-9}\right)$

A. $1.25 \times 10^{-7} M$

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

C. $1.25 \times 10^{-10} M$

D. $0.1 M$

Answer: A

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41. 100 mL , each of $0.25M$ NaF and 0.01 5 Ba $(NO)_3$ are mixed $K_{sp} of BaF_2 = 1.7 \times 10^{-6}$

A. A ppt is formed

B. No ppt is formed

C. Cannot say

D. Some more data are needed

Answer: A

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42. The molar solubility of $PbI_2 \in 0.2M Pb(NO_3)_2$ solution in terms of solubility product, K_{sp}

A. $\left(K_{sp}/0.2\right)^{1/2}$

B. $\left(K_{sp}/0.4\right)^{1/2}$

C. $\left(K_{sp}/0.8\right)^{1/2}$

D. $\left(K_{sp}/0.8\right)^{1/3}$

Answer: C

Watch Video Solution

43. At 298 K , the K_{sp} value of $Fe(OH)_3$ in aqueous solution is 3.8×10^{-38}. The solubility of Fe^{3+} ions will increase when

A. P^H is increased

B. P^H is 7

C. P^H is decreased

D. Saturated solution is exposed to sun light

Answer: C

Watch Video Solution

44. Number of moles of CuI $\left(K_{sp} = 5 \times 10^{-12}\right)$ that will dissolve in 1 L of 0.1 M NaI solution is

A. 2.2×10^{6}

B. 5×10^{-11}

C. 5×10^{-10}

D. 2.2×10^{-5}

Answer: B

Watch Video Solution

45. The least soluble compound (salt) of the following is

A. $CsCl\left(K_{sp} = 10^{-12}\right)$

B. $HgS\left(K_{sp} = 1 \times 10^{-52}\right)$

C. $PbCl_2\left(K_{sp} = 1.7 \times 10^{-5}\right)$

D. $Zns\left(K_{sp} = 1.2 \times 10^{-23}\right)$

Answer: B

Watch Video Solution

46. $\left[SO_4^{2-}\right]$ must be exceed what value to obtain a $RaSO_4\left(K_{sp} = 4 \times 10^{-11}\right)$ ppt in 500 mL of a solution containing $1 \times 10^{-4} mole of Ra^{2+}$ ions ?

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

B. $2 \times 10^{-7} M$

C. $0.001 M$

D. $0.01 M$

Answer: B

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LECTURE SHEET (EXERCISE -IV LEVEL -II (ADVANCED) (Straight Objective Type Questions))

1. If the solubility product of MOH is $1 \times 10^{-10} mol^2 . dm^{-2}$. Then the p^H of the its aqueous solution will be

A. 12

B. 9

C. 6

D. 3

Answer: B

Watch Video Solution

2. $K_{sp}\left(BaSO_4\right)$ is 1.1×10^{10}. In which case is $BaSO_4$ precipitated ?

A. $100mLof4 \times 10^{-3} MofBaCl_2 + 300mLof6.0 \times 10^{-4} MofNa_2SO_4$

B. $100mLof4 \times 10^{-4} MofBaCl_2 + 300mLof6 \times 10^{-8} MofNa_2SO_4$

C. $300mLof4 \times 10^{-4}MofBaCl_2 + 100mLof6.0 \times 10^{-8}MofNa_2SO_4$

D. in all cases

Answer: A

Watch Video Solution

3. A solution is saturated with respect to $SrCO_3$ and SrF_2. The $\left[CO_3^{2-}\right]$ was found to be $1.2 \times 10^{-3}M$. The concentration of F^- in the solution would be : $\left(K_{sp}ofSrCO_3 = 7 \times 10^{-10}K_{sp}ofSrF_2 = 8 \times 10^{-10}\right)$

A. $1.3 \times 10^{-3}M$

B. $2.6 \times 10^{-2}M$

C. $3.7 \times 10^{-2}M$

D. $5.8 \times 10^{-7}M$

Answer: C

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4. What is the maximum concentration of Mg^{+2} that can be introduced into a solution containing $0.1 MNH_3$ and $0.01 MNH_4^+$ without causing precipitation of $Mg(OH)_2 ? K_b of NH_3 = 10^6 K_{sp} of Mg(OH)_2 = 1.2 \times 10^{-12}$

A. $0.012M$

B. $0.24M$

C. $0.024M$

D. $0.048M$

Answer: A

Watch Video Solution

5. Out of $Ca^{2+}, Al^{3+}, Bi^{3+}, Mg^{2+}$ and Zn^{2+} the reagents NH_4Cl and aqueous NH_3 will precipitate

A. Ca^{2+}, Al^{3+}

B. Al^{3+}, Bi^{3+}

C. $Bi^{3+}, \left(Mg^{2+}\right.$

D. Mg^{2+}, Zn^{2+}

Answer: B

Watch Video Solution

6. In qualitative analysis, to identify the IIA group sulphides, HCl is added to salt solution before the additions of H_2S. Because

A. Low S^{2-} ion concentration is required to get ppt

B. High S^{2-} ion concentration is required to get ppt

C. IIA group metal sulphides have higher values of K_{sp} than that of IVA group metal sulphides

D. P^H value increases

Answer: A

View Text Solution

7. If the solubility product of $MOHis1 \times 10^{-10} mol^2 dm^{-2}$ Then the P^H of its aqueous solutions will be

A. 12

B. 9

C. 6

D. 3

Answer: B

Watch Video Solution

8. $K_{sp}\left(BaSO_4\right)$ is 1.1×10^{10}. In which case is $BaSO_4$ precipitated ?

A. $100 mLof 4 \times 10^{-3} Mof BaCl_2 + 300 mLof 6.0 \times 10^{-4} Mof Na_2SO_4$

B. $100 mLof 4 \times 10^{-4} Mof BaCl_2 + 300 mLof 6 \times 10^{-8} Mof Na_2SO_4$

C. $300 mL of 4 \times 10^{-4} M of BaCl_2 + 100 mL of 6.0 \times 10^{-8} M of Na_2SO_4$

D. in all cases

Answer: A

Watch Video Solution

9. A solution is saturated in $SrCO_3$, and SrF_2. The CO_3^{2-} was found to be 10^{-3} mol/L. If the concentration of Fin solution is represented as $y \times 10^{-2}$ M then what is the value of 'y'?

[Given : $K_{sp}(SrCO_3) = 2.5 \times 10^{-10}, K_{sp}(SrF_2) = 10^{-10}$]

A. $1.3 \times 10^{-3} M$

B. 2.6×10^{-2}

C. $3.7 \times 10^{-2} M$

D. $5.8 \times 10^{-7} M$

Answer: C

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10. What is the maximum concentration of Mg^{+2} that can be introduced into a solution containing $0.1 M NH_3$ and $0.01 M NH_4^+$ without causing precipitation of $Mg(OH)_2$? $K_b of NH_3 = 10^6 K_{sp} of Mg(OH)_2 = 1.2 \times 10^{-12}$

A. $0.012 M$

B. $0.24 M$

C. $0.024 M$

D. $0.048 M$

Answer: A

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11. Out of $Ca^{2+}, Al^{3+}, Bi^{3+}, Mg^{2+}$ and Zn^{2+} the reagents NH_4Cl and aqueous NH_3 will precipitate

A. Ca^{2+}, Al^{3+}

B. Al^{3+}, Bi^{3+}

C. $Bi^{3+}, \left(Mg^{2+}\right.$

D. Mg^{2+}, Zn^{2+}

Answer: B

Watch Video Solution

12. In qualitative analysis, to identily the HA group sulphides, HCl is added to salt solution before the addition of H_2S. Because

A. Low S^{2-} ion concentration is required to get ppt

B. High S^{2-} ion concentration is required to get ppt

C. IIA group metal sulphides have higher values of K_{sp} than that of IVA group metal sulphides

D. P^H value increases

Answer: A

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LECTURE SHEET (EXERCISE -IV LEVEL -II (ADVANCED) (More than One correct answer Type Questions))

1. An acid -base indicator has a $Kaof3.0 \times 10^{-5}$ The acid form of the indicator is red and the basic form is blue. Then

A. pH is 4.05 when indicator is 75 % red

B. pH is 5.00 when indicator is 75% blue

C. pH is 5.00 when indicator is 75 % red

D. pH is 4.05 when indicator is 75% blue

Answer: A::B

Watch Video Solution

2. An acid base indicator $\left(K_a = 10^{-5}\right)$ has its pH range 4.4 - 6.0. The correct statement (s) amongst the following is/are

A. The indicator will be suitable for the titration of a strong acid against a weak base.

B. The acidic colour of the indicator wil predominate if the concentration of acidic form is 4 times more than that of the basic form.

C. The indicator will be suitable for the titration of weak acid against a strong base.

D. The basic colour of the indicator will prevail when concentration of basic form will be at least 10 times more than that of the acidic form.

Answer: A::B::D

Watch Video Solution

3. During the titration of a mixture of Na_2CO_3 and $NaHCO_3$ against HCl

A. Phenolphthalein can be used to detect to detect the end point when half equivalent of Na_2CO_3 and full equivalent NaOH is consumed (first end point)

B. Phenolphthalein can be used to detect the second end point

C. Methyl orange can be used to detect the final end point

D. Methyl orange can be used to detect the first end point

Answer: A::C

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4. Which statement about solubility product is/are correct?

A. It is the product of ionic concentration of a slightly soluble salt in its saturated solution at a certain temp.

B. It may be used to calculate solubility of substance

C. If the product of ionic concentration of the ions present in a solution exceed its solubility product. The compounds is precipitated out.

D. If its ionic product is equal to solubility product, the solution is maintained at saturated level.

Answer: A::B::C::D

View Text Solution

5. $A(OH)_2$ is a partially soluble substance and its K_{sp} value is 4×10^{-12} Which of the following statement is/are correct ?

A. The solubility is unaffected by pH of the medium

B. Its solubility increases in a buffered medium having pH = 2

C. Its solubility decreases in a buffered medium having pH= 9

D. Its saturated solution has pH =10.3

Answer: B::C::D

View Text Solution

6. Which of the following statement is/are incorrect?

A. Solubility of AgCl is less in 0.5 M KCl solutionn than in pure water

B. Solubility of AgCl is more in 0.5 M $CaCl_2$ than in pure water

C. Solubility of AgCl is more in 1M $AgNO_3$ than in pure water

D. Solubility of AgCl is more in NH_3 than in pure water

Answer: B::C

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7. A solution contains 0.05M of each of NaCl and $Na_2, CrO_4,$. Solid $AgNO_3,$ is gradually added to it. Whichof the following facts true

(Given: $K_{sp}(AgCl) = 1.7 \times 106(- 10)M^2$ and $K_{sp}\left(Ag_2, CrO_4,\right) = 1.9 \times 10^{-12}M^3$:

A. Cl^- ions are precipitated first

B. CrO_4^{2-} ions are precipitated first

C. Both Cl^- and CrO_4^{2-} ions are precipitated together

D. The second ion starts precipitating when $\left[1^{st}ion\right] = 2.758 \times 10^{-5}$

Answer: A::D

Watch Video Solution

8. An acid -base indicator has a $Kaof3.0 \times 10^{-5}$ The acid form of the indicator is red and the basic form is blue. Then

A. pH is 4.05 when indicator is 75 % red

B. pH is 5.00 when indicator is 75% blue

C. pH is 5.00 when indicator is 75 % red

D. pH is 4.05 when indicator is 75% blue

Answer: A::B

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9. An acid base indicator $\left(K_a = 10^{-5}\right)$ has its pH range 4.4 - 6.0. The correct statement (s) amongst the following is/are

A. The indicator will be suitable for the titration of a strong acid against a weak base.

B. The acidic colour of the indicator wil predominate if the concentration of acidic form is 4 times more than that of the basic form.

C. The indicator will be suitable for the titration of weak acid against a strong base.

D. The basic colour of the indicator will prevail when concentration of basic form will be at least 10 times more than that of the acidic form.

Answer: A::B::D

Watch Video Solution

10. During the titration of a mixture of $NaOH, Na_2CO_3$ and inert substances against HCl

A. Phenolphthalein can be used to detect to detect the end point when half equivalent of Na_2CO_3 and full equivalent NaOH is consumed (first end point)

B. Phenolphthalein can be used to detect the second end point

C. Methyl orange can be used to detect the final end point

D. Methyl orange can be used to detect the first end point

Answer: A::C

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11. Which statement is correct?

A. It is the product of ionic concentration of a slightly soluble salt in its saturated solution at a certain temp.

B. It may be used to calculate solubility of substance

C. If the product of ionic concentration of the ions present in a solution exceed its solubility product. The compounds is precipitated out.

D. If its ionic product is equal to solubility product, the solution is maintained at saturated level.

Answer: A::B::C::D

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12. $A(OH)_2$ is a partially soluble substance and its K_{sp} value is 4×10^{-12} .

Which of the following statement is / are correct ?

A. The solubility is unaffected by pH of the medium

B. Its solubility increases in a buffered medium having pH = 2

C. Its solubility decreases in a buffered medium having pH= 9

D. Its saturated solution has pH =10.3

Answer: B::C::D

Watch Video Solution

13. Which of the following statement is/are incorrect?

A. Solubility of AgCl is less in 0.5 M KCl solutionn than in pure water

B. Solubility of AgCl is more in 0.5 M $CaCl_2$ than in pure water

C. Solubility of AgCl is more in 1M $AgNO_3$ than in pure water

D. Solubility of AgCl is more in NH_3 than in pure water

Answer: B::C

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14. A solution contains 0.05M of each of NaCl and Na_2, CrO_4,. Solid $AgNO_3$, is gradually added to it. Whichof the following facts true

(Given: $K_{sp}(AgCl) = 1.7 \times 106(- 10)M^2$ and $K_{sp}\left(Ag_2, CrO_4,\right) = 1.9 \times 10^{-12}M^3$:

A. Cl^- ions are precipitated first

B. CrO_4^{2-} ions are precipitated first

C. Both Cl^- and CrO_4^{2-} ions are precipitated together

D. The second ion starts precipitating when $\left[1^{st}ion\right] = 2.758 \times 10^{-5}$

Answer: A::D

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LECTURE SHEET (EXERCISE -IV LEVEL -II (ADVANCED) (Linked Comprehension Type Questions))

1. An acid-base titration consists of the controlled addition of a dissolved base to a dissolved acid (or the reverse). Acid and base react rapidly to neutralize each other. At the equivalence point, equivalents of reacting substances are equal. The pH during a titration changes every time with a drop of titrant added, but the rate of this change varies enormously. A titration curve, graph of pH as a function of the volume of titrant, displays in detail how the pH changes over the course of an acid base titration. Significantly,the pH changes most rapidly near the equivalence point. The exact shape of a titration curve depends on theK_a and K_b, of acid and base. < The suitable indicator for this titration will be :

A. bromo thymol blue

B. methyl orange

C. methyl red

D. all of these

Answer: D

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2. An acid-base titration consists of the controlled addition of a dissolved base to a dissolved acid (or the reverse). Acid and base react rapidly to neutralize each other. At the equivalence point, equivalents of reacting substances are equal. The pH during a titration changes every time with a drop of titrant added, but the rate of this change varies enormously. A titration curve, graph of pH as a function of the volume of titrant, displays in detail how the pH changes over the course of an acid base titration. Significantly,the pH changes most rapidly near the equivalence point. The exact shape of a titration curve depends on theK_a and K_b, of acid and base.

`

Which of the titration could it represent?

A. $HCl by NH_4OH$

B. $RbOH by HBr$

C. $CH_3COOH by NaOH$

D. $NH_3 by HNO_3$

Answer: B

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3. An acid-base titration consists of the controlled addition of a dissolved base to a dissolved acid (or the reverse). Acid and base react rapidly to neutralize each other. At the equivalence point, equivalents of reacting substances are equal. The pH during a titration changes every time with a drop of titrant added, but the rate of this change varies enormously. A titration curve, graph of pH as a function of the volume of titrant, displays in detail how the pH changes over the course of an acid base titration. Significantly. the pH changes most rapidly near the equivalence point. The exact shape of a titration curve depends on the K_a and K_b of acid and base

The pH at equivalence point is:

A. 11

B. 7

C. 3

D. 2

Answer: B

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4. A solution which remains in equilibrium with undissolved solute is said to be saturated. The concentration of a saturated solution at a given temperature is called solubility. The product of concentration of ions in a saturated solution of an electrolyte at a given temperature, is called solubility product $\left(K_{sp}\right)$. For the electrolyte,

$A_{x}, B_{y}, : A_{x}, B_{y(s)} \rightarrow xA^{y+} + y^{Bx-}$, with solubility S, the solubility product $\left(K_{sp}\right) = x^{x} \times y^{y} \times s^{x+y}$. While calculating the solubility of a sparingly soluble salt in the presence of some strong electrolyte containing a common ion, the common ion concentration is practically equal to that of strong electrolyte. If in a solution, the ionic product of an clectrolyte exceeds its K_{sp}, value at a particular temperature, then precipitation occurs.

The solubility of $PbSO_4$, in water is 0.303 g/l at $25\,^{\circ}$C, its solubility product at that temperature is

A. $10^{-4}M^2$

B. $9.18 \times 10^{-4}M$

C. $10^{-6}M^2$

D. $9.18 \times 10^{-8}M^2$

Answer: C

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5. A solution which remains in equilibrium with undissolved solute is said to be saturated. The concentration of a saturated solution at a given temperature is called solubility. The product of concentration of ions in a saturated solution of an electrolyte at a given temperature, is called solubility product $\left(K_{sp}\right)$. For the electrolyte, $A_{x'} B_{y'} : A_{x'} B_{y(s)} \rightarrow xA^{y+} + y^{Bx-}$, with solubility S, the solubility product $\left(K_{sp}\right) = x^x \times y^y \times s^{x+y}$. While calculating the solubility of a sparingly soluble salt in the presence of some strong electrolyte containing a common ion, the common ion concentration is practically equal to that of strong electrolyte. If in a solution, the ionic product of an clectrolyte exceeds its $K_{sp'}$ value at a particular temperature, then precipitation occurs.

The solubility of $BaSO_{4'}$ in 0.1 M $BaCl_{2'}$ solution is $\left(K_{sp'}\right.$ of $\left.BaSO_{4'} = 1.5 \times 10^{-9}\right)$

A. $1.5 \times 10^{-9} M$

B. $1.5 \times 10^{-8} M$

C. $2.25 \times 10^{-16} M$

D. $2.25 \times 10^{-18} M$

Answer: B

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6. Consider an ionic solid that dissolves in water according to the equation:

$M_nX_{m(s)} nM^{m+}_{aq} n + mX^{n-}_{aq}$. The equilibrium constant for this reaction, $K_{sp} = \left[M^{m+}\right]^n \left[X^{n-}\right]^m$ is known as the solubility product of M_n, X_m. The form of this euquilibrium is important in understanding effects such as the influence of pH, complex fomation and common ion cffect. Equilibrium constant in solution should be written correctly using activities and not concentrations. The difference between thesc quantities is large in concentrated ionic solutions and K_{sp} is quantitatively reliable as a guide of solubilities only for very dilute solutions, If solubility product of AB type salt is 4×10^{-10} at 18°C, and M.W of AB is 143.5 g/mol.

The solubility in g/lit of AB is

A. $14.35gm/\text{lit}$

B. $2.87 \times 10^{-3}gm/\text{lit}$

C. $1.43gm/\text{lit}$

D. $28.7gm/\text{lit}$

Answer: B

Watch Video Solution

7. Consider an ionic solid that dissolves in water according to the equation:

$M_nX_{m(s)}nM^{m+}_{aq}\ n + mX^{n-}_{aq}$. The equilibrium constant for this reaction, $K_{sp} = \left[M^{m+}\right]^n\left[X^{n-}\right]^m$ is known as the solubility product of M_n, X_m. The form of this euquilibrium is important in understanding effects such as the influence of pH, complex fomation and common ion cffect. Equilibrium constant in solution should be written correctly using activities and not concentrations. The difference between thesc quantities is large in concentrated ionic solutions and K_{sp} is quantitatively reliable as a guide of solubilities only for very dilute solutions, If solubility product of AB type salt is 4×10^{-10} at 18°C, and M.W of AB is 143.5 g/mol.

If ppt. of AB is washed with 5 lit water, loss in wt. of ppt. of AB is

A. $10^{-4} mol / \text{lit}$

B. 10^{-4} gm

C. $10^{-4} mol$

D. $10^{-4} mg$

Answer: C

Watch Video Solution

8. Consider an ionic solid that dissolves in water according to the equation:

$M_nX_{m(s)} nM_{aq}^{m+} n + mX_{aq}^{n-}$. The equilibrium constant for this reaction, $K_{sp} = \left[M^{m+}\right]^n\left[X^{n-}\right]^m$ is known as the solubility product of M_n, X_m. The form of this euquilibrium is important in understanding effects such as the influence of pH, complex fomation and common ion cffect. Equilibrium constant in solution should be written correctly using activities and not concentrations. The difference between thesc quantities is large in concentrated ionic solutions and K_{sp} is quantitatively reliable as a guide of solubilities only for very dilute solutions, If solubility product of AB type salt is 4×10^{-10} at 18°C, and M.W of AB is 143.5 g/mol.

The solubility in g/lit of AB is

A. all the solute settles down

B. unsaturated solution is formed

C. exactly saturated solution is formed without undissolved traces

D. a part of salt settles down

Answer: D

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9. An acid-base titration consists of the controlled addition of a dissolved base to a dissolved acid (or the reverse). Acid and base react rapidly to neutralize each other. At the equivalence point, equivalents of reacting substances are equal. The pH during a titration changes every time with a drop of titrant added, but the rate of this change varies enormously. A titration curve, graph of pH as a function of the volume of titrant, displays in detail how the pH changes over the course of an acid base titration. Significantly. the pH changes most rapidly near the equivalence point. The exact shape of a titration curve depends on the K_a and K_b of acid and base

The pH at equivalence point is:

A. bromo thymol blue

B. methyl orange

C. methyl red

D. all of these

Answer: D

Watch Video Solution

10. An acid-base titration consists of the controlled addition of a dissolved base to a dissolved acid (or the reverse). Acid and base react rapidly to neutralize each other. At the equivalence point, equivalents of reacting substances are equal. The pH during a titration changes every time with a drop of titrant added, but the rate of this change varies enormously. A titration curve, graph of pH as a function of the volume of titrant, displays in detail how the pH changes over the course of an acid base titration. Significantly. the pH changes most rapidly near the equivalence point. The exact shape of a titration curve depends on the K_a and K_b of acid and base

The suitable indicator for this titration will be:

A. $HClbyNH_4OH$

B. $RbOHbyHBr$

C. $CH_3COOHbyNaOH$

D. NH_3byHNO_3

Answer: B

Watch Video Solution

11. An acid-base titration consists of the controlled addition of a dissolved base to a dissolved acid (or the reverse). Acid and base react rapidly to neutralize each other. At the equivalence point, equivalents of reacting substances are equal. The pH during a titration changes every time with a drop of titrant added, but the rate of this change varies enormously. A titration curve, graph of pH as a function of the volume of titrant, displays in detail how the pH changes over the course of an acid base titration. Significantly. the pH changes most rapidly near the equivalence point. The exact shape of a titration curve depends on the K_a and K_b of acid and base

The pH at equivalence point is:

A. 11

B. 7

C. 3

D. 2

Answer: B

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12. A solution which remains in equilibrium with undissolved solute is said to be saturated. The concentration of a saturated solution at a given temperature is called solubility. The product of concentration of ions in a saturated solution of an electrolyte at a given temperature, is called solubility product $\left(K_{sp}\right)$. For the electrolyte, $A_x, B_y, : A_x, B_{y(s)} \rightarrow xA^{y+} + y^{Bx-}$, with solubility S, the solubility product $\left(K_{sp}\right) = x^x \times y^y \times s^{x+y}$. While calculating the solubility of a sparingly soluble salt in the presence of some strong electrolyte containing a common ion, the common ion concentration is practically equal to that of strong electrolyte. If in a solution, the ionic product of an clectrolyte exceeds its K_{sp}, value at a particular temperature, then precipitation occurs.

The solubility of $PbSO_4$, in water is 0.303 g/l at $25\,^\circ C$, its solubility product at that temperature is

A. $10^{-4}M^2$

B. $9.18 \times 10^{-4}M$

C. $10^{-6}M^2$

D. $9.18 \times 10^{-8}M^2$

Answer: C

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13. A solution which remains in equilibrium with undissolved solute is said to be saturated. The concentration of a saturated solution at a given temperature is called solubility. The product of concentration of ions in a saturated solution of an electrolyte at a given temperature, is called solubility product $\left(K_{sp}\right)$. For the electrolyte, $A_x, B_y, : A_x, B_{y(s)} \rightarrow xA^{y+} + y^{Bx-}$, with solubility S, the solubility product $\left(K_{sp}\right) = x^x \times y^y \times s^{x+y}$. While calculating the solubility of a sparingly soluble salt in the presence of some strong electrolyte containing a common ion, the common ion concentration is practically equal to that of strong electrolyte. If in a solution, the ionic product of an clectrolyte exceeds its K_{sp}, value at a particular temperature, then precipitation occurs.

The solubility of $BaSO_4$, in 0.1 M $BaCl_2$, solution is $\left(K_{sp}, \text{ of } BaSO_4, = 1.5 \times 10^{-9}\right)$

A. $1.5 \times 10^{-9} M$

B. $1.5 \times 10^{-8} M$

C. $2.25 \times 10^{-16} M$

D. $2.25 \times 10^{-18} M$

Answer: B

Watch Video Solution

14. Consider an ionic solid that dissolves in water according to the equation:

$M_nX_{m(s)} nM_{aq}^{m+} n + mX_{aq}^{n-}$. The equilibrium constant for this reaction, $K_{sp} = \left[M^{m+}\right]^n \left[X^{n-}\right]^m$ is known as the solubility product of M_n, X_m. The form of this euquilibrium is important in understanding effects such as the influence of pH, complex fomation and common ion cffect. Equilibrium constant in solution should be written correctly using activities and not concentrations. The difference between thesc quantities is large in concentrated ionic solutions and K_{sp} is quantitatively reliable as a guide of solubilities only for very dilute solutions, If solubility product of AB type salt is 4×10^{-10} at 18° C, and M.W of AB is 143.5 g/mol.

The solubility in g/lit of AB is

A. $14.35 gm/\text{lit}$

B. $2.87 \times 10^{-3} gm/\text{lit}$

C. $1.43 gm/\text{lit}$

D. $28.7 gm/\text{lit}$

Answer: B

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15. Consider an ionic solid that dissolves in water according to the equation:

$M_nX_{m(s)} nM_{aq}^{m+} n + mX_{aq}^{n-}$. The equilibrium constant for this reaction, $K_{sp} = \left[M^{m+}\right]^n\left[X^{n-}\right]^m$ is known as the solubility product of M_n, X_m. The form of this euquilibrium is important in understanding effects such as the influence of pH, complex fomation and common ion cffect. Equilibrium constant in solution should be written correctly using activities and not concentrations. The difference between thesc quantities is large in concentrated ionic solutions and K_{sp} is quantitatively reliable as a guide of solubilities only for very dilute solutions, If solubility product of AB type salt is 4×10^{-10} at $18\,^{\circ}$C, and M.W of AB is 143.5 g/mol.

The solubility in g/lit of AB is

A. $10^{-4} mol/\text{lit}$

B. 10^{-4} gm

C. $10^{-4} mol$

D. $10^{-4} mg$

Answer: C

Watch Video Solution

16. Consider an ionic solid that dissolves in water according to the equation:

$M_nX_{m(s)} nM^{m+}_{aq} n + mX^{n-}_{aq}$. The equilibrium constant for this reaction, $K_{sp} = \left[M^{m+}\right]^n\left[X^{n-}\right]^m$ is known as the solubility product of M_n, X_m. The form of this euquilibrium is important in understanding effects such as the influence of pH, complex fomation and common ion cffect. Equilibrium constant in solution should be written correctly using activities and not concentrations. The difference between thesc quantities is large in concentrated ionic solutions and K_{sp} is quantitatively reliable as a guide of solubilities only for very dilute solutions, If solubility product of AB type salt is 4×10^{-10} at $18\,^{\circ}$C, and M.W of AB is 143.5 g/mol.

The solubility in g/lit of AB is

A. all the solute settles down

B. unsaturated solution is formed

C. exactly saturated solution is formed without undissolved traces

D. a part of salt settles down

Answer: D

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LECTURE SHEET (EXERCISE -IV LEVEL -II (ADVANCED) (Matrix Matching Type Questions))

1. Match the following columns

Column-I	Column-II
A) Radius of n^{th} orbit	P) Inversely proportional to Z
B) Energy of n^{th} shell	Q) Integral multiple of $h/2\pi$
C) Angular momentum is lowest orbital	R) Proportional to $\left(-\frac{1}{n^2}\right)$
D) velocity of electron in n^{th} orbit	S) Inversely proportional to n

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2.

Column-I	Column-II
A) 20 ml of 0.1 M CH_3COOH + 50 ml of 0.1M NaOH	P) pH >7
B) 20 ml of 0.1M NH_4OH + 50 ml of 0.1M CH_3COOH	Q) pH < 7
C) 50 ml of 0.1M NaOH + 50 ml of 0.1M CH_3COOH	R) Phenolphthalein is suitable indicator
D) 20 ml of 0.1M NH_4OH + 20 ml of 0.1M H_2SO_4	S) MeOH is suitable indicator

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3.

Column-I (Indicator)	Column-II (Types of titration)
A) Phenolphthalein (8.3-10.0)	P) NaOH + HCl
B) Phenol red (6.8-8.4)	Q) $H_2SO_4 + NH_4OH$
C) Bromo cresol green (3.8-5.4)	R) CH_3COOH + NaOH
D) Methyl orange (3.1-4.4)	S) $KOH + H_2SO_4$

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4.

Column-I	Column-II
A) 20 ml of 0.1 M CH_3COOH + 50 ml of 0.1M NaOH	P) pH >7
B) 20 ml of 0.1M NH_4OH + 50 ml of 0.1M CH_3COOH	Q) pH < 7
C) 50 ml of 0.1M NaOH + 50 ml of 0.1M CH_3COOH	R) Phenolphthalein is suitable indicator
D) 20 ml of 0.1M NH_4OH + 20 ml of 0.1M H_2SO_4	S) MeOH is suitable indicator

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LECTURE SHEET (EXERCISE -IV LEVEL -II (ADVANCED) (Integer Type Questions))

1. Calculate the pH at which an acid indicator with K_{a}, $= 1.0 \times 10^{-5}$ changes colour when the indicator concentration is 1.0×10^{-3} M

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2. The K, of an indicator HIn is $9x10^{4}$, The percentage of the basic form of indicator is 10x in a solution of pH = 4. What is x ?

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3. K_{sp} of $M(OH)_{x}$, is 27×10^{-12} and its solubility in water is 10^{-3} mol $litre^{-1}$. Find the value of X

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4. Solubility products of ACO_3, BSO_4, and ASO_4, are 4×10^{-10}, 6×10^{-10} and 8×10^{-10} respectively. The solubility product of BCO_3, is x x 10^{-10}, What is x ?

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5. The solubility product of a springly soluble metal hydroxide $\left[M(OH)_2\right] is 5 \times 10^{-16} mol^3 L^{-3}$ at 298 K.Find the pH of its saturated aqucous solutions.

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6. The solubility product of SrF_2 in water is 8×10^{-10} Calculate its solubility in 0.1 M of aqueous NaF solution. If its solubility is expressed as $y \times 10^{-8}$ then what is the value of 'y' ?

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7. Few drops of dilute solution of $AgNO_3$ are added to a litre of 0.1 M solution of KCl and it is found that some AgCl settles down at the bottom . If concentration of $Ag^+ is 10^{-x}$, find x, $\left(K_{sp} = 10^{10}\right)$

Watch Video Solution

8. A saturated 0.01 M H_2 S solution is buffered at pH =3 with exactly sufficient Pb$\left(NO_3\right)_2$ to not precipitate Pbc. K_a of $H_2S = 10^{-23}$, K_{sp} of Pbs = 10^{-28}. The concentration of Pb^{+2} in the solution is 10^{-x}. What is x ?

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9. Calculate the concentration of free silver ion $\left[Ag^+\right]$ in an aqueous solution that is prepared as $0.1 M AgNO_3$ and $3.0 M NH_3, Ag^+(aq) + 2NH_3(aq) \Leftrightarrow \left[Ag\left(NH_3\right)_2\right]^+(aq) K_f = 1.6$. If answer is $x \times 10^{-10} M$ then x= _____?

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10. Calculate the pH at which an acid indicator with $K_a = 1.0 \times 10^{-5}$ changes colour when the indicator concentration is $1.0 \times 10^{-3}M$.

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11. The K, of an indicator HIn is $9x10^4$, The percentage of the basic form of indicator is 10x in a solution of pH = 4. What is x ?

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13. Solubility products of ACO_3, BSO_4 and $ASO_4 are 4 \times 10^{-10}, 6 \times 10^{-10}$ and 8×10^{-10} respectively. The solubility product of $BCO_3 is x \times 10^{-10}$ What is x?

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18. Calculate the concentration of free silver ion $\left[Ag^+\right]$ in an aqueous solution that is prepared as

$0.1 M AgNO_3$ and $3.0 M NH_3, Ag^+(aq) + 2NH_3(aq) \Leftrightarrow \left[Ag\left(NH_3\right)_2\right]^+(aq) K_f = 1.6$

. If answer is $x \times 10^{-10} M$ then x= _____?

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PRACTICE SHEET (EXERCISE -I LEVEL -I (MAIN) (Straight Objective Type Questions))

1. Explain the acidic nature of phenol.

A. HCl

B. HCOOH

C. H_2SO_4

D. CO_2

Answer: D

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2. The species which does not have a conjugate base is

A. H_3PO_4

B. $H_2PO_3^-$

C. $H_2PO_2^-$

D. HPO_4^{2-}

Answer: C

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3. Which of the following is a Bronsted-Lowry acid but not an Arrhenius acid?

A. HCl

B. NH_4^+

C. BF_3

D. CH_3COOH

Answer: B

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4. Which of the following is a neutral salt ?

A. Na_3PO_4

B. $CaSO_4$

C. Na_2CO_3

D. all the above

Answer: D

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5. Which of the following is not a conjugate acid base pair?

A. HPO_4^{2-}, PO_4^{3-}

B. $H_2PO_4^-, HPO_4^{2-}$

C. $H_2PO_4^-, H_3PO_4$

D. $H_2PO_4^-, PO_4^{3-}$

Answer: D

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6. In which set of diatomic species the bond order is 2.5 ?

A. $H_3O^+, HPO_4^{2-}, HCO_3^-$

B. $H_2O, HPO_3^{2-}, H_2PO_2^-$

C. $HSO_4^-, HPO_4^-, H_2PO_3^-$

D. All

Answer: C

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7. Asparticacid + A $\xrightarrow{\text{Transaminase}}$ B + Glutamic acid

In the above reaction A and B respectively,

A. 2

B. 3

C. 4

D. 5

Answer: B

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8. Which of the following species acts as Bronsted base but not as acid ?

A. CH_3COOH

B. HCO_3^-

C. $H_2PO_2^-$

D. $H_2PO_3^-$

Answer: C

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9. Which of the following relatively more strong acid in aqueous solutions?

A. $HClO_4$

B. H_2SO_4

C. Hl

D. All are equaly strong

Answer: D

Watch Video Solution

10. Weakest conjugate base is obtained from

A. HNO_3

B. CH_3COOH

C. HCN

D. H_2S

Answer: A

Watch Video Solution

11. Choose the correct increasing order of acidic strength

A. $OH^- < H_2O < NH_4^- < HF < H_3O^+$

B. $H_3O^+ < HF > H_2O > NH_4^- > OH^-$

C. $NH_4^+ < HF < H_3O^+ < H_2O < OH^-$

D. $H_3O^+ < NH_4^+ < HF < OH^- < H_2O$

Answer: A

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12. Which of the following statements is true ?

A. HNO_3 is a stronger acid than HNO_2

B. H_3PO_3 is stronger acid than H_2SO_3

C. In aqueous solution HF is stronger acid than HCl

D. $HClO_4$ is a weaker acid than $HClO_3$

Answer: A

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13. Assertion (A) : HNO_3 is not a Bronsted acid in $CHCl_3$

Reason (R) : $CHCl_3$ is an example of aprotic solvent .

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 false

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

Answer: A

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14. Which of the following acts as Lewis base?

A. SCN^-

B. R_2O

C. RNH_2

D. All the above

Answer: D

Watch Video Solution

15. Which of the following acts as Lewis acid ?

A. $HCOO^-$

B. H_2SO_4

C. SiF_4

D. H_2S

Answer: C

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16. Nitrogen trihalides are

A. Lewis acid

B. Lewis base

C. Lowry-Bronsted acid

D. Arrhenius base

Answer: C

Watch Video Solution

17. In a complex compound ligand acts as

A. Lewis acid

B. Lewis base

C. Lowry-Bronsted acid

D. Arrhenius base

Answer: B

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18. Arrhenius theory could not explain the acidic nature of

A. HCl

B. HCOOH

C. H_2S

D. CO_2

Answer: D

Watch Video Solution

19. The species which does not have a conjugate base is

A. H_3PO_4

B. $H_2PO_3^-$

C. $H_2PO_2^-$

D. HPO_4^{2-}

Answer: C

Watch Video Solution

20. Which of the following is a Bronsted-Lowry acid but not an Arrhenius acid?

A. HCl

B. NH_4^+

C. BF_3

D. CH_3COOH

Answer: B

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21. Which of the following is a neutral salt ?

A. Na_3PO_4

B. $CaSO_4$

C. Na_2CO_3

D. all the above

Answer: D

Watch Video Solution

22. Which of the following is not a conjugate acid base pair?

A. HPO_4^{2-}, PO_4^{3-}

B. $H_2PO_4^-, HPO_4^{2-}$

C. $H_2PO_4^-, H_3PO_4$

D. $H_2PO_4^-, PO_4^{3-}$

Answer: D

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23. Which is the set of amphiprotic species?

A. $H_3O^+, HPO_4^{2-}, HCO_3^-$

B. $H_2O, HPO_3^{2-}, H_2PO_2^-$

C. $HSO_4^-, HPO_4^-, H_2PO_3^-$

D. All

Answer: C

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24. H_2CO_3 ionises in two stages as represented below

$$H_2CO_3 + H_2O \Leftrightarrow H_3O^+ + HCO_3^-, HCO_3^- + H_2O \Leftrightarrow H_3O^+ CO_3^{2-}$$

the no. of conjugate acid -base pairs in the above reaction are

A. 2

B. 3

C. 4

D. 5

Answer: B

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25. Which of the following species acts as Bronsted base but not as acid ?

A. CH_3COOH

B. HCO_3^-

C. $H_2PO_2^-$

D. $H_2PO_3^-$

Answer: C

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26. Which of the following relatively more strong acid in aqueous solutions?

A. $HClO_4$

B. H_2SO_4

C. HI

D. All are equaly strong

Answer: D

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27. Weakest conjugate base is obtained from

A. HNO_3

B. CH_3COOH

C. HCN

D. H_2S

Answer: A

Watch Video Solution

28. Arrange NH_4^+, H_2O, H_3O^+ ,HF and OH^- in increasing order of acidic nature :

A. $OH^{-} < H_2O < NH_4^{-} < HF < H_3O^{+}$

B. $H_3O^{+} < HF > H_2O > NH_4^{-} > OH^{-}$

C. $NH_4^{+} < HF < H_3O^{+} < H_2O < OH^{-}$

D. $H_3O^{+} < NH_4^{+} < HF < OH^{-} < H_2O$

Answer: A

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29. Which of the following statement is true

A. HNO_3 is a stronger acid than HNO_2

B. H_3PO_3 is stronger acid than H_2SO_3

C. In aqueous solution HF is stronger acid than HCl

D. $HClO_4$ is a weaker acid than $HClO_3$

Answer: A

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30. Assertion (A) : HNO_3 is not a Bronsted acid in $CHCl_3$

Reason (R) : $CHCl_3$ is an example of aprotic solvent .

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 false

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

Answer: A

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31. Which of the following acts as Lewis base?

A. SCN^-

B. R_2O

C. RNH_2

D. All the above

Answer: D

Watch Video Solution

32. Which of the following acts as Lewis acid ?

A. $HCOO^-$

B. H_2SO_4

C. SiF_4

D. H_2S

Answer: C

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33. Nitrogen trihalides are

A. Lewis acid

B. Lewis base

C. Lowry-Bronsted acid

D. Arrhenius base

Answer: C

Watch Video Solution

34. In a complex compound ligand acts as

A. Lewis acid

B. Lewis base

C. Lowry-Bronsted acid

D. Arrhenius base

Answer: B

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PRACTICE SHEET (EXERCISE -I LEVEL -II (ADVANCED) (Straight Objective Type Questions))

1. Conjugate base of $\left[Cu\left(NH_3\right)_6\right]^{2+}$ is

A. $\left[Cu\left(NH_3\right)_3NH_2\right]^{-}$

B. $\left[Cu\left(NH_3\right)_5NH_2\right]^{+}$

C. $\left[Cu\left(NH_3\right)_4NH_2\right]^{+}$

D. $\left[Cu\left(NH_3\right)_4NH_2\right]^{2+}$

Answer: B

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2. Identify Bronsted Lowry acids in the reaction given below ?

$$\left[AlH_2O\right)_6]^{3+} + HCO_3 \rightarrow [A]\left(H_2O\right)(OH)]^{2+} + H_2CO_3$$

A. A,C

B. A,D

C. B,D

D. B,C

Answer: B

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3. Glycine exists as the zwitter ion, N^+H_3, CH_2, COO^-. Its conjugate base is

A. NH_2CH_2COOH

B. $NH_2CH_2COO^-$

C. NH_3CH_2COOH

D. $NH_3CH_2COOH^+$

Answer: B

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4. What is the decreasing order of strength of the bases OH, NH_2 , H-C=C and $CH_3, \ - CH_2,$

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

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

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

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

Answer: A

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5. Acetic acid and glucose have same

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

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

Answer: A

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6. $HClO_4$ is a poor conductor in

A. Water

B. $dil. NH_3$

C. Acetic acid

D. NaOH solution

Answer: C

Watch Video Solution

7. Enthalpy of neutralization is defined as the enthalpy change when 1 mole of acid/base is completely neutralized by base/acid in dilute solution. For strong acid and strong base neutralization net chemical change is $H^{+}_{(aq)} + OH^{-}_{(aq)} \rightarrow H_2O_{(l)}, \Delta H^0_r \equiv -55.84 kJ/mol$

If enthalpy of neutralization of CH_3COOH by NaoH is -49.86 kJ/mol then enthalpy of ionisation of CH_3COOH is

A. H_2O

B. $NaOH$

C. CS_2

D. HCl

Answer: D

Watch Video Solution

8. Conjugate base of $\left[Cu\left(NH_3\right)_6\right]^{2+}$ is

A. $\left[Cu\left(NH_3\right)_3NH_2\right]^{-}$

B. $\left[Cu\left(NH_3\right)_5NH_2\right]^{+}$

C. $\left[Cu\left(NH_3\right)_4NH_2\right]^{+}$

D. $\left[Cu\left(NH_3\right)_4NH_2\right]^{2+}$

Answer: B

Watch Video Solution

9. Identify Bronsted Lowry acids in the reaction given below ?

$\left[AIH_2O\right)_6]^{3+} + HCO_3 \rightarrow [A]\left(H_2O\right)(OH)]^{2+} + H_2CO_3$

A. A,C

B. A,D

C. B,D

D. B,C

Answer: B

Watch Video Solution

10. Glycine exists as the zwitter ion, N^+H_3, CH_2, COO^-. Its conjugate base is

A. NH_2CH_2COOH

B. $NH_2CH_2COO^-$

C. NH_3CH_2COOH

D. $NH_3CH_2COOH^+$

Answer: B

Watch Video Solution

11. What is the decreasing order of strength of the bases OH, NH_2 , H-C=C and CH_3, $-CH_2$,

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

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

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

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

Answer: A

Watch Video Solution

12. Assertion (A) : In water ,HCl and HNO_3 have same strength . But their strength in acetic acid are different .

Reason (R) : Acetic acid is stronger acid that water.

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

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

Answer: A

Watch Video Solution

13. $HClO_4$ is a poor conductor in

A. Water

B. $dil.\ NH_3$

C. Acetic acid

D. NaOH solution

Answer: C

Watch Video Solution

14. Aniline is a strong base in

A. H_2O

B. $NaOH$

C. CS_2

D. HCl

Answer: D

Watch Video Solution

PRACTICE SHEET (EXERCISE -I LEVEL -II (ADVANCED) (More than One correct answer Type Questions))

1. (A): HCl is not acidic in benzene.

(R): Benzene does not accept protons

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

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

Answer: A

Watch Video Solution

2. On the basis of Bronsted concepts, which of the following are the correct representations?

A. $CH_3CH_2OH + HCl \Leftrightarrow CH_3CH_2O^+H_2 + Cl^-$

B. $CH_3CH_2OH + NH_2 \Leftrightarrow CH_3CH_2O^+H_2 + NH^{2-}$

C. $CH_3COOH + CH_3O^- \Leftrightarrow cH_3COO^- + CH_3OH$

D. $CH_3COOH + CH_3NH_2 \Leftrightarrow CH_3COO^+H_2 + CH_3NH^-$

Answer: A::C

Watch Video Solution

3. Which of the following is wrong?

A. All Bronsted bases are Lewis bases

B. All Lewis acids are Bronsted acids

C. All Arrhenius acids are Bronsted acids

D. All Arhenius bases are Bronsted bases

Answer: B

Watch Video Solution

4. Based on the following equilibrium reactions

$HNO_2 + HF \rightarrow H_2F^+ + NO_2^-$

$CH_3COOH + HF \rightarrow F + CH_3COOH_2^+$

$H_2O + CH_3COOH \rightarrow H_3O^+ + CH_3COO^-$

Which are the correct order (s) regarding acid strength

A. $H_2O < CH_3COOH$

B. $HF < HNO_2$

C. $H_2O < HF$

D. $CH_3COOH < HNO_2$

Answer: A::B::C::D

Watch Video Solution

5. (A): HCl is not acidic in benzene.

(R): Benzene does not accept protons

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

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

Answer: A

Watch Video Solution

6. On the basis of Bronsted concepts, which of the following are the correct representations?

A. $CH_3CH_2OH + HCl \Leftrightarrow CH_3CH_2O^+H_2 + Cl^-$

B. $CH_3CH_2OH + NH_2 \Leftrightarrow CH_3CH_2O^+H_2 + NH^{2-}$

C. $CH_3COOH + CH_3O^- \Leftrightarrow cH_3COO^- + CH_3OH$

D. $CH_3COOH + CH_3NH_2 \Leftrightarrow CH_3COO^+H_2 + CH_3NH^-$

Answer: A::C

Watch Video Solution

7. Which of the following is wrong ?

A. All Bronsted bases are Lewis bases

B. All Lewis acids are Bronsted acids

C. All Arrhenius acids are Bronsted acids

D. All Arhenius bases are Bronsted bases

Answer: B

Watch Video Solution

8. Based on the following equilibrium reactions

$HNO_2 + HF \rightarrow H_2F^+ + NO_2^-$

$CH_3COOH + HF \rightarrow F + CH_3COOH_2^+$

$H_2O + CH_3COOH \rightarrow H_3O^+ + CH_3COO^-$

Which are the correct order (s) regarding acid strength

A. $H_2O < CH_3COOH$

B. $HF < HNO_2$

C. $H_2O < HF$

D. $CH_3COOH < HNO_2$

Answer: A::B::C::D

Watch Video Solution

PRACTICE SHEET (EXERCISE -I LEVEL -II (ADVANCED) (Linked Comprehension Type Questions))

1. Acid base theories are important to understand the role of many substances in different reactions. Different theories are in practice which have advantages as well as limitations at their level. We always consider most convenient theory under the given conditions.

Which of the following is not Arrhenius acid

A. H_3PO_4

B. HNO_3

C. H_3PO_2

D. H_3BO_3

Answer: D

Watch Video Solution

2. Acid base theories are important to understand the role of many substances in different reactions. Different theories are in practice which have advantages as well as limitations at their level. We always consider most convenient theory under the given conditions.

Which of the following is not Bronsted base

A. HS^{-}

B. CH_3COOH

C. HF

D. H_3O^{+}

Answer: D

Watch Video Solution

3. $\begin{array}{ll} \text{List-I} & \text{List-II} \\ (A) SiF_4 & P. \text{ Lewis acid} \\ (B) CO_2 & Q. \text{ Lewis base} \\ (C) SO_2 & R. \text{ Bronstead acid} \\ (D) NH_3 & S. \text{ Bronstead base} \end{array}$

Watch Video Solution

4. Acid base theories are important to understand the role of many substances in different reactions. Different theories are in practice which have advantages as well as limitations at their level. We always consider most convenient theory under the given conditions.

Which of the following is not Arrhenius acid

A. H_3PO_4

B. HNO_3

C. H_3PO_2

D. H_3BO_3

Answer: D

Watch Video Solution

5. Acid base theories are important to understand the role of many substances in different reactions. Different theories are in practice which have advantages as well as limitations at their level. We always consider most convenient theory under the given conditions.

Which of the following is not Bronsted base

A. HS^-

B. CH_3COOH

C. HF

D. H_3O^+

Answer: D

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6.

List-I	List-II
$(A)SiF_4$	P. Lewis acid
$(B)CO_2$	Q. Lewis base
$(C)SO_2$	R. Bronstead acid
$(D)NH_3$	S. Bronstead base

Watch Video Solution

PRACTICE SHEET (EXERCISE -I LEVEL -II (ADVANCED) (Matrix Matching Type Questions))

1. Acid base theories are important to understand the role of many substances in different reactions. Different theories are in practice which have advantages as well as limitations at their level. We always consider most convenient theory under the given conditions.

Which of the following is strong conjugate base

A. F^-

B. Cl^-

C. Br^-

D. I^-

Answer: A

Watch Video Solution

2. Acid base theories are important to understand the role of many substances in different reactions. Different theories are in practice which have advantages as well as limitations at their level. We always consider most convenient theory under the given conditions.

Which of the following is strong conjugate base

A. F^-

B. Cl^-

C. Br^-

D. I^-

Answer: A

Watch Video Solution

PRACTICE SHEET (EXERCISE -II LEVEL -I (MAIN) (Straight Objective Type Questions))

1. The value of ionic product of water increases with increase in

A. Acidic nature of solution

B. Basic nature of solution

C. Temperature

D. Volume of the solution

Answer: C

Watch Video Solution

2. P^H of a solution is independent of

A. Temperature

B. Nature of the solution

C. Degree of dissociation of acid (or) base

D. Volume of the solution

Answer: D

Watch Video Solution

3. At 100° C, the value of $P^{k_w is}$

A. 14

B. < 14

C. > 14

D. $P^H - P^{OH}$

Answer: C

Watch Video Solution

4. Which of the following is wrong ?

A. At any temperature P^H of water is exactly equal to 7

B. At$25^{\circ}C$, the P^{H} of an acid is less than 7

C. At $25^{\circ}C$, the p^{H} of a base is greater than 7

D. At $25^{\circ}C$, the P^{OH} of water is equal to 7

Answer: A

Watch Video Solution

5. If the ionic product of water $\left(K_w\right) is 1.96 \times 10^{-14} at 35^{\circ}C$ what is its value at $10^{\circ}C$?

A. 1.96×10^{-14}

B. 3.92×10^{-14}

C. 2.95×10^{-15}

D. 1.96×10^{-13}

Answer: D

Watch Video Solution

6. At 25^{0}C, the hydroxyl ion concentration of a basic solution is 6.75×10^{-3} M.Then the value of K_w is

A. $13.5 \times 10^{-6} M^2$

B. $13.5 \times 10^{-12} M^2$

C. $13.5 \times 10^{-8} M^2$

D. $10^{-14} M^2$

Answer: D

Watch Video Solution

7. At certain temperature the K_w of D_2,O is $10^{=-16}$ M. Then the pD of pure D_2,O at that temperature is

A. 7

B. 16

C. 8

D. 6

Answer: C

Watch Video Solution

8. One litre of water contains 10^{-7} moles of H^{+} ions . Degree of ionisation of water (in percentage) is

A. 1.8×10^{-7}

B. 1.8×10^{-9}

C. 3.6×10^{-7}

D. 3.6×10^{-9}

Answer: A

Watch Video Solution

9. The $\left[OH^{-}\right]$ of a solution is 10^{-10} Its pH is

A. 4

B. 10

C. 7

D. 9

Answer: A

Watch Video Solution

10. The pH of a 0.005 MH_2SO_4 solution is

A. 5.0

B. 2.0

C. 2.3

D. 3.3

Answer: B

Watch Video Solution

11. The P^H of a solution is 3.602. Its H^+ ion concentration is

A. 4×10^{-14}

B. 2.5×10^{-11}

C. 2.5×10^{-4}

D. 5.0×10^{-4}

Answer: C

Watch Video Solution

12. The ionic product of water is 10^{-14}, The H^+ ion concentration in 0.1 M NaOH soluiion is

A. $10^{-11}M$

B. $10^{-13}M$

C. $10^{-1}M$

D. $10^{-4}M$

Answer: B

Watch Video Solution

13. What is the pH of a solution obtained by dissolving 0.0005 mole of the strong electrolyte, calcium hydroxide, $Ca(OH)_2$, to form 100 ml of a saturated solution (aqueous)? $\left(K_w = 1.0 \times 10^{-14}\text{mole}^2\text{litre}^{-2}\right)$

A. 9.8

B. 11.7

C. 12.0

D. 3.0

Answer: C

Watch Video Solution

14. TheP^{H} of a I lit solution is 2. It is diluted with water till its p^{H} becomes 4, How many litres of water is added?

A. 99

B. 9

C. 999

D. 9.9

Answer: A

Watch Video Solution

15. The P^{H} of solution is 9. It is times more basic than a solution with P^{H} = 6.

A. 3

B. 100

C. 1000

D. 15

Answer: C

Watch Video Solution

16. 50 ml of H_2, O is added to 50 ml of 1×10^{-3} M barium hydroxide solution. What is the P^H of the resulting solution?

A. 3.0

B. 3.3

C. 11.7

D. 11.0

Answer: D

Watch Video Solution

17. When 100 ml of N/10 NaOH are added to 50 ml of N/5 HCl, the P^H of the resulting solution is

A. 7

B. greater than 7

C. less than 7

D. Zero

Answer: A

Watch Video Solution

18. The P^H of HCl is 5. It is diluted by 1000 times. Its P^H will be

A. 5

B. 8

C. 2

D. 6 - 7

Answer: D

Watch Video Solution

19. Ostwald dilution law is applicable to

A. Strong electrolytes

B. Weak electrolytes

C. Non-electrolytes

D. All types electrolytes.

Answer: B

Watch Video Solution

20. Which of the following is a strong electrolyte

A. NH_4OH

B. $Mg(OH)_2$

C. $BaCl_2$

D. H_3PO_4

Answer: C

Watch Video Solution

21. Which of the following does not affect the degree of ionisation?

A. Temperature

B. Current

C. Nature of solvent

D. Concentration

Answer: B

Watch Video Solution

22. Which of the following is relatively stronger base? P^{kb} values are given in brackets.

A. $AOH(5.8)$

B. $BOH(6.8)$

C. $COH(2.4)$

D. $DOH(10.9)$

Answer: C

Watch Video Solution

23. The P^{H} of a weak mono basic acid is 5. The degree of ionisation of acid in 0.1 M solution is

A. 10^{-4}

B. 10^{-3}

C. 10^{-2}

D. 10^{-1}

Answer: A

Watch Video Solution

24. The P^H of 10^{-3} M mono acidic base, if it is 1% ionised is

A. 5

B. 8

C. 3

D. 9

Answer: D

Watch Video Solution

25. The first and second dissociation constants of an acid H_2A are 10^{-5} and 5×10^{-10} respectively . Then overall dissociation constant of the acid is

A. 5×10^{15}

B. 5.0×10^{-15}

C. 0.2×10^{5}

D. 5.0×10^{-5}

Answer: B

Watch Video Solution

26. The value of ionic product of water increases with increase in

A. Acidic nature of solution

B. Basic nature of solution

C. Temperature

D. Volume of the solution

Answer: C

Watch Video Solution

27. P^H of a solution is independent of

A. Temperature

B. Nature of the solution

C. Degree of dissociation of acid (or) base

D. Volume of the solution

Answer: D

Watch Video Solution

28. At $100\ ^\circ$ C, the value of $P^{k_w is}$

A. 14

B. < 14

C. > 14

D. P^H - P^{OH}

Answer: C

Watch Video Solution

29. Which of the following is wrong ?

A. At any temperature P^H of water is exactly equal to 7

B. At$25\ ^\circ C$, the P^H of an acid is less than 7

C. At $25\ ^\circ C$, the p^H of a base is greater than 7

D. At $25\ ^\circ C$, the P^{OH} of water is equal to 7

Answer: A

Watch Video Solution

30. If the ionic product of water $\left(K_w\right) is 1.96 \times 10^{-14} at 35^{\circ} C$ what is its value at $10^{\circ} C$?

A. 1.96×10^{-14}

B. 3.92×10^{-14}

C. 2.95×10^{-15}

D. 1.96×10^{-13}

Answer: D

Watch Video Solution

31. At 25^{0}C, the hydroxyl ion concentration of a basic solution is 6.75×10^{-3} M.Then the value of K_w is

A. $13.5 \times 10^{-6} M^2$

B. $13.5 \times 10^{-12} M^2$

C. $13.5 \times 10^{-8} M^2$

D. $10^{-14} M^2$

Answer: D

Watch Video Solution

32. At certain temperature the K_w of D_2,O is $10^{=-16}$ M. Then the pD of pure D_2,O at that temperature is

A. 7

B. 16

C. 8

D. 6

Answer: C

Watch Video Solution

33. One litre of water contains 10^{-7} moles of H^{+} ions . Degree of ionisation of water (in percentage) is

A. 1.8×10^{-7}

B. 1.8×10^{-9}

C. 3.6×10^{-7}

D. 3.6×10^{-9}

Answer: A

Watch Video Solution

34. The $\left[OH^{-}\right]$ of a solution is 10^{-10} Its pH is

A. 4

B. 10

C. 7

D. 9

Answer: A

Watch Video Solution

35. The pH of a 0.005 MH_2SO_4 solution is

A. 5.0

B. 2.0

C. 2.3

D. 3.3

Answer: B

Watch Video Solution

36. The P^H of a solution is 3.602. Its H^+ ion concentration is

A. 4×10^{-14}

B. 2.5×10^{-11}

C. 2.5×10^{-4}

D. 5.0×10^{-4}

Answer: C

Watch Video Solution

37. The ionic product of water is 10^{-14}, The H^+ ion concentration in 0.1 M NaOH soluiion is

A. $10^{-11}M$

B. $10^{-13}M$

C. $10^{-1}M$

D. $10^{-4}M$

Answer: B

Watch Video Solution

38. What is the pH of a solution obtained by dissolving 0.0005 mole of the strong electrolyte, calcium hydroxide, $Ca(OH)_2$, to form 100 ml of a saturated solution (aqueous)? $\left(K_w = 1.0 \times 10^{-14}\text{mole}^2\text{litre}^{-2}\right)$

A. 9.8

B. 11.7

C. 12.0

D. 3.0

Answer: C

Watch Video Solution

39. TheP^H of a I lit solution is 2. It is diluted with water till its p^H becomes 4, How many litres of water is added?

A. 99

B. 9

C. 999

D. 9.9

Answer: A

Watch Video Solution

40. The P^H of solution is 9. It is times more basic than a solution with P^H = 6.

A. 3

B. 100

C. 1000

D. 15

Answer: C

Watch Video Solution

41. 50 ml of H_2, O is added to 50 ml of 1×10^{-3} M barium hydroxide solution. What is the P^H of the resulting solution?

A. 3.0

B. 3.3

C. 11.7

D. 11.0

Answer: D

Watch Video Solution

42. When 100 ml of N/10 NaOH are added to 50 ml of N/5 HCl, the P^H of the resulting solution is

A. 7

B. greater than 7

C. less than 7

D. Zero

Answer: A

Watch Video Solution

43. The P^H of HCl is 5. It is diluted by 1000 times. Its P^H will be

A. 5

B. 8

C. 2

D. 6 - 7

Answer: D

Watch Video Solution

44. Ostwald dilution law is applicable to

A. Strong electrolytes

B. Weak electrolytes

C. Non-electrolytes

D. All types electrolytes.

Answer: B

Watch Video Solution

45. Which of the following is a strong electrolyte

A. NH_4OH

B. $Mg(OH)_2$

C. $BaCl_2$

D. H_3PO_4

Answer: C

Watch Video Solution

46. Which of the following does not affect the degree of ionisation?

A. Temperature

B. Current

C. Nature of solvent

D. Concentration

Answer: B

Watch Video Solution

47. Which of the following is relatively stronger base? P^{kb} values are given in brackets.

A. $AOH(5.8)$

B. $BOH(6.8)$

C. $COH(2.4)$

D. $DOH(10.9)$

Answer: C

Watch Video Solution

48. The P^{H} of a weak mono basic acid is 5. The degree of ionisation of acid in 0.1 M solution is

A. 10^{-4}

B. 10^{-3}

C. 10^{-2}

D. 10^{-1}

Answer: A

Watch Video Solution

49. The P^H of 10^{-3} M mono acidic base, if it is 1% ionised is

A. 5

B. 8

C. 3

D. 9

Answer: D

Watch Video Solution

50. The first and second dissociation constants of an acid H_2A are 10^{-5} and 5×10^{-10} respectively . Then overall dissociation constant of the acid is

A. 5×10^{15}

B. 5.0×10^{-15}

C. 0.2×10^{5}

D. 5.0×10^{-5}

Answer: B

Watch Video Solution

PRACTICE SHEET (EXERCISE -II LEVEL -II (ADVANCED) (Straight Objective Type Questions))

1. The no.of H_3, O^+ ions present in 10 ml of water at 25° C is

A. 6.023×10^{-14}

B. 6.023×10^{14}

C. 6.023×10^{-19}

D. 6.023×10^{19}

Answer: B

Watch Video Solution

2. To change the P^{H} of a solution from I to 1.301. Which of the following should be adopted?

A. 1 lit of water is to be added

B. 1 kg of water is to be added

C. The volume of the solution should be doubled by adding water

D. The wt of the solute present in the solution should be doubled

Answer: C

Watch Video Solution

3. Equal volumes of 0.1 M potassium hydroxide and 0.1 M sulphuric acid are mixed . The P^H of resulting solution is

A. 7

B. 0

C. less than 7

D. greater than 7

Answer: C

Watch Video Solution

4. Equal volumes of two solutions with $P^H = 3$ and $P^H = 11$ are mixed . Then the P^H of resulting solution is

A. 8

B. 7

C. 6

D. 0

Answer: B

Watch Video Solution

5. A weak electrolyte obeys Ostwald's dilution law. Select the correct statements.

A. A decrease in concentration of weak acid shows an incrase in its degree of dissociation (α)

B. As $c \rightarrow 0$, the degree of dissociation (α) approaches unity

C. A plot of $\alpha^2 \text{versus} \frac{1}{c}$ gives a straight line with slope equal to dissociation constant of weak electrolyte

D. A plot of α^2 versus . C gives a straight line with slope equal to dissociation constant of weak electrolyte

Answer: D

Watch Video Solution

6. The no.of H_3, O^+ ions present in 10 ml of water at 25° C is

A. 6.023×10^{-14}

B. 6.023×10^{14}

C. 6.023×10^{-19}

D. 6.023×10^{19}

Answer: B

Watch Video Solution

7. To change the P^H of a solution from I to 1.301. Which of the following should be adopted?

A. 1 lit of water is to be added

B. 1 kg of water is to be added

C. The volume of the solution should be doubled by adding water

D. The wt of the solute present in the solution should be doubled

Answer: C

Watch Video Solution

8. Equal volumes of 0.1 M potassium hydroxide and 0.1 M sulphuric acid are mixed . The P^H of resulting solution is

A. 7

B. 0

C. less than 7

D. greater than 7

Answer: C

Watch Video Solution

9. Equal volumes of two solutions with $P^H = 3$ and $P^H = 11$ are mixed . Then the P^H of resulting solution is

A. 8

B. 7

C. 6

D. 0

Answer: B

Watch Video Solution

10. A weak electrolyte obeys Ostwald's dilution law. Select the correct statements.

A. A decrease in concentration of weak acid shows an incrase in its degree of dissociation (α)

B. As $c \rightarrow 0$, the degree of dissociation (α) approaches unity

C. A plot of $\alpha^2 \text{versus} \frac{1}{c}$ gives a straight line with slope equal to dissociation constant of weak electrolyte

D. A plot of α^2 versus . C gives a straight line with slope equal to dissociation constant of weak electrolyte

Answer: D

Watch Video Solution

PRACTICE SHEET (EXERCISE -II LEVEL -II (ADVANCED) (More than one correct answer Type Questions))

1. 100 ml of 0.1 M HCl and 100 ml of 0.1 M HOCN are mixed . What is the concentration of $..OCN^{-}..$, and pH of the solution ? $\left(K_a = 1.2 \times 10^{-6}\right)$

A. $1.2 \times 10^{-6}, 1.3$

B. $1.2 \times 10^{-6}, 1$

C. $2.6 \times 10^{-8}, 1.6$

D. $2.4 \times 10^{-6}, 2.6$

Answer: A

Watch Video Solution

2. Which of the following are correct ?

A. pH of 0.1 M HF is more than that of 0.1 M HCl

B. pH of pure water is greater than that of 0.1 M HCl

C. pH of water at 25° C is greather than that at $30^{\circ}C$

D. pH of water is 7 at any temperature

Answer: A::B::C

Watch Video Solution

3. Which are correct statement ?

A. With increase in temperature pH of water decreases

B. With increase in temperature degree of dissociation of water increase

C. pH of CH_3COOH increase on dilution

D. pH of $NH_{3(aq)}$ decrease on dilution

Answer: A::B::C::D

Watch Video Solution

4. 100 ml of 0.1 M HCl and 100 ml of 0.1 M HOCN are mixed . What is the concentration of . . OCN^-. . , and pH of the solution ? $\left(K_a = 1.2 \times 10^{-6}\right)$

A. $1.2 \times 10^{-6}, 1.3$

B. $1.2 \times 10^{-6}, 1$

C. $2.6 \times 10^{-8}, 1.6$

D. $2.4 \times 10^{-6}, 2.6$

Answer: A

Watch Video Solution

5. Which of the following are correct ?

A. pH of 0.1 M HF is more than that of 0.1 M HCl

B. pH of pure water is greater than that of 0.1 M HCl

C. pH of water at 25° C is greather than that at $30^\circ C$

D. pH of water is 7 at any temperature

Answer: A::B::C

Watch Video Solution

6. Which are correct statement ?

A. With increase in temperature pH of water decreases

B. With increase in temperature degree of dissociation of water increase

C. pH of CH_3COOH increase on dilution

D. pH of $NH_{3(aq)}$ decrease on dilution

Answer: A::B::C::D

Watch Video Solution

PRACTICE SHEET (EXERCISE -II LEVEL -II (ADVANCED) (Linked Comprehension Type Questions))

1. Which of the following solution will have pH = 13 on assuming complete dissociation

A. 100 ml of solution of 0.1 N$Mg(OH)_2$

B. 0. 56 g of KOH in 100 ml solution

C. 4 g of NaOH in 500 ml solution

D. 100 ml of solution of 0.05 M Mg $(OH)_2$

Answer: A::B::D

Watch Video Solution

2. The dissolution of ammonia gas in water does not obey Henry's law. On dissolving. a major portion of ammonia molecules unite with H_2, O to form NH_4, OH molecules. A portion of the latter again dissociates into NH_4^+, and OH^- ions. In solution thercfore, we have NH_3, molecules, NH_4, OH molecules and NH_4^+, ions and the following equilibrium exist:

$NH_{3(g)}$ (pressure P and concentration c)

$\rightarrow NH_{3(l)} + H_2, O \rightarrow NH_4, OH \rightarrow NH_4^+ \rightarrow , + OH^-$

Let c_1,mol/L of NH_3, pass in liquid state which on dissolution in water forms c_2 mol/ L of NH_4, OH. The solution contains $c_3$mol/L of NH_4^+, ions.

Total concentration of ammonia, which can be determined by volumetric analysis is equal to:

A. c_1

B. $c_1 + c_2 + c_3$

C. $c_1 + c_3$

D. $c_2 + c_3$

Answer: A

Watch Video Solution

3. The dissolution of ammonia gas in water does not obey Henry's law. On dissolving. a major portion of ammonia molecules unite with H_2, O to form NH_4, OH molecules. A portion of the latter again dissociates into NH_4^+, and OH^- ions. In solution thercfore, we have NH_3, molecules, NH_4, OH molecules and NH_4^+, ions and the following equilibrium exist:

$NH_{3(g)}$ (pressure P and concentration c) $\rightarrow NH_{3(l)} + H_2, O \rightarrow NH_4, OH \rightarrow NH_4^+ \rightarrow , + OH^-$

Let c_1,mol/L of NH_3, pass in liquid state which on dissolution in water forms c_2 mol/ L of NH_4, OH. The solution contains $c_3$mol/L of NH_4^+, ions. Degree of dissociation of ammonium hydroxide is

A. c_1

B. c_3/c_1

C. c_3/c

D. c_3/c_2

Answer: D

Watch Video Solution

4. The dissolution of ammonia gas in water does not obey Henry. s law. On dissolving , a major portion of ammonia molecules unite with H_2O to form NH_4OH molecules . A portion of the latter again dissociates into NH_4^+ and OH^- ions. In solution therefore , we have NH_3 molecules, NH_4OH molecules and NH_4^+ ions and the following equilibrium exist :

$NH_{3(g)}$ (pressure P and concentration c)

$\Leftrightarrow NH_{3(i)} + H_2O \Leftrightarrow NH_4OH \Leftrightarrow NH_4^+ + OH^-$ Let c_1 mol//L of NH_3 pass in liquid state which on dissolution in water forms $c_2$mol/ L of NH_4OH. The solution contains c_3 mol/L of NH_4^+ ions.

The dissociation constant of NH_4OH can be given as :

A. $K_b = \dfrac{(c_3)^2}{(c_2 - c_3)}$

B. $K_b = \dfrac{(c3)^2}{c_2}$

C. $K_b = \dfrac{c_2}{(c_2 - c_3)}$

D. $K_b = \dfrac{c_3}{(c_1 - c_2)}$

Answer: A

Watch Video Solution

5. Weak acids dissociate partially in aqueous medium. If any common ion is present in the solution, the degree of dissociation of the acid is suppressed however the dissociation constant value remains constant.

In which of the following the degree of dissociation of water is maximum

'?

A. $0.1 MNH_3$

B. $0.1 MHCl$

C. $0.1 MHCN$

D. Pure water

Answer: D

Watch Video Solution

6. Weak acids dissociate partially in aqueous medium. If any common ion is present in the solution, the degree of dissociation of the acid is suppressed however the dissociation constant value remains constant. What is the degree of dissociation of water is 0.0IM HCOOH $\left(K_a = 10^{-6}\right)$ at 25° C?

A. 1.8×10^{-12}

B. 1.8×10^{-14}

C. 0.8×10^{-12}

D. 3.6×10^{-10}

Answer: A

Watch Video Solution

7. Which of the following solution will have pH = 13 on assuming complete dissociation

A. 100 ml of solution of 0.1 N$Mg(OH)_2$

B. 0. 56 g of KOH in 100 ml solution

C. 4 g of NaOH in 500 ml solution

D. 100 ml of solution of 0.05 M Mg $(OH)_2$

Answer: A::B::D

Watch Video Solution

8. The dissolution of ammonia gas in water does not obey Henry's law. On dissolving. a major portion of ammonia molecules unite with H_2, O to form NH_4, OH molecules. A portion of the latter again dissociates into NH_4^+, and OH^- ions. In solution thercfore, we have NH_3, molecules, NH_4, OH molecules and NH_4^+, ions and the following equilibrium exist:

$NH_{3(g)}$ (pressure P and concentration c)

$\rightarrow NH_{3(l)} + H_2, O \rightarrow NH_4, OH \rightarrow NH_4^+ \rightarrow , + OH^-$

Let c_1,mol/L of NH_3, pass in liquid state which on dissolution in water forms c_2 mol/ L of NH_4, OH. The solution contains $c_3$mol/L of NH_4^+, ions. Total concentration of ammonia, which can be determined by volumetric analysis is equal to:

A. c_1

B. $c_1 + c_2 + c_3$

C. $c_1 + c_3$

D. $c_2 + c_3$

Answer: A

Watch Video Solution

9. The dissolution of ammonia gas in water does not obey Henry's law. On dissolving. a major portion of ammonia molecules unite with H_2, O to form NH_4, OH molecules. A portion of the latter again dissociates into NH_4^+, and OH^- ions. In solution thercfore, we have NH_3, molecules, NH_4, OH molecules and NH_4^+, ions and the following equilibrium exist:

$NH_{3(g)}$ (pressure P and concentration c) $\rightarrow NH_{3(l)} + H_2, O \rightarrow NH_4, OH \rightarrow NH_4^+ \rightarrow, + OH^-$

Let c_1,mol/L of NH_3, pass in liquid state which on dissolution in water forms c_2 mol/ L of NH_4, OH. The solution contains $c_3$mol/L of NH_4^+, ions. Degree of dissociation of ammonium hydroxide is

A. c_1

B. c_3/c_1

C. c_3/c

D. c_3/c_2

Answer: D

Watch Video Solution

10. The dissolution of ammonia gas in water does not obey Henry. s law. On dissolving , a major portion of ammonia molecules unite with H_2O to form NH_4OH molecules . A portion of the latter again dissociates into NH_4^+ and OH^- ions. In solution therefore , we have NH_3 molecules, NH_4OH molecules and NH_4^+ ions and the following equilibrium exist :

$NH_{3(g)}$ (pressure P and concentration c) $\Leftrightarrow NH_{3(i)} + H_2O \Leftrightarrow NH_4OH \Leftrightarrow NH_4^+ + OH^-$ Let c_1 mol//L of NH_3 pass in liquid state which on dissolution in water forms $c_2$mol/ L of $NH_4OH.$ The solution contains c_3 mol/L of NH_4^+ ions.

The dissociation constant of NH_4OH can be given as :

A. $K_b = \dfrac{(c_3)^2}{(c_2 - c_3)}$

B. $K_b = \dfrac{(c3)^2}{c_2}$

C. $K_b = \frac{c_2}{(c_2 - c_3)}$

D. $K_b = \frac{c_3}{(c_1 - c_2)}$

Answer: A

Watch Video Solution

11. Weak acids dissociate partially in aqueous medium. If any common ion is present in the solution, the degree of dissociation of the acid is suppressed however the dissociation constant value remains constant. In which of the following the degree of dissociation of water is maximum '?

A. $0.1 M NH_3$

B. $0.1 M HCl$

C. $0.1 M HCN$

D. Pure water

Answer: D

Watch Video Solution

12. Weak acids dissociate partially in aqueous medium. If any common ion is present in the solution, the degree of dissociation of the acid is suppressed however the dissociation constant value remains constant. What is the degree of dissociation of water is 0.0IM HCOOH $\left(K_a = 10^{-6}\right)$ at 25° C?

A. 1.8×10^{-12}

B. 1.8×10^{-14}

C. 0.8×10^{-12}

D. 3.6×10^{-10}

Answer: A

Watch Video Solution

PRACTICE SHEET (EXERCISE -II LEVEL -II (ADVANCED) (Matrix Matching Type Questions))

1.

List-I	List-II
$(A) 1 \times 10^{-8}$ M KOH	$P.\ pH = 1.3$
$(B) 1 \times 10^{-8}$ MHBr	$Q.\ pH = 6.95$
(C) 1MHCI + 1MNaOH	$R.\ pH = 7.0414$
$(D) 0.02 MH_2SO_4$	$S.\ pH = 7$
	acidic solution

Watch Video Solution

2. Asolution with pH 2.699 is diluted two times, then calculate pH of the resulting solution. [Given antilog of 0.3010 = 2

Watch Video Solution

3. 100 ml of 0.1 M NaCl and 100 ml of 0.2 MNaOH are mixed. What is the change in pH of NaCl solution ?

Watch Video Solution

4. The pH of 0.05 M aqueous solution of diethyl amine is 12.0. The $K_b = x \times 10^{-3}$ then what is x value?

Watch Video Solution

5. A 0.1 M solution of weak acid HA is 1% dissociated at $25^{\circ}C$ To this solution NaA is added till [NaA] = 0.2 M, if the new degree of dissociation of HA =$y \times 10^{-5}$ then what is 'y'?

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6.

List-I	List-II
$(A) 1 \times 10^{-8}$M KOH	$P. pH = 1.3$
$(B) 1 \times 10^{-8}$MHBr	$Q. pH = 6.95$
(C)1MHCI + 1MNaOH	$R. pH = 7.0414$
$(D) 0.02 MH_2SO_4$	$S. pH = 7$
	acidic solution

Watch Video Solution

7. Asolution with pH 2.699 is diluted two times, then calculate pH of the resulting solution. [Given antilog of 0.3010 = 2

Watch Video Solution

8. 100 ml of 0.1 M NaCl and 100 ml of 0.2 MNaOH are mixed. What is the change in pH of NaCI solution ?

Watch Video Solution

9. The pH of 0.05 M aqueous solution of diethyl amine is 12.0. The $K_b = x \times 10^{-3}$ then what is x value?

Watch Video Solution

10. A 0.1 M solution of weak acid HA is 1% dissociated at $25^\circ C$ To this solution NaA is added till [NaA] = 0.2 M, if the new degree of dissociation

of HA $=y \times 10^{-5}$ then what is 'y'?

Watch Video Solution

PRACTICE SHEET (EXERCISE -III LEVEL -I (MAIN) (Straight Objective Type Questions))

1. To a buffer solution of $CH_3, COOH$ and $CH_3, COONa$, some HCl is added. Then the reaction involved is

A. $CH_3COOH + OH^- \rightarrow CH_3COO^- + H_2O$

B. $CH_3COO^- + H^+ \rightarrow CH_3COOH$

C. $Na^+OH^- \rightarrow NaOH$

D. $CH_3COO^- + Na^+ \rightarrow CH_3COONa$

Answer: B

Watch Video Solution

2. An acidic buffer contains 0.06 M salt and 0.02 M acid . The dissociation constant of acid is 10^{-4}TheP^H of the buffer solution is

A. 4

B. 10

C. 4.48

D. 8.25

Answer: C

Watch Video Solution

3. Solution of 0.1 N NH_4OH and $0.1 N NH_4Cl$ has $P^H 9.25$. Then P^{K_b} of NH_4OH is

A. 9.25

B. 4.75

C. 3.75

D. 8.25

Answer: B

Watch Video Solution

4. For acetic acid and sodium acetate buffer, addition of which of the following increases the P^H ?

A. CH_3COONa

B. H_2O

C. CH_3COOH

D. none of these

Answer: A

Watch Video Solution

5. A solution consists of 0.2 M NH_4OH and $0.2 M NH_4Cl$. If $K_b of NH_4OH is 1.8 \times 10^{-5}$, the $\left[OH^-\right]$ of the resulting solution is

A. $0.9 \times 10^{-5} M$

B. 1.8×10^{-5}

C. $3.2 \times 10^{-5} M$

D. 3.6×10^{-5} M

Answer: B

Watch Video Solution

6. 50 ml of 0.1 M solution of sodium acetate and 50 ml of 0.01 M acetic acid are mixed . The pKa of acetic acid is 4.76 The P^H of the buffer solution is

A. 3.76

B. 4.76

C. 5.76

D. 9.24

Answer: C

Watch Video Solution

7. When 100 ml of 0.4 M CH_3COOH is mixed with 100 ml of 0.2 M NaOH , the $\left[H_3O\right]^+$ in the solution is approximately : $\left[K_a\left(CH_3COOH\right) = 1.8 \times 10^{-5}\right]$

A. 1.8×10^{-4}

B. 1.8×10^{-5}

C. 9×10^{-6}

D. 9×10^{-5}

Answer: B

Watch Video Solution

8. An acidic buffer contains

A. Excess of H^{+} ions , few anions and excess of undissociated molecules of weak acid

B. Excess of cations ,few OH^{-} ions and some undissociated molecules of weak acid.

C. Excess of anions, few H^{+} ions and some undissociated molecules of weak acid

D. Strong acid and its salt with a weak base

Answer: C

Watch Video Solution

9. Assertion (A): The pH of a buffer solution containing equal moles of acetic acid and sodium acetate is 4.8 (pK_a of acetic acid is 4.8).

Reasons (R): The ionic product of water at $25^{\circ} C is 10^{-14} mol^2 L^{-2}$.

The correct answer is

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 false

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

Answer: B

Watch Video Solution

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

Reason (R): Acetate ion undergoes anionic hydrolysis.

The correct answer is

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 false

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

Answer: A

Watch Video Solution

11. The hydrolysis constant of CH_3COONa is given by

A. $\frac{K_W}{K_a}$

B. $\frac{K_W}{K_b}$

C. $\frac{K_W}{K_a.K_b}$

D. $K_a.K_b$

Answer: C

Watch Video Solution

Watch Video Solution

12. For a conjugate acid -base pair , K_a and K_b are related as

A. $K_a. K_b = 1$

B. $K_a. K_b = K_W$

C. $K_a. K_b = 14$

D. $K_a. K_b = 7$

Answer: B

Watch Video Solution

13. The pH of the mixture of 25 ml of 0.01 M of $CH_3COOH\left(K_a ofCH_3COOH = 5 \times 10^{-5}\right)$ and $25mlof0.01M$ of NaOH solution is

A. 7

B. 8

C. 10. 25

D. 9. 125

Answer: B

Watch Video Solution

14. To a buffer solution of $CH_3, COOH$ and $CH_3, COONa$, some HCl is added. Then the reaction involved is

A. $CH_3COOH + OH^- \rightarrow CH_3COO^- + H_2O$

B. $CH_3COO^- + H^+ \rightarrow CH_3COOH$

C. $Na^+OH^- \rightarrow NaOH$

D. $CH_3COO^- + Na^+ \rightarrow CH_3COONa$

Answer: B

Watch Video Solution

15. An acidic buffer contains 0.06 M salt and 0.02 M acid . The dissociation constant of acid is 10^{-4}TheP^{H} of the buffer solution is

A. 4

B. 10

C. 4.48

D. 8.25

Answer: C

Watch Video Solution

16. Solution of 0.1 N NH_4OH and $0.1 N NH_4Cl$has $P^{H}9.25$. Then $P^{K_b}ofNH_4OH$ is

A. 9.25

B. 4.75

C. 3.75

D. 8.25

Answer: B

Watch Video Solution

17. For acetic acid and sodium acetate buffer, addition of which of the following increases the P^H ?

A. CH_3COONa

B. H_2O

C. CH_3COOH

D. none of these

Answer: A

Watch Video Solution

18. A solution consists of 0.2 M NH_4OH and $0.2 M NH_4Cl$. If $K_b of NH_4OH is 1.8 \times 10^{-5}$, the $[OH^-]$ of the resulting solution is

A. $0.9 \times 10^{-5} M$

B. 1.8×10^{-5}

C. $3.2 \times 10^{-5} M$

D. 3.6×10^{-5} M

Answer: B

Watch Video Solution

19. 50 ml of 0.1 M solution of sodium acetate and 50 ml of 0.01 M acetic acid are mixed . The pKa of acetic acid is 4.76 The P^H of the buffer solution is

A. 3.76

B. 4.76

C. 5.76

D. 9.24

Answer: C

Watch Video Solution

20. When 100 ml of 0.4 M CH_3COOH is mixed with 100 ml of 0.2 M NaOH , the $\left[H_3O\right]^+$ in the solution is approximately : $\left[K_a\left(CH_3COOH\right) = 1.8 \times 10^{-5}\right]$

A. 1.8×10^{-4}

B. 1.8×10^{-5}

C. 9×10^{-6}

D. 9×10^{-5}

Answer: B

Watch Video Solution

21. An acidic buffer contains

A. Excess of H^+ ions , few anions and excess of undissociated molecules of weak acid

B. Excess of cations ,few OH^- ions and some undissociated molecules of weak acid.

C. Excess of anions, few H^+ ions and some undissociated molecules of weak acid

D. Strong acid and its salt with a weak base

Answer: C

Watch Video Solution

22. Assertion (A): The pH of a buffer solution containing equal moles of acetic acid and sodium acetate is 4.8 (pK_a of acetic acid is 4.8).

Reasons (R): The ionic product of water at $25^\circ C is 10^{-14} mol^2 L^{-2}$.

The correct answer is

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 false

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

Answer: B

Watch Video Solution

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

Reason (R): Acetate ion undergoes anionic hydrolysis.

The correct answer is

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 false

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

Answer: A

Watch Video Solution

24. The hydrolysis constant of CH_3COONa is given by

A. $\frac{K_W}{K_a}$

B. $\frac{K_W}{K_b}$

C. $\frac{K_W}{K_a.K_b}$

D. $K_a.K_b$

Answer: C

Watch Video Solution

Watch Video Solution

25. For a conjugate acid -base pair , K_a and K_b are related as

A. $K_a.K_b = 1$

B. $K_a.K_b = K_W$

C. $K_a.K_b = 14$

D. $K_a.K_b = 7$

Answer: B

Watch Video Solution

26. The pH of the mixture of 25 ml of 0.01 M of $CH_3COOH\left(K_a of CH_3COOH = 5 \times 10^{-5}\right)$ and $25 ml of 0.01 M$ of NaOH solution is

A. 7

B. 8

C. 10.25

D. 9.125

Answer: B

Watch Video Solution

PRACTICE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (Straight Objective Type Questions))

1. How many grams of NaOH is to be added to one litre of $1MH_2CO_3$ to get a HCO_3^{-}/CO_3^{-2} buffer of maximum capacity ?

A. 90 gram

B. 60 gram

C. 20 gram

D. 50 gram

Answer: B

Watch Video Solution

2. In the titration of a solution of weak acid, HX with NaOH ,the pH is 5.8 after 10 mL of NaOH solution has been added and 6.40 after 20.0mL of the NaOH has been added. What is the ionisation constant of the acid HX ?

A. 7.94×10^{-7}

B. 7.94×10^{-6}

C. 7.94×10^{-8}

D. 7.94×10^{-9}

Answer: A

Watch Video Solution

3. Two buffer solutions P & Q with pH values 4.0 and 6.0 are prepared from acid HA and the salt KA . Both the buffer are 0.5 M in HA . The pH of the mixture of the solution obtained by mixing equal volumes of the two buffers is (pKa of acid =5)

A. 5.69

B. 4.71

C. 6.71

D. 4.301

Answer: A

Watch Video Solution

4. A weak base BOH is tirated against 0.1 M of HCl solution. The following table indicates the volumes of HCl added and pH of solution.

S.No.	Volume of base	Volume of 0.1M HCl	pH of solution
1.	40 mL	5 mL	10.04
2.	40 mL	20 mL	9.14

From this data the pK_b of base may be.

A. 4.74

B. 4.3

C. 4.9

D. 4.5

Answer: A

Watch Video Solution

5. When 0.1 mole of an acid is added to 2 lit of a buffer solution, the P^H of the buffer decreases by 0.5 The buffer capacity of the solution is

A. 0.6

B. 0.4

C. 0.2

D. 0.1

Answer: D

Watch Video Solution

6. 100 ml aqueous 0.1 molar $M(CN)_2$, (80% ionized) solution is mixed with 100 ml of 0.05 molar H_2, SO_2 solution (80% ionized). $\left(K_6\text{, of CN" = }10^{-6}\right)$

A. 6

B. 8

C. 9

D. 7

Answer: B

Watch Video Solution

7. How many grams of NaOH is to be added to one litre of $1MH_2CO_3$ to get a HCO_3^- / CO_3^{-2} buffer of maximum capacity ?

A. 90 gram

B. 60 gram

C. 20 gram

D. 50 gram

Answer: B

Watch Video Solution

8. In the titration of a solution of weak acid, HX with NaOH ,the pH is 5.8 after 10 mL of NaOH solution has been added and 6.40 after 20.0mL of the NaOH has been added. What is the ionisation constant of the acid HX ?

A. 7.94×10^{-7}

B. 7.94×10^{-6}

C. 7.94×10^{-8}

D. 7.94×10^{-9}

Answer: A

Watch Video Solution

9. Two buffer solutions P & Q with pH values 4.0 and 6.0 are prepared from acid HA and the salt KA . Both the buffer are 0.5 M in HA . The pH of the mixture of the solution obtained by mixing equal volumes of the two buffers is (pKa of acid =5)

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B. 4.71

C. 6.71

D. 4.301

Answer: A

Watch Video Solution

10. A weak base BOH is tirated against 0.1 M of HCl solution. The following table indicates the volumes of HCl added and pH of solution.

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2.	40 mL	20 mL	9.14

From this data the pK_b of base may be.

A. 4.74

B. 4.3

C. 4.9

D. 4.5

Answer: A

Watch Video Solution

11. When 0.1 mole of an acid is added to 2 lit of a buffer solution, the P^H of the buffer decreases by 0.5 The buffer capacity of the solution is

A. 0.6

B. 0.4

C. 0.2

D. 0.1

Answer: D

Watch Video Solution

12. 100 ml aqueous 0.1 molar $M(CN)_2$, (80% ionized) solution is mixed with 100 ml of 0.05 molar H_2, SO_2 solution (80% ionized). $\left(K_6\right.$, of CN" = 10^{-6})

A. 6

B. 8

C. 9

D. 7

Answer: B

Watch Video Solution

PRACTICE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (More than One answer Type Questions Type Questions))

1. Which of the following mixtures can act as buffer?

A. $H_2CO_3 + NaOH(1.5:1$ molar ratio)

B. $H_2CO_3 + NaOH(1.5:2$molar ratio)

C. $NH_4OH + HCl(5:4$ molar ratio)

D. $NH_4OH + HCl(4:5$ molar ratio)

Answer: A::B::C

Watch Video Solution

2. Which one of the following is/are buffer solution(s)?

A. $0.8MH_2S + 0.8MKHS$

B. $2MC_6H_5NH_2 + 2MC_6H_5NH_3Br$

C. $3MH_2CO_3 + 3MKHCO_3$

D. $0.05MKClO_4 + 0.05MHClO_4$

Answer: A::B::C

Watch Video Solution

3. Total emf produd in a thermocouple does not depend on

A. $RCH \mid NH_2 . COOH$

B. $NaHS$

C. CH_3COONH_4

D. $\left(NH_4\right)_2SO_4$

Answer: A::B::C

Watch Video Solution

4. Which of the following salts are acidic in aqueous solutions?

A. $(NH_4)_2SO_4$

B. $NaHCO_3$

C. $CuSO_4$

D. $AgNO_3$

Answer: A::C::D

Watch Video Solution

5. The Ksp values of MA , MB , MC , MD are $1.8 \times 10^{-10}, 4 \times 10^{-3}, 4 \times 10^{-8} \& 6 \times 10^{-5}$ respectively . If a 0.01 M solution of MX is added dropwise to a mixture containing A , B , C , D solution the one to be precipitated first will be :

A. $(pH)_{N_BA} < (pH)_{NaB}$

B. $(pH)_{NaD} < (pH)_{NaB}$

C. $(pH)_{NaA} < (pH)_{NaD}$

D. $(pH)_{NaB} = 7$

Answer: A::C

Watch Video Solution

6. Which of the following mixtures can act as buffer?

A. $H_2CO_3 + NaOH(1.5 : 1$ molar ratio)

B. $H_2CO_3 + NaOH(1.5 : 2$molar ratio)

C. $NH_4OH + HCl(5 : 4$ molar ratio)

D. $NH_4OH + HCl(4 : 5$ molar ratio)

Answer: A::B::C

Watch Video Solution

7. Which one of the following is/are buffer solution(s)?

A. $0.8MH_2S + 0.8MKHS$

B. $2MC_6H_5NH_2 + 2MC_6H_5NH_3Br$

C. $3MH_2CO_3 + 3MKHCO_3$

D. $0.05MKClO_4 + 0.05MHClO_4$

Answer: A::B::C

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8. The pH of which compound in aqueous solution does not depend on its concentration in solution:

A. $RCH | NH_2 . COOH$

B. $NaHS$

C. CH_3COONH_4

D. $(NH_4)_2SO_4$

Answer: A::B::C

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9. Which of the following salts are acidic in aqueous solutions?

A. $(NH_4)_2SO_4$

B. $NaHCO_3$

C. $CuSO_4$

D. $AgNO_3$

Answer: A::C::D

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10. K_a values for Ha,HB and HD are $10^{-5}, 10^{-7}$ and 10^{-9} respectively . Whch of the following will be correct for decimolar aqueous solution of NaA, NaB and NaD at 25° C ?

A. $(pH)_{N_BA} < (pH)_{NaB}$

B. $(pH)_{NaD} < (pH)_{NaB}$

C. $(pH)_{NaA} < (pH)_{NaD}$

D. $(pH)_{NaB} = 7$

Answer: A::C

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PRACTICE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (More than One answer Type Questions))

1. 100 ml solution having 0.2 M HA (weak acid, $K_{a'} = 1.0x10^{-5}$) and 0.2 N NaA, 200 ml of 0.1 M NaOH has been added. Furthermore, diluted to IL. Which of the following statement is correct?

A. Initially , the solution has pH equal to 5, that is before additions of NaOH

B. In the final solution , the concentration of $\left[OH^{-}\right] is 10^{-9}$ M.

C. After the addition of NaOH , the pH of solution increase by four units.

D. After the addition of base, the solution losses buffering action and can be restored after the addition of acid.

Answer: A::D

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2. 100 ml solution having 0.2 M HA (weak acid, $K_{a}, = 1.0x10^{-5}$) and 0.2 N NaA, 200 ml of 0.1 M NaOH has been added. Furthermore, diluted to IL. Which of the following statement is correct?

A. Initially , the solution has pH equal to 5, that is before additions of NaOH

B. In the final solution , the concentration of $\left[OH^{-}\right] is 10^{-9}$ M.

C. After the addition of NaOH , the pH of solution increase by four units.

D. After the addition of base, the solution losses buffering action and can be restored after the addition of acid.

Answer: A::D

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PRACTICE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (Linked Comprehension Type Questions))

1. When a salt reacts with water to form acidic (or) basic solution the process is called salt hydrolysis. The P^H of salt solution can be calculated using the following relation $P^H = \frac{1}{2}\left[P^{k_w} + P^{Ka} + \log C\right]$ for salt of weak acid and strong base.

$P^H = \frac{1}{2}\left[P^{K_w} - P^{K_a} - \log C\right]$ for salt of weak base and strong acid ,

$P^H = \frac{1}{2}\left[P^{K_w} + P^{K_a} - P^{K_b}\right]$

For a salt of weak acid and weak base where .c. represents the concentration of salt . When a weak acid (or) a weak base is not completly neatralised by strong base (or) strong acid respectively, then formation of buffer takes places. The P^H of buffer solution can be calculated using the following relation

$P^H = P^{Ka} + \log\frac{([\text{salt})]}{[\text{Acid }]}, P^{OH} = P^{Kb} + \log\frac{[\text{salt}]}{[\text{base}]}$

Answer the following questions using the following data

$pK_a\left(CH_3COOH\right) = 4.7447, pK_b\left(NH_4OH\right) = 4.7447, P^{K_W} = 14.$

0.001 M NH_4Cl aqueous solution has P^H

A. 6.127

B. 7.126

C. 2.167

D. 1.267

Answer: A

Watch Video Solution

2. When a salt reacts with water to form acidic (or) basic solution the process is called salt hydrolysis. The P^H of salt solution can be calculated using the following relation $P^H = \frac{1}{2}\left[P^{k_w} + P^{Ka} + \log C\right]$ for salt of weak acid and strong base.

$P^H = \frac{1}{2}\left[P^{K_w} - P^{K_a} - \log C\right]$ for salt of weak base and strong acid , $P^H = \frac{1}{2}\left[P^{K_w} + P^{K_a} - P^{K_b}\right]$

For a salt of weak acid and weak base where .c. represents the concentration of salt . When a weak acid (or) a weak base is not completly neatralised by strong base (or) strong acid respectively, then formation of buffer takes places. The P^H of buffer solution can be calculated using the following relation

$$P^H = P^{Ka} + \log\frac{([\text{salt})]}{[\text{Acid }]}, P^{OH} = P^{Kb} + \log\frac{[\text{salt}]}{[\text{base}]}$$

Answer the following questions using the following data

$pK_a(CH_3COOH) = 4.7447, pK_b(NH_4OH) = 4.7447, P^{K_W} = 14.$

One mole CH_3COOH and one mole CH_3COONa are dissolved in water one litre aqueous solution The P^H of the resulting solution will be

A. 9.2553

B. 4.7447

C. 14

D. 7

Answer: A

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3. When a salt reacts with water to form acidic (or) basic solution the process is called salt hydrolysis. The P^H of salt solution can be calculated using the following relation $P^H = \frac{1}{2}\left[P^{k_w} + P^{Ka} + \log C\right]$ for salt of weak acid and strong base.

$P^H = \frac{1}{2}\left[P^{K_w} - P^{K_a} - \log C\right]$ for salt of weak base and strong acid ,

$P^H = \frac{1}{2}\left[P^{K_w} + P^{K_a} - P^{K_b}\right]$

For a salt of weak acid and weak base where .c. represents the concentration of salt . When a weak acid (or) a weak base is not completly neatralised by strong base (or) strong acid respectively, then formation of buffer takes places. The P^H of buffer solution can be calculated using the following relation

$P^H = P^{Ka} + \log\frac{([\text{salt})]}{[\text{Acid }]}, P^{OH} = P^{Kb} + \log\frac{[\text{salt}]}{[\text{base}]}$

Answer the following questions using the following data

$pK_a\left(CH_3COOH\right) = 4.7447, pK_b\left(NH_4OH\right) = 4.7447, P^{K_W} = 14.$

0.001 M NH_4Cl aqueous solution has P^H

A. 1.6021

B. 12.9379

C. 4.7447

D. 8.7218

Answer: B

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4. When a salt reacts with water to form acidic (or) basic solution the process is called salt hydrolysis. The P^H of salt solution can be calculated using the following relation $P^H = \frac{1}{2}\left[P^{k_w} + P^{Ka} + \log C\right]$ for salt of weak acid and strong base.

$P^H = \frac{1}{2}\left[P^{K_w} - P^{K_a} - \log C\right]$ for salt of weak base and strong acid , $P^H = \frac{1}{2}\left[P^{K_w} + P^{K_a} - P^{K_b}\right]$

For a salt of weak acid and weak base where .c. represents the concentration of salt . When a weak acid (or) a weak base is not completly neatralised by strong base (or) strong acid respectively, then formation of buffer takes places. The P^H of buffer solution can be calculated using the following relation

$$P^H = P^{Ka} + \log\frac{([\text{salt})]}{[\text{Acid }]}, P^{OH} = P^{Kb} + \log\frac{[\text{salt}]}{[\text{base}]}$$

Answer the following questions using the following data

$$pK_a\left(CH_3COOH\right) = 4.7447, pK_b\left(NH_4OH\right) = 4.7447, P^{K_W} = 14.$$

0.001 M NH_4Cl aqueous solution has P^H

A. 6.127

B. 7.126

C. 2.167

D. 1.267

Answer: A

Watch Video Solution

5. When a salt reacts with water to form acidic (or) basic solution the process is called salt hydrolysis. The P^H of salt solution can be calculated using the following relation $P^H = \frac{1}{2}\left[P^{k_w} + P^{Ka} + \log C\right]$ for salt of weak acid and strong base.

$P^H = \frac{1}{2}\left[P^{K_w} - P^{K_a} - \log C\right]$ for salt of weak base and strong acid , $P^H = \frac{1}{2}\left[P^{K_w} + P^{K_a} - P^{K_b}\right]$

For a salt of weak acid and weak base where .c. represents the concentration of salt . When a weak acid (or) a weak base is not completly neatralised by strong base (or) strong acid respectively, then formation of buffer takes places. The P^H of buffer solution can be calculated using the following relation

$$P^H = P^{Ka} + \log\frac{([\text{salt})]}{[\text{Acid }]}, P^{OH} = P^{Kb} + \log\frac{[\text{salt}]}{[\text{base}]}$$

Answer the following questions using the following data

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A. 9.2553

B. 4.7447

C. 14

D. 7

Answer: A

Watch Video Solution

6. When a salt reacts with water to form acidic (or) basic solution the process is called salt hydrolysis. The P^H of salt solution can be calculated using the following relation $P^H = \frac{1}{2}\left[P^{k_w} + P^{Ka} + \log C\right]$ for salt of weak acid and strong base.

$P^H = \frac{1}{2}\left[P^{K_w} - P^{K_a} - \log C\right]$ for salt of weak base and strong acid ,

$P^H = \frac{1}{2}\left[P^{K_w} + P^{K_a} - P^{K_b}\right]$

For a salt of weak acid and weak base where .c. represents the concentration of salt . When a weak acid (or) a weak base is not completly neatralised by strong base (or) strong acid respectively, then formation of buffer takes places. The P^H of buffer solution can be calculated using the following relation

$$P^H = P^{Ka} + \log\frac{([\text{salt})]}{[\text{Acid }]}, P^{OH} = P^{Kb} + \log\frac{[\text{salt}]}{[\text{base}]}$$

Answer the following questions using the following data

$$pK_a\left(CH_3COOH\right) = 4.7447, pK_b\left(NH_4OH\right) = 4.7447, P^{K_W} = 14.$$

0.001 M NH_4Cl aqueous solution has P^H

A. 1. 6021

B. 12. 9379

C. 4. 7447

D. 8. 7218

Answer: B

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PRACTICE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (Matrix Matching Type Questions))

1. What is the pH of a salt which was produced by a strong acid and a strong base ?

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2. Match the Column-I with Column-II :

List-I	List-II
$(A) CuSO_4$	P. Cationic interaction
$(B) Na_2CO_3$	Q. Anionic interaction
$(C) FeCl_3$	R. $pH > 7$
$(D) K_2SO_4$	S. pH < 7
	T. No hydrolysis of ions

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3.

Column -I	Column -II
(A) pH of a basic buffer mixture	$(P) pK_a + \log\frac{[\text{salt}]}{[\text{Acid}]}$
(B)pH of an acidic buffer mixture	$(Q)\left(pK_a\right)_{C,Acid} + \log\frac{[\text{Base}]}{[\text{salt}]}$
(C)pH of salt solution of weak acid + strong base	$(R)\frac{1}{2}\left[pK_W + pK_a + \log c\right)$
(D)pH of a salt solution of strong acid + weak base	$(S)\frac{1}{2}\left[pK_W - pK_b - \log c\right]$

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4. Match the Column-I with Column-II :

List-I	List-II
$(A)CuSO_4$	P. Cationic interaction
$(B)Na_2CO_3$	Q. Anionic interaction
$(C)FeCI_3$	R. $pH > 7$
$(D)K_2SO_4$	S. pH < 7
	T. No hydrolysis of ions

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PRACTICE SHEET (EXERCISE -III LEVEL -II (ADVANCED) (Integer Type Questions))

1. Certain weak acid has P^{ka} = 4. Find pH of 0.01M NaA(ag)

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2. Find pH of 0.1 M $NaHCO_3$, $(P^{kal}\&p^{kal}\text{of}H_2, CO_3$ are 7 & 11)

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3. Calculate $\left[H^+\right]$ in a 0.1 M solution of dichloroacetic acid $\left(K_a = 5 \times 10^{-2}\right)$ that also contains 0.1 M sodium dichloroacetae. Neglect hydrolysis of sodium salt. If $\left[H^+\right] = y \times 10^{-2}$ then what is the value of y ?

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4. Find pH of solution prepared by mixing 100 ml. $0.1 MNa_3PO_4$ and 200 ml , 0.1 M HCl $\left(P^{kal}, P^{ka2} \& P^{ka3}\right.$ of H_3PO_4 are $3, 7 \& 10$ respectively)

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5. Certain weak acid has P^{ka} = 4. Find pH of 0.01M NaA(ag)

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6. Find pH of 0.1 M $NaHCO_3$, $(P^{kal} \& p^{kal} \text{of} H_2, CO_3$ are 7 & 11)

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7. Calculate $\left[H^+\right]$ in a 0.1 M solution of dichloroacetic acid $\left(K_a = 5 \times 10^{-2}\right)$ that also contains 0.1 M sodium dichloroacetae. Neglect hydrolysis of sodium salt. If $\left[H^+\right] = y \times 10^{-2}$ then what is the value of y ?

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8. Find pH of solution prepared by mixing 100 ml. $0.1MNa_3PO_4$ and 200 ml , 0. 1 M HCl $\left(P^{kal}, P^{ka2} \& P^{ka3}\right.$ of H_3PO_4 are 3, 7&10 respectively)

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PRACTICE SHEET (EXERCISE -IV LEVEL -I (MAIN) (Straight Objective Type Questions))

1. The human eye is sensitive to colour differences of indicator only when the ratio $\left[In^{-}\right]/[H \in]$ is greater then 10 (or) smaller than 0.1. What should be the minimum change in the pH of solution of observe a complete colour change .$\left(pK_{In} = 5\right)$.

A. 1.2

B. 1.4

C. 1

D. 2

Answer: D

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2. Ionisation of NH_4 OH is supressed by the addition of NH_4CI because

A. NH_4Cl is a salt of WB and SA

B. NH_4Cl is a salt of strong base and weak acid

C. Of the common ion effect of NH_4^+ ion

D. none of these

Answer: C

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3. Dissociation of CH_3,COOH is supressed by adding

A. HCl

B. H_2SO_4

C. CH_3COONa

D. Any of the above

Answer: D

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4. The solubility product of $BaSO_4$ at 18^0 C is 1.5×10^{-9} . It solubility (mole lit^{-1}) at the same temperature is

A. 1.5×10^{-9}

B. 1.5×10^{-5}

C. 3.9×10^{-9}

D. 3.9×10^{-5}

Answer: D

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5. The molar solubility in mol. lit^{-1} of a sparingly soluble salt MX_4, is S. The corresponding solubility product K_{sp}, is given by the relation

A. $S = \left(K_{sp}/128\right)^{1/4}$

B. $S = \left(218K_{sp}\right)^{1/4}$

C. $S = \left(256K_{sp}\right)^{1/5}$

D. $S = \left(K_{sp}/256\right)^{1/5}$

Answer: D

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6. The solubility of CaF_2 is 2×10^{-4} mole /litre . Its solubility product is

A. 2.0×10^{-4}

B. 4.0×10^{-8}

C. $4 \times 8.0 \times 10^{-12}$

D. 3.2×10^{-4}

Answer: C

Watch Video Solution

7. What is the solubility product $\left(K_{sp}\right)$ of calcuim phosphate in pure water ? [S=molar solubility]

A. $108x^2$

B. $36x^3$

C. $36x^5$

D. $108x^5$

Answer: D

Watch Video Solution

8. pH of Ba$(OH)_2$ Ssolution is 12. Its solubility product is :

A. $10^{-6}M^3$

B. $4 \times 10^{-6}M^3$

C. $0.5 \times 10^{-7}M^3$

D. $5 \times 10^{-7}M^3$

Answer: D

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9. The solubility of AgCl in 0.1M NaCl is $\left(K_{sp} \text{ of AgCl} = 1.2 \times 10^{-10}\right)$

A. $0.1M$

B. 1.2×10^{-5}

C. 1.095×10^{-5}

D. 1.2×10^{-9}

Answer: D

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10. Which of the following is most soluble ?

A. $Bi_2S_3\left(K_{sp} = 1 \times 10^{-17}\right)$

B. $MnS\left(K_{sp} = 7 \times 10^{-16}\right)$

C. $CuS\left(K_{sp} = 8 \times 10^{-37}\right)$

D. $Ag_2S\left(K_{sp} = 6 \times 10^{-51}\right)$

Answer: A

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11. To Ag_2CrO_4 solution over its own percipitate CrO_4^{2-} ions are added . This results in

A. increase in Ag^{+} concentration

B. decrease in Ag^{+} concentration

C. increase in solubility product

D. shifting of Ag^{+} ions from the precipitate into the solution.

Answer: B

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12. Among the following statements

a) If two salts have equal solubility then their solubility products are equal.

b) $BaSO_4$, in more soluble in water than in dil. H_2, SO_4

(c)When KI is added to Pbl_2, then the $\left[Pb^{2+}\right]$ decreases

d) In any solution containing AgCI, the value of $\left[Ag^{+}\right]\left[CI^{-}\right]$ is constant at constant temperature.

A. All are correct

B. a,b and d are correct

C. a,c and d are correct

D. b,c and d are correct

Answer: D

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13. The human eye is sensitive to colour differences of indicator only when the ratio $\left[In^{-}\right]/[H \in]$ is greater then 10 (or) smaller than 0.1. What should be the minimum change in the pH of solution of observe a complete colour change .$\left(pK_{In}=5\right)$.

A. 1.2

B. 1.4

C. 1

D. 2

Answer: D

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14. Ionisation of NH_4 OH is supressed by the addition of NH_4CI because

A. NH_4Cl is a salt of WB and SA

B. NH_4Cl is a salt of strong base and weak acid

C. Of the common ion effect of NH_4^+ ion

D. none of these

Answer: C

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15. Dissociation of CH_3,COOH is supressed by adding

A. HCl

B. H_2SO_4

C. CH_3COONa

D. Any of the above

Answer: D

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16. The solubility product of $BaSO_4 at 18\,^{\circ}C is 15 \times 10^{-9}$ Its solubility (mole lit^{-1}) at the same temperature is

A. 1.5×10^{-9}

B. 1.5×10^{-5}

C. 3.9×10^{-9}

D. 3.9×10^{-5}

Answer: D

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17. The molar solubility in mol. lit^{-1} of a sparingly soluble salt MX_4, is S. The corresponding solubility product K_{sp}, is given by the relation

A. $S = (K_{sp}/128)^{1/4}$

B. $S = (218K_{sp})^{1/4}$

C. $S = (256K_{sp})^{1/5}$

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

Answer: D

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18. The solubility of CaF_2 is 2×10^{-4} mole /litre . Its solubility product is

A. 2.0×10^{-4}

B. 4.0×10^{-8}

C. $4 \times 8.0 \times 10^{-12}$

D. 3.2×10^{-4}

Answer: C

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19. Comment on the solubility of calcium sulphate in water.

A. $108x^2$

B. $36x^3$

C. $36x^5$

D. $108x^5$

Answer: D

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20. pH of Ba$(OH)_2$ Ssolution is 12. Its solubility product is :

A. $10^{-6}M^3$

B. $4 \times 10^{-6}M^3$

C. $0.5 \times 10^{-7}M^3$

D. $5 \times 10^{-7}M^3$

Answer: D

Watch Video Solution

21. The solubility of AgCl in 0.1M NaCl is $\left(K_{sp} \text{ of AgCl} = 1.2 \times 10^{-10}\right)$

A. $0.1M$

B. 1.2×10^{-5}

C. 1.095×10^{-5}

D. 1.2×10^{-9}

Answer: D

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22. Which of the following is most soluble ?

A. $Bi_2S_3\left(K_{sp} = 1 \times 10^{-17}\right)$

B. $MnS\left(K_{sp} = 7 \times 10^{-16}\right)$

C. $CuS\left(K_{sp} = 8 \times 10^{-37}\right)$

D. $Ag_2S\left(K_{sp} = 6 \times 10^{-51}\right)$

Answer: A

Watch Video Solution

23. To Ag_2CrO_4 solution over its own percipitate CrO_4^{2-} ions are added . This results in

A. increase in Ag^+ concentration

B. decrease in Ag^+ concentration

C. increase in solubility product

D. shifting of Ag^+ ions from the precipitate into the solution.

Answer: B

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24. Among the following statements

a) If two salts have equal solubility then their solubility products are equal.

b) $BaSO_4$, in more soluble in water than in dil. H_2, SO_4

(c)When KI is added to Pbl_2, then the $\left[Pb^{2+}\right]$ decreases

d) In any solution containing AgCI, the value of $\left[Ag^+\right]\left[CI^-\right]$ is constant at constant temperature.

A. All are correct

B. a,b and d are correct

C. a,c and d are correct

D. b,c and d are correct

Answer: D

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PRACTICE SHEET (EXERCISE -IV LEVEL -I (ADVANCED) (Straight Objective Type Questions))

1. A saturated solution of o- nitrophenol has a pH equal to 4.53 then its solubility in water is $\left(pK_a = 7.23\right)$

A. $2.085g/\text{lit}$

B. $20.85g/\text{lit}$

C. $10.425g/\text{lit}$

D. $1.0425g/\text{lit}$

Answer: A

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2. In the lollowing reuction. AgCl +KI ⇔ KCl + Agl. As Kl is added, the cquilibrium is shifted towards right giving more Agl precipitate, because

A. Both AgCl and Agl are sparingly soluble

B. The K_{sp} of Agl is lower than K_{sp} of AgCl

C. The $K_{sp}$of Ag I is higher than K_{sp} of AgCl

D. Both AgCl and Agl have same solubility product.

Answer: B

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3. K_{Sp} of MX =K_{sp} of MX_2. Which is more soluble ?

A. Mx

B. Mx_2

C. Equal

D. K_{sp} value is required

Answer: B

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4. The solubility of solid silver chromate. Ag_2CrO_4 . is determined in three solvents. Substance K_{sp} of $Ag_2CrO_4 = 9 \times 10^{-12}$

(I) pure water (ii) 0.1 M $AgNO_3$ (iii) 0.1 M Na_2CrO_4

Predict the relative solubility of Ag_2CrO_4 in the three solvents:

A. $I = II = III$

B. $I < II < III$

C. $II = III < I$

D. $II < III < I$

Answer: D

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5. The maximum pH of a solution which is 0.10 M in Mg^{2+} from which $Mg(OH)_2$ is not precipitated is : (Given K_{sp} of $Mg(OH)_2 = 1.2 \times 10^{-11} M$)

A. 4.96

B. 6.96

C. 7.54

D. 9.04

Answer: D

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6. What will be the result if 100 mlL of 0.06 M $Mg(NO_2)_2$ is added to 50 ml. of 0.06 M $Na_2C_2O_4$? [Ksp of $MgC_2O_4 = 8.6 \times 10^{-5}$]

A. A precipitate will not be formed

B. A precipitate will form and an excess of Mg^{2+} ions will remains in the solution

C. A precipitate will form and an excess of $C_2O_4^{2-}$ ions will remain in the solution

D. A precipitate will form but neither ion is present in excess

Answer: B

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7. What can be permitted concentration of $Ag^+ ions$ in 0.1 M HCN solution buffered at pH =3 without causing precipitation of AgCN.

K_{sp} of $AgCN = 1.2 \times 10^{-16}, K_a$ of $HCN = 4.8 \times 10^{-10}$

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

B. $2.5 \times 10^{-9}M$

C. $8.0 \times 10^{-6}M$

D. $1.65 \times 10^{-6}M$

Answer: B

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8. When HCl gas is passed through a saturated solution of common salt, pure NaCl is precipitated because

A. HCl is highly ionised in solution

B. HCl is highly soluble in water

C. The solubility product of NaCl is lowered by HCl

D. The ionic product of $\left[Na^{+}\right]\left[Cl^{-}\right]$ exceeds the solubility product of NaCl

Answer: D

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9. 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 b and c

Answer: D

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10. Why only As^{+3} gets precipitated as As_2S_3 and not Zn^{2+} as ZnS when H_2S is passed through an acidic solution containing As^{+1} and Zn^{+2}?

A. Solubility product of As_2S_3 is less than that of Zns

B. Enough As^{+3} are present in acidic medium

C. Zinc salt does not ionise in acidic medium

D. Solubility product change in presence of an acid.

Answer: A

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11. A saturated solution of o- nitrophenol has a pH equal to 4.53 then its solubility in water is $\left(pK_a = 7.23\right)$

A. $2.085g/\text{lit}$

B. $20.\ 85g/\text{lit}$

C. $10.\ 425g/\text{lit}$

D. $1.0425g/\text{lit}$

Answer: A

Watch Video Solution

12. In the lollowing reuction. AgCl +KI ⇔ KCl + AgI. As KI is added, the cquilibrium is shifted towards right giving more AgI precipitate, because

A. Both AgCl and AgI are sparingly soluble

B. The K_{sp} of AgI is lower than K_{sp} of AgCl

C. The K_{sp} of Ag I is higher than K_{sp} of AgCl

D. Both AgCl and Agl have same solubility product.

Answer: B

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13. K_{Sp} of MX $= K_{sp}$ of MX_2. Which is more soluble ?

A. Mx

B. Mx_2

C. Equal

D. K_{sp} value is required

Answer: B

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14. The solubility of solid silver chromate. Ag_2CrO_4 . is determined in three solvents. Substance K_{sp} of $Ag_2CrO_4 = 9 \times 10^{-12}$

(I) pure water (ii) 0.1 M $AgNO_3$ (iii) 0.1 M Na_2CrO_4

Predict the relative solubility of Ag_2CrO_4 in the three solvents:

A. $I = II = III$

B. $I < II < III$

C. $II = III < I$

D. $II < III < I$

Answer: D

Watch Video Solution

15. The maximum pH of a solution which is 0.10 M in Mg^{2+} from which $Mg(OH)_2$ is not precipitated is : (Given K_{sp} of $Mg(OH)_2 = 1.2 \times 10^{-11} M\big)$

A. 4. 96

B. 6.96

C. 7. 54

D. 9. 04

Answer: D

Watch Video Solution

16. What will be the result if 100 mlL of 0.06 M $Mg(NO_2)_2$ is added to 50 ml. of 0.06 M $Na_2C_2O_4$? [Ksp of $MgC_2O_4 = 8.6 \times 10^{-5}$]

A. A precipitate will not be formed

B. A precipitate will form and an excess of Mg^{2+} ions will remains in the solution

C. A precipitate will form and an excess of $C_2O_4^{2-}$ ions will remain in the solution

D. A precipitate will form but neither ion is present in excess

Answer: B

Watch Video Solution

17. What can be permitted concentration of $Ag^{+} ions$ in 0.1 M HCN solution buffered at pH =3 without causing precipitation of AgCN.

K_{sp} of $AgCN = 1.2 \times 10^{-16}, K_a$ of $HCN = 4.8 \times 10^{-10}$

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

B. $2.5 \times 10^{-9} M$

C. $8.0 \times 10^{-6} M$

D. $1.65 \times 10^{-6} M$

Answer: B

Watch Video Solution

18. When HCl gas is passed through a saturated solution of common salt, pure NaCl is precipitated because

A. HCl is highly ionised in solution

B. HCl is highly soluble in water

C. The solubility product of NaCl is lowered by HCl

D. The ionic product of $[Na^+][Cl^-]$ exceeds the solubility product of NaCl

Answer: D

Watch Video Solution

19. 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 b and c

Answer: D

Watch Video Solution

20. Why only As^{+3} gets precipitated as As_2S_3 and not Zn^{2+} as ZnS when H_2S is passed through an acidic solution containing As^{+1} and Zn^{+2}?

A. Solubility product of As_2S_3 is less than that of Zns

B. Enough As^{+3} are present in acidic medium

C. Zinc salt does not ionise in acidic medium

D. Solubility product change in presence of an acid.

Answer: A

Watch Video Solution

PRACTICE SHEET (EXERCISE -IV LEVEL -I (ADVANCED) (More than One correct answer Type Questions))

1. Which of the following is/are true for an acid -base titration?

A. Indicators catalyse the acid base reactions by releasing or accepting H^+ ions.

B. Indicators do not significantly effect the pH of the solution to which they are added

C. Acid- base reactions do not occur in absence of indicators

D. Indicators have different colours in dissociated and undissociated forms.

Answer: B::D

Watch Video Solution

2. Let the colour of the indicator (Hin colourles) will be visible only when its ionised form (pink) is 25 or more in a solution. Suppose Hln $\left(pK_{In} = 9.0\right)$ is added to a solution of pH = 9.6. Predict what will happen. (Take log 2 = 0.3)

A. Pink colour will be visible

B. Pink colour will not be visible

C. % of ionised form will be less than 25%

D. % of ionised form will be more than 25%

Answer: A::D

Watch Video Solution

3. Titration curves for 0.1M solution of three weak acids HA_1, HA_2 and HA_3 with ionization constants K_1, K_2 and K_3 respectively are plotted as shown in the figure.

Which of the following is/are true?

` (##AKS_ELT_AO_CHE_XI_V01_B_C05_E02_135_Q01.png" width="80%">

A. $K_2 = \left(K_1 + K_3\right)/2$

B. $K_1 < K_3$

C. $K_1 > K_2$

D. $K_2 > K_3$

Answer: C::D

Watch Video Solution

4. The additions of sodium acetate to 0.1 M acetic acid will cause :

A. increase in its pH value

B. decrease in its pH value

C. decreases concentration of H^+ of solution

D. decreases degree of ionisation of acetic acid

Answer: A::C::D

Watch Video Solution

5. Which of the following is/are correct about the solubility ?

A. Solubility of CaF_2 is more in buffer solution of pH = 3 than in pure water

B. Solubility of ZnS in water depends upon the pH of solution

C. Solubility of AgCl increases in the presence of sodium thiosulphate

D. Solubility of ZnS in the presence of H^+ ion can be derived by $K = \frac{[Zn^{2+}][H_2S]}{[H^+]^2}$ where K is equilibrium constant for the reactions $ZnS_s + 2H^+_{aq} \Leftrightarrow Zn^{2+}_{(aq)} + H_2S_{(aq)}$

Answer: A::B::C::D

Watch Video Solution

6. Which of the following is/are true for an acid -base titration?

A. Indicators catalyse the acid base reactions by releasing or accepting H^+ ions.

B. Indicators do not significantly effect the pH of the solution to which they are added

C. Acid- base reactions do not occur in absence of indicators

D. Indicators have different colours in dissociated and undissociated forms.

Answer: B::D

Watch Video Solution

7. Let the colour of the indicator (Hin colourles) will be visible only when its ionised form (pink) is 25 or more in a solution. Suppose Hln

$\left(pK_{In} = 9.0\right)$ is added to a solution of pH = 9.6. Predict what will happen.

(Take log 2 = 0.3)

A. Pink colour will be visible

B. Pink colour will not be visible

C. % of ionised form will be less than 25%

D. % of ionised form will be more than 25%

Answer: A::D

Watch Video Solution

8. In the diagram shown in figure, all pulleys are smooth and massless and strings are light. Match the following

`(##AKS_TRG_AO_PHY_XI_V01_A_C05_E01_045_Q01.png" width="80%">

A. $K_2 = \left(K_1 + K_3\right)/2$

B. $K_1 < K_3$

C. $K_1 > K_2$

D. $K_2 > K_3$

Answer: C::D

Watch Video Solution

9. The additions of sodium acetate to 0.1 M acetic acid will cause :

A. increase in its pH value

B. decrease in its pH value

C. decreases concentration of H^+ of solution

D. decreases degree of ionisation of acetic acid

Answer: A::C::D

Watch Video Solution

10. Which of the following is/are correct about the solubility?

A. Solubility of CaF_2 is more in buffer solution of pH = 3 than in pure water

B. Solubility of ZnS in water depends upon the pH of solution

C. Solubility of AgCl increases in the presence of sodium thiosulphate

D. Solubility of ZnS in the presence of H^+ ion can be derived by $K = \frac{[Zn^{2+}][H_2S]}{[H^+]^2}$ where K is equilibrium constant for the reactions $ZnS_s + 2H^+_{aq} \Leftrightarrow Zn^{2+}_{(aq)} + H_2S_{(aq)}$

Answer: A::B::C::D

Watch Video Solution

PRACTICE SHEET (EXERCISE -IV LEVEL -I (ADVANCED) (Linked Comprehension Type Questions))

1. An acidic indicator ionises as $I_nH \Leftrightarrow \mathrm{In}^- + H^+$. The molecular and ions of the indicator show different colours. The indicator changed it colour if its acidic of basic form completely predominant.

Dissociation constant of an acidic indicator is 10^{-5} . At what p^H 80% of the indicator exists in molecular form ?

A. 4.4

B. 6.6

C. 5.5

D. 3.3

Answer: A

Watch Video Solution

2. An acidic indicator ionises as $I_nH \Leftrightarrow \text{In}^- + H^+$. The molecular and ions of the indicator show different colours. The indicator changed it colour if its acidic of basic form completely predominant.

An indicator with $P^{K\in}$ = 5 is added to a solution with p^H = 5 . What is the percentage of acidic form of the indicator

A. 25 %

B. 50 %

C. 75 %

D. 100 %

Answer: B

Watch Video Solution

3. An acidic indicator ionises as $I_nH \Leftrightarrow \text{In}^- + H^+$. The molecular and ions of the indicator show different colours. The indicator changed it colour if its acidic of basic form completely predominant.

What is the percentage of basic form acidic indicator $\left(p^{ka} = 6\right)$ is an aqeous NaCl solution at $25\,^\circ$ C

A. 90 %

B. 80 %

C. 60 %

D. 100 %

Answer: A

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4. An acidic indicator ionises as $I_nH \Leftrightarrow \text{In}^- + H^+$. The molecular and ions of the indicator show different colours. The indicator changed it colour if its acidic of basic form completely predominant.

Dissociation constant of an acidic indicator is 10^{-5} . At what p^H 80% of the indicator exists in molecular form ?

A. 4.4

B. 6.6

C. 5.5

D. 3.3

Answer: A

Watch Video Solution

5. An acidic indicator ionises as $I_nH \Leftrightarrow \mathrm{In}^- + H^+$. The molecular and ions of the indicator show different colours. The indicator changed it colour if its acidic of basic form completely predominant.

An indicator with $P^{K\in}$ = 5 is added to a solution with p^H = 5 . What is the percentage of acidic form of the indicator

A. 25 %

B. 50 %

C. 75 %

D. 100 %

Answer: B

Watch Video Solution

6. An acidic indicator ionises as $I_nH \Leftrightarrow In^- + H^+$. The molecular and ions of the indicator show different colours. The indicator changed it colour if its acidic of basic form completely predominate.

What is the percentage of basic form acidic indicator $.\left(P^{ka} = 6\right)$ is an aqeous NaCl soluition at 25% C

A. $90\ \%$

B. $80\ \%$

C. $60\ \%$

D. $100\ \%$

Answer: A

Watch Video Solution

PRACTICE SHEET (EXERCISE -IV LEVEL -I (ADVANCED) (Matrix Matching Type Questions))

1.

List -I Salt	List -II Kg
$(A) AgCI$	$P. 27S^4$
$(B) PbI_2$	$Q. 108(S)^5$
$(C) AS_2S_3$	$R. 4S^3$
$(D) Ag_3PO_4$	$S. S^2$

Watch Video Solution

2.

List -I Salt	List -II Kg
$(A) AgCI$	$P. 27S^4$
$(B) PbI_2$	$Q. 108(S)^5$
$(C) AS_2S_3$	$R. 4S^3$
$(D) Ag_3PO_4$	$S. S^2$

Watch Video Solution

PRACTICE SHEET (EXERCISE -IV LEVEL -I (ADVANCED) (Integer Type Questions))

1. At what pH will a 10^{-4} M solution of an indicator with $K_b = 1 \times 10^{-11}$ change colour?

Watch Video Solution

2. What is the minimum pH required to prevent the precipitation of Zn^{+2} in a solution that is 0.01 M $ZnCl_2$ and saturated with 0.1 M H_2 S (Given : K_{sp} ZnS = 10^{-21} and $Ka_1 \times Ka_2$ of $H_2S = 10^{-20}$)

Watch Video Solution

3. Calculate the ratio of solubility of $AgCl$ at $25^\circ C$ in 3.0 M $NH_3\left(K_{sp}\right.$ of AgCl in $\left.NH_3 \text{ is } 3.1 \times 10^{-3}\right)$ and in $H_2O\left(K_{sp}\right.$ of AgCl in $\left.H_2O \text{ is} 1.8 \times 10^{-10}\right)$. If answer is 1.15×10^x then x=________?

Watch Video Solution

4. The simultaneous solubility of Ag CN $\left(K_f = 2.5 \times 10^{-16}\right)$ and $AgCl\left(Ksp = 1.6 \times 10^{-10}\right)$ in 1. 0M NH_3 (aq) are respectively : $\left[Given, K_f\left[Ag\left(NH_3\right)_2^+\right] = 10^7\right]$

Watch Video Solution

5. A solution of 0.01 MCd^{2+} contains $0.01MNH_4OH$. What conc. Of NH_4^+ from NH_4Cl is necessary to prevent precipitation of $Cd(OH)_2?K_{sp}$ of $(OH)_2 = 2.0 \times 10^{-14}, K_b$ of $NH_4OH = 1.8 \times 10^{-5}$ if answer is 1.272×10^{-x} mol/litre then x=_______?

Watch Video Solution

6. At what pH will a 10 −4 M solution of an indicator with K b =1×10 −11 change colour?

Watch Video Solution

7. What is the minimum pH required to prevent the precipitation of Zn^{+2} in a solution that is 0.01 M $ZnCl_2$ and saturated with 0.1 M H_2 S (Given : K_{sp} ZnS = 10^{-21} and $Ka_1 \times Ka_2$ of $H_2S = 10^{-20}$)

Watch Video Solution

8. Calculate the ratio of solubility of $AgCl$ at $25^{\circ}C$ in 3.0 M $NH_3\left(K_{sp}\right.$ of AgCl in NH_3 is $3.1 \times 10^{-3}\left.\right)$ and in $H_2O\left(K_{sp}\right.$ of AgCl in H_2O is$1.8 \times 10^{-10}\left.\right)$. If answer is 1.15×10^{x} then x=_______?

Watch Video Solution

9. Determine the number of moles of AgI which may be dissolved in 1.0 litre of 1.0M CN^- solution ,K_{sp} for AgI and K_f for $\left[Ag(CN)_2\right]^-$ are $1.2 \times 10^{-17}M^2$ and 7.1×10^{-19} respectively . If answer is 4.9×10^{x} then x =_________?

Watch Video Solution

10. A solution of 0.01 MCd^{2+} contains $0.01MNH_4OH$. What conc. Of NH_4^+ from NH_4Cl is necessary to prevent precipitation of

$Cd(OH)_2 ? K_{sp}$ of $(OH)_2 = 2.0 \times 10^{-14}$, K_b of $NH_4OH = 1.8 \times 10^{-5}$ if answer is 1.272×10^{-x} mol/litre then x=_______?

Watch Video Solution

ADDITIONAL PRACTICE EXERCISE (LEVEL -I (MAIN) (Straight Objective Type Questions))

1. A solution contains equimolar concentration of a weak acid HA and its conjugate base A^-, pK_b of A^- is 9 . The pH of the solution is

A. methyl orange (3 to 4)

B. methyl red (5 to 6)

C. bromothymol blue (6 to 7.5)

D. phenolphthalein (8 to 9.)

Answer: D

Watch Video Solution

2. Which of the following solution will have pH closer to 1.0 ?

A. 100 ml of (M/ to) HCl +100 ml of (M/10) NaOH

B. 55 ml of (M/to) HCl +45ml of (M/10) NaOH

C. 10 ml of (M/10)HCl+90 ml of (M/10) NaOH

D. 75 ml of (M/5) HCl +25ml of (M/5) NaOH

Answer: D

Watch Video Solution

3. Which one is the most acidic compound ?

A. $NiCl_2$

B. $FeCl_2$

C. $AlCl_3$

D. $BeCl_2$

Answer: C

Watch Video Solution

4. A weak acid HX has the dissociation constant 1×10^{-5} M.It forms a salt NaX on reactions 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

5. Solubility products constants $\left(K_{sp}\right)$ of salts of types MX, MX_2, M_3X at temperature T are $4 \times 10^{-8} 3.2 \times 10^{-14}$ and 27×10^{-15} respectively. Solubility $\left(\text{moldm}^{-3}\right)$ of the salts at temperature T are in the order :

A. $MX > MX_2 > M_3X$

B. $M_3X > MX_2 > MX$

C. $MX_2 > MX$

D. $MX > M_3X > MX_2$

Answer: D

Watch Video Solution

6. $H_2O + H_3PO_3 \Leftrightarrow H_3O^+ + H_2OPO_3^-, pK_1 = x$

$H_2O + H_2PO_3 \Leftrightarrow H_3O^+ HPO_3^{-2}, pK_2 = y$

Hence , pH of 0.01 M NaH_2PO_3 is :

A. 9.35

B. 4.675

C. 2.675

D. 7.350

Answer: B

Watch Video Solution

7. Jagadeesh: How can we predict the nature of a salt, sodium acetate $\left(CH_3COONa\right)$?

Leela: Explained the doubt of Jagadeesh by asking some questions. Here their conversation is given in incomplete sentence.

Frame the questions and fill in it.

Leela : ....? Jagadesh : CH_3COONa (Sodium acetate) is basic in nature.

A. $3 < 2 < 1$

B. $2 < 1 < 3$

C. $1 < 2 < 3$

D. $3 < 1 < 2$

Answer: A

Watch Video Solution

8. $M(OH)_x$ has aK_{sp} of 4×10^{-9} and its solubility is 10^{-3} M. The value of x is :

A. 4

B. 1

C. 3

D. 2

Answer: D

Watch Video Solution

9. Solubility of Hg_2Cl_2 in a solvent is S moles/ litre.Its solubility product will be

A. $16S^2$

B. $8S^2$

C. $16S^4$

D. $4S^3$

Answer: D

Watch Video Solution

10. A sample of hard water contains 0.005 moles of calcium chloride per litre.What is the minimum concentration of sodium sulphate which must be added for removing the Ca^{2+} ions from this water sample ?

K_{sp} of $CaSO_4 = 2.4 \times 10^{-5}$

A. 4.8×10^{-2}

B. 4.8×10^{-3}

C. 2.4×10^{-2}

D. 2.4×10^{-3}

Answer: B

Watch Video Solution

11. The pK_{al} and pK_{a_2} of an amino acid are 2.3 and 9.7 respectively. The isoelectric point of amino acid is

A. 12

B. 7.4

C. 6.0

D. 3.7

Answer: C

Watch Video Solution

12. The best indicator for detection of end point in litration of a weak acid and a strong base is

A. methyl orange (3 to 4)

B. methyl red (5 to 6)

C. bromothymol blue (6 to 7.5)

D. phenolphthalein (8 to 9.)

Answer: D

Watch Video Solution

13. Which of the following solution will have pH closer to 1.0 ?

A. 100 ml of (M/ to) HCl +100 ml of (M/10) NaOH

B. 55 ml of (M/to) HCl +45ml of (M/10) NaOH

C. 10 ml of (M/10)HCl+90 ml of (M/10) NaOH

D. 75 ml of (M/5) HCl +25ml of (M/5) NaOH

Answer: D

Watch Video Solution

14. Which one is the more acidic in aqueous solution ?

A. $NiCl_2$

B. $FeCl_2$

C. $AlCl_3$

D. $BeCl_2$

Answer: C

Watch Video Solution

15. A weak acid HX has the dissociation constant 1×10^{-5} M.It forms a salt NaX on reactions 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

16. Solubility products constants $\left(K_{sp}\right)$ of salts of types MX, MX_2, M_3X at temperature T are $4 \times 10^{-8} 3.2 \times 10^{-14}$ and 27×10^{-15} respectively. Solubility $\left(\text{moldm}^{-3}\right)$ of the salts at temperature T are in the order :

A. $MX > MX_2 > M_3X$

B. $M_3X > MX_2 > MX$

C. $MX_2 > MX$

D. $MX > M_3X > MX_2$

Answer: D

Watch Video Solution

17. $H_3PO_4 + H_2O \Leftrightarrow H_3O^+ + H_2PO_4^-, pK_1 = 2.15,$

$H_2PO_4^- + H_2O \Leftrightarrow H_3O^+ HPO_4^{-2}, pK_2 = 7.20$ Hence pH of 0.01 M NaH_2PO_4 is

A. 9.35

B. 4. 675

C. 2. 675

D. 7.350

Answer: B

Watch Video Solution

18. Consider the three solutions of 1 M concetration

(1) Sodium acetate $\left(CH_3COONa\right)$

(2) Acetic acid +Sodium acetate $\left(CH_3COOH + CH_3COONa\right)$

(3) Acetic acid $\left(CH_3COOH\right)$

pH of these solutions will lie in the following sequence:

A. $3 < 2 < 1$

B. $2 < 1 < 3$

C. $1 < 2 < 3$

D. $3 < 1 < 2$

Answer: A

Watch Video Solution

19. $M(OH)_x$ has aK_{sp} of 4×10^{-9} and its solubility is 10^{-3} M. The value of x is :

A. 4

B. 1

C. 3

D. 2

Answer: D

Watch Video Solution

20. Solubility of Hg_2Cl_2 in a solvent is S moles/ litre.Its solubility product will be

A. $16S^2$

B. $8S^2$

C. $16S^4$

D. $4S^3$

Answer: D

Watch Video Solution

21. A sample of hard water contains 0.005 moles of calcium chloride per litre.What is the minimum concentration of sodium sulphate which must be added for removing the Ca^{2+} ions from this water sample ?

K_{sp} of $CaSO_4 = 2.4 \times 10^{-5}$

A. 4.8×10^{-2}

B. 4.8×10^{-3}

C. 2.4×10^{-2}

D. 2.4×10^{-3}

Answer: B

Watch Video Solution

22. The pK_{al} and pK_{a_2} of an amino acid are 2.3 and 9.7 respectively. The isoelectric point of amino acid is

A. 12

B. 7.4

C. 6.0

D. 3.7

Answer: C

Watch Video Solution

ADDITIONAL PRACTICE EXERCISE (LEVEL -II LECTURE SHEET (ADVANCED) (Straight Objective Type Questions))

1. A 25.0ml sample of 0.1 M HCl is titrated with 0.1 M NaOH . What is the pH of the solution at the points where 24.9 and 25.1 ml of NaOH have been added ?

A. 3.70, 10.70

B. 3.30, 10.30

C. 3. 70, 10.30

D. 3. 0, 11. 10

Answer: C

Watch Video Solution

2. What $\left[NH_4^+\right]$ in a solution that contains $0.02MNH_3\left(K_b = 1.8 \times 10^{-5}\right)$ and $0.01MKOH$?

A. 9×10^{-6}

B. 1.8×10^{-5}

C. 3.6×10^{-5}

D. none of these

Answer: C

Watch Video Solution

3. Mass number of Li, Be and B are 7,9 and 10 respectively. Which of the following has two electron three protons and four neutrons ?

A. 1M NaA

B. 1 M NaB

C. 1M NaC

D. 1M NaD

Answer: D

Watch Video Solution

4. The percentage degree of hydrolysis of a salt of weak acid (HA) and weak base (BOH) in its 0.1 M solutions is found to be 10% If the molarity of the solution is 0.05M , the percentage hydrolysis of the salt should be :

A. 5 %

B. 10 %

C. 20 %

D. none of these

Answer: B

Watch Video Solution

5. The pH of the resultant solution of 20 ml of $0.1MH_3PO_4$ and $20ml0.1MNa_3PO_4$ is

A. $pK_{a1} + \log 2$

B. pK_{al}

C. pK_{a_2}

D. $\frac{pK_{a1} + pK_{a_2}}{2}$

Answer: C

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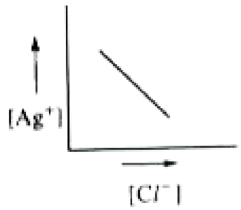
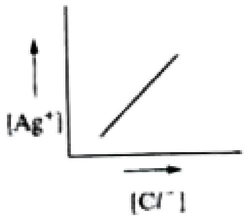
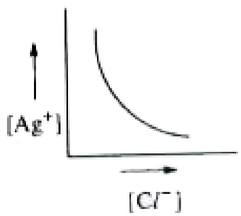
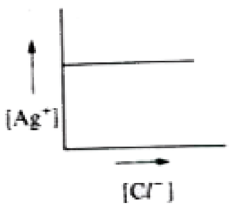
6. In NaCl is doped with 1×10^{-3} mol percent of $SrCl_2$, what is the concentration of cation vacancies ?

A. 

B. 

C. 

D. 

Answer: C

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7. A saturated solution of $Ca_3(PO_4)_2$ has $[Ca^{+2}] = 2 \times 10^{-8} M$ and $[PO_4^{-3}] = 1.6 \times 10^{-5} M$, K_{sp} of $Ca_3(PO_4)_2$ is

A. $3.2 \times 10-^{13}$

B. $3.\ 2 \times 10^{-34}$

C. 2.048×10^{-33}

D. none of these

Answer: C

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8. The solubility of $Ba_3(AsO_4)_2$ (formula weight =690) is $6.9 \times 10^{-2} g/100 ml$. what is the K_{sp} ?

A. 1.08×10^{-11}

B. 1.08×10^{-13}

C. 1.0×10^{-15}

D. 6.0×10^{-13}

Answer: B

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9. How many grams of MgC_2O_4 (formula weight =112) will dissolve in 1.5 L of water ? $\left(K_{sp} = 8.1 \times 10^5\right)$

A. 1.0

B. 1.29

C. 1.512

D. 4.65

Answer: C

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10. What is the molar solubility of $Fe(OH)_2\left(K_{sp} = 8.0 \times 10^{-16}\right)$ at pH 13.0 ?

A. 8.0×10^{-18}

B. 8.0×10^{-15}

C. 8.0×10^{-17}

D. 8.0×10^{-14}

Answer: D

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11. Solubility of AgCl in 0.2 M NaCl is x and that in 0.1 M $AgNO_3$ is y then which of the following is correct ?

A. $x = y$

B. $x > y$

C. $x < y$

D. we cannot predict

Answer: C

Watch Video Solution

12. What mass of AgI will dissolve in 1.0L of 1.0M NH_3 ? Neglect change in conc. NH_3

[Given , $K_{sp}(AgI) = 1.5 \times 10^{-16}, K_f\left[Ag\left(NH_3\right)_2^+\right] = 1.6 \times 10^7\right]$, (At .Wt . Ag =108 , 1 =127)

A. $4.9 \times 10^{-5}g$

B. $0.0056g$

C. $0.035g$

D. $0.011g$

Answer: D

Watch Video Solution

13. A 25.0ml sample of 0.1 M HCl is titrated with 0.1 M NaOH . What is the pH of the solution at the points where 24.9 and 25.1 ml of NaOH have been added ?

A. 3.70, 10.70

B. 3.30, 10.30

C. 3. 70, 10.30

D. 3. 0, 11. 10

Answer: C

Watch Video Solution

14. What $\left[NH_4^+\right]$ in a solution that contains $0.02MNH_3\left(K_b = 1.8 \times 10^{-5}\right)$ and $0.01MKOH$?

A. 9×10^{-6}

B. 1.8×10^{-5}

C. 3.6×10^{-5}

D. none of these

Answer: C

Watch Video Solution

15. The enthalpy of neutralization of four acids HA, HB ,HC and HD with NaOH are $-13, -12, -11, -10$kcal/ mol. Which salt has maximum degree of hydrolysis ?

A. 1M NaA

B. 1 M NaB

C. 1M NaC

D. 1M NaD

Answer: D

Watch Video Solution

16. The percentage degree of hydrolysis of a salt of weak acid (HA) and weak base (BOH) in its 0.1 M solutions is found to be 10% If the molarity of the solution is 0.05M , the percentage hydrolysis of the salt should be :

A. 5%

B. 10%

C. 20%

D. none of these

Answer: B

Watch Video Solution

17. The pH of the resultant solution of 20 ml of $0.1 M H_3PO_4$ and $20 ml 0.1 M Na_3PO_4$ is

A. $pK_{a1} + \log 2$

B. pK_{al}

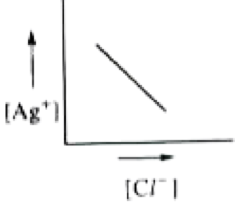
C. pK_{a_2}

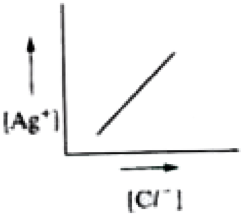
D. $\dfrac{pK_{a1} + pK_{a_2}}{2}$

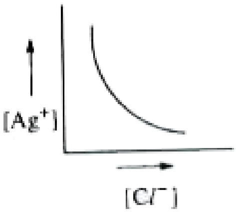
Answer: C

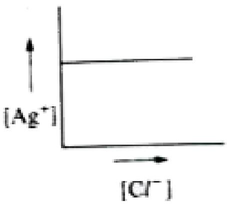
Watch Video Solution

18. In a saturated solution of AgCl, NaCl is added gradually. The concentration of Ag^+ is plotted against the concentration of Cl^- . The graph appears as :

A. 

B. 

C. 

D. 

Answer: C

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19. A saturated solution of $Ca_3(PO_4)_2$ has $[Ca^{+2}] = 2 \times 10^{-8} M$ and $[PO_4^{-3}] = 1.6 \times 10^{-5} M$, K_{sp} of $Ca_3(PO_4)_2$ is

A. $3.2 \times 10-^{13}$

B. $3.\ 2 \times 10^{-34}$

C. 2.048×10^{-33}

D. none of these

Answer: C

Watch Video Solution

20. The solubility of $Ba_3(AsO_4)_2$ (formula weight =690) is $6.9 \times 10^{-2} g/100ml$. what is the K_{sp} ?

A. 1.08×10^{-11}

B. 1.08×10^{-13}

C. 1.0×10^{-15}

D. 6.0×10^{-13}

Answer: B

Watch Video Solution

21. How many grams of MgC_2O_4 (formula weight =112) will dissolve in 1.5 L of water ? $\left(K_{sp} = 8.1 \times 10^5\right)$

A. 1.0

B. 1.29

C. 1.512

D. 4.65

Answer: C

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22. What is the molar solubility of $Fe(OH)_2\left(K_{sp} = 8.0 \times 10^{-16}\right)$ at pH 13.0 ?

A. 8.0×10^{-18}

B. 8.0×10^{-15}

C. 8.0×10^{-17}

D. 8.0×10^{-14}

Answer: D

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23. Solubility of AgCl in 0.2 M NaCl is x and that in 0.1 M $AgNO_3$ is y then which of the following is correct ?

A. $x = y$

B. $x > y$

C. $x < y$

D. we cannot predict

Answer: C

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24. What mass of AgI will dissolve in 1.0L of 1.0M NH_3 ? Neglect change in conc. NH_3

[Given , $K_{sp}(AgI) = 1.5 \times 10^{-16}, K_f\left[Ag\left(NH_3\right)_2^+\right] = 1.6 \times 10^7\right]$, (At .Wt . Ag =108 , 1 =127)

A. $4.9 \times 10^{-5}g$

B. $0.0056g$

C. $0.035g$

D. $0.011g$

Answer: D

Watch Video Solution

ADDITIONAL PRACTICE EXERCISE (LEVEL -II LECTURE SHEET (ADVANCED) (More than One correct answer Type Questions))

1. PCl_5 in solid state exists as PCl_4^+ and PCl_6^- and also in some solvents it undergoes dissociation as $2PCl_5 \Leftrightarrow PCl_4^+ + PCl_6^-$

Which statement is wrong ?

A. Solution assumes colour of Hin when $p^{K_{In}} + 1$

B. Solution assumes colour of In^- When pH $=p^{K_{In}} - 1$

C. Solution assumes colour Hin when pH $=p^{K_{In}} + 1$

D. Solution assumes colour of In^- when pH $=p^{K_{In}} - 1$

Answer: C::D

Watch Video Solution

2. If you have saturated solution of CaF_2 then :

A. $\left[Ca^{2+}\right] = \sqrt{K_{sp}}$

B. $\left[Ca^{2+}\right] = \left[F^{-}\right]$

C. $2\left[Ca^{2+}\right] = \left[F^{-}\right]$

D. $\left[Ca^{2+}\right] = \left[K_{sp}/4\right]^{1/3}$

Answer: C::D

Watch Video Solution

3. Solubility product of the hydroxide $M(OH)_2$ is 4×10^{-12} , Select the correct statement (s) among the following:

A. The pH of its saturated solution will be 10. 3

B. Its solubility will decrease in a buffer medium of pH= 9

C. Its solubility will increase in a buffer medium of pH =1

D. Its solubility unaffected by pH of the medium

Answer: A::C

Watch Video Solution

4. In a buffer solution consisting NaH_2PO_4 and Na_2HPO_4 select the correct statement among the following

A. NaH_2PO_4 is acid and Na_2HPO_4 is salt

B. The pH of solution can be calculated using the relation $: pH = pK_2 + \log_{10}\frac{\left[HPO_4^{2-}\right]}{\left[H_2PO_4^-\right]}$

C. Na_2HPO_4 is acid and NaH_2PO_4 is salt

D. The pH cannot be calculated

Answer: A::B

Watch Video Solution

5. Dissociation of an indicator can be considered as Hin $\Leftrightarrow H^+ + In^-$ Colours of Hin and In^- ae differect. Which statement is correct ?

A. Solution assumes colour of Hin when $p^{K_{In}} + 1$

B. Solution assumes colour of In^{-} When pH $=p^{K_{In}} - 1$

C. Solution assumes colour Hin when pH $=p^{K_{In}} + 1$

D. Solution assumes colour of In^{-} when pH $=p^{K_{In}} - 1$

Answer: C::D

Watch Video Solution

6. If you have saturated solution of CaF_2 then :

A. $\left[Ca^{2+}\right] = \sqrt{K_{sp}}$

B. $\left[Ca^{2+}\right] = \left[F^{-}\right]$

C. $2\left[Ca^{2+}\right] = \left[F^{-}\right]$

D. $\left[Ca^{2+}\right] = \left[K_{sp}/4\right]^{1/3}$

Answer: C::D

Watch Video Solution

7. Solubility product of the hydroxide $M(OH)_2$ is 4×10^{-12} , Select the correct statement (s) among the following:

A. The pH of its saturated solution will be 10. 3

B. Its solubility will decrease in a buffer medium of pH= 9

C. Its solubility will increase in a buffer medium of pH =1

D. Its solubility unaffected by pH of the medium

Answer: A::C

Watch Video Solution

8. In a buffer solution consisting NaH_2PO_4 and Na_2HPO_4 select the correct statement among the following

A. NaH_2PO_4 is acid and Na_2HPO_4 is salt

B. The pH of solution can be calculated using the relation

$$: pH = pK_2 + \log_{10}\frac{\left[HPO_4^{2-}\right]}{\left[H_2PO_4^{-}\right]}$$

C. Na_2HPO_4 is acid and NaH_2PO_4 is salt

D. The pH cannot be calculated

Answer: A::B

Watch Video Solution

ADDITIONAL PRACTICE EXERCISE (LEVEL -II LECTURE SHEET (ADVANCED) (Linked Comprehension Type Questions))

1. 100 ml 0.1 MH_3PO_4 solution is being titrated with 0.1 M NaOH solution. The pH of the reaction mixture keeps increasing with addition of NaOH. The successive dissociation constant of H_3PO_4 are $10^{-3}, 10^{-6}$ and 10^{-14} respectively.

How much volume of the given NaOH must be added such that a buffer $H_2PO_4^- / HPO_4^{-2}$ of maximum capacity is formed.

A. 100 ml

B. 150 ml

C. 200 ml

D. 250 ml

Answer: B

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2. 100 ml 0.1 MH_3PO_4 solution is being titrated with 0.1 M NaOH solution. The pH of the reaction mixture keeps increasing with addition of NaOH. The successive dissociation constant of H_3PO_4 are $10^{-3}, 10^{-6}$ and 10^{-14} respectively.

What is the pH of the reaction mixture after adding 50 ml of NaOH ?

A. 3

B. 4

C. 6

D. 5.3

Answer: A

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3. 100 ml 0.1 MH_3PO_4 solution is being titrated with 0.1 M NaOH solution. The pH of the reaction mixture keeps increasing with addition of NaOH. The successive dissociation constant of H_3PO_4 are $10^{-3}, 10^{-6}$ and 10^{-14} respectively.

What is the pH of the solution after adding 150 ml of NaOH solution?

A. 3

B. 6

C. 6. 7

D. 5.3

Answer: B

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4. Sparingly soluble salts maintains their solubility product value in their saturated solutions irrespective of the sources of the ions .

What is the solubility of $MgCl_2(gm/L)$ in a 0.01 M KOH solution without causing precipitation of $Mg(OH)_2$?

K_{sp} of $Mg(OH)_2 = 2 \times 10^8$

A. 1.9×10^{-2}

B. 2.8×10^{-3}

C. 3.4×10^{-1}

D. 4.6×10^{-4}

Answer: A

Watch Video Solution

5. Sparingly soluble salts maintains their solubility product value in their saturated solutions irrespective of the sources of the ions .

what is the molar solubility of $AgNO_3$ in a 0.1 M H_2S solution buffered at pH= 2

$\left(K_1 \text{ and } K_2 \text{ of } H_2S \text{ are } 10^4 \text{ and } 10^{-8}\right.$ respectively)

$\left(K_{sp} \text{ of } Ag_2S = 4 \times 10^{-13}\right)$

(Note : No Ag_2S precipitate should be formed)

A. $0.01M$

B. $0.02M$

C. $0.03M$

D. $0.04M$

Answer: B

Watch Video Solution

6. 100 ml 0.1 MH_3PO_4 solution is being titrated with 0.1 M NaOH solution. The pH of the reaction mixture keeps increasing with addition of NaOH. The successive dissociation constant of H_3PO_4 are 10^{-3}, 10^{-6} and 10^{-14} respectively.

How much volume of the given NaOH must be added such that a buffer $H_2PO_4^- / HPO_4^{-2}$ of maximum capacity is formed.

A. 100 ml

B. 150 ml

C. 200 ml

D. 250 ml

Answer: B

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7. 100 ml 0.1 MH_3PO_4 solution is being titrated with 0.1 M NaOH solution. The pH of the reaction mixture keeps increasing with addition of NaOH.

The successive dissociation constant of H_3PO_4 are $10^{-3}, 10^{-6}$ and 10^{-14} respectively.

What is the pH of the reaction mixture after adding 50 ml of NaOH ?

A. 3

B. 4

C. 6

D. 5.3

Answer: A

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8. 100 ml 0.1 MH_3PO_4 solution is being titrated with 0.1 M NaOH solution. The pH of the reaction mixture keeps increasing with addition of NaOH. The successive dissociation constant of H_3PO_4 are $10^{-3}, 10^{-6}$ and 10^{-14} respectively.

What is the pH of the solution after adding 150 ml of NaOH solution?

A. 3

B. 6

C. 6. 7

D. 5.3

Answer: B

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9. Sparingly soluble salts maintains their solubility product value in their saturated solutions irrespective of the sources of the ions .

What is the solubility of $MgCl_2(gm/L)$ in a 0.01 M KOH solution without causing precipitation of $Mg(OH)_2$?

K_{sp} of $Mg(OH)_2 = 2 \times 10^8$

A. 1.9×10^{-2}

B. 2.8×10^{-3}

C. 3.4×10^{-1}

D. 4.6×10^{-4}

Answer: A

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10. Sparingly soluble salts maintains their solubility product value in their saturated solutions irrespective of the sources of the ions .

what is the molar solubility of $AgNO_3$ in a 0.1 M H_2S solution buffered at pH= 2

$\left(K_1 \text{ and } K_2 \text{ of } H_2S \text{ are } 10^4 \text{ and } 10^{-8}\right.$ respectively)

$\left(K_{sp} \text{ of } Ag_2S = 4 \times 10^{-13}\right)$

(Note : No Ag_2S precipitate should be formed)

A. $0.01M$

B. $0.02M$

C. $0.03M$

D. $0.04M$

Answer: B

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ADDITIONAL PRACTICE EXERCISE (LEVEL -II LECTURE SHEET (ADVANCED) (Matrix Matching Type Questions))

1. When Na_2CO_3 aqueous solution is being titrated with hydrochloric acid

Column-I	Column-II
(A) At the start of titration	(P) Buffer solution of HCO_3^- and
(B)Before the first equivalent point	(Q)Buffer solution H_2CO_3 and H
(C)At the first equivalent point	(R)Amphiprotic anion $pH = (1/2)$
(D)Between first and second equivalent points	(S)Hydrolysis of CO_3^{-2}

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2. When Na_2CO_3 aqueous solution is being titrated with hydrochloric acid

Column-I	Column-II
(*A*) At the start of titration	(*P*) Buffer solution of HCO_3^- and
(*B*)Before the first equivalent point	(*Q*)Buffer solution H_2CO_3 and *H*
(*C*)At the first equivalent point	(*R*)Amphiprotic anion $pH = (1/2)$
(*D*)Between first and second equivalent points	(*S*)Hydrolysis of CO_3^{-2}

Watch Video Solution

ADDITIONAL PRACTICE EXERCISE (LEVEL -II PRACTICE SHEET (ADVANCED) (Straight Objective Type Questions))

1. H_3A is a weak triprotic acid $\left(K_{a_1} = 10^{-5}, K_{a_2} = 10^{-13}\right)$. What is the value of pX of 0.1 M $H_3A(aq.)$ solution ? Where pX $= -\log X$ and $X = \frac{\left[A^{3-}\right]}{\left[HA^{2-}\right]}$

A. 7

B. 8

C. 9

D. 10

Answer: D

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2. A buffer solution 0.04 M in Na_2HPO_4 and 0.02 M in Na_3PO_4 is prepared. The electrolytic oxidation of 1.0 milli -mole of the organic compound RNHOH is carried out in 100 mL of the buffer. The reaction is

$RNHOH + H_2O \rightarrow RNO_2 + 4H^+ + 4e^-$

The approximate pH of solution after the oxidation is complete is:

[Given : for $H_3OPO_4, pK_{a_1} = 7.20, pK_{a_2} = 12\big]$

A. 6.90

B. 7.20

C. 7. 5

D. None of these

Answer: C

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3. When a 20 mL of 0.08 M weak base BOH is titrated with $0.08HCl$, the pH of the solution at the end point is 5. What will be the pOH if 10 mL 0.04 M NaOH is added to the resulting solution?

[Given : $\log 2 = 0.30$ and $\log 3 = 0.48$)

A. 5.40

B. 5.88

C. 4.92

D. None of these

Answer: B

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4. A solution is $0.01MKI$ and $0.1MKCl$. If solid $AgNO_3$ is added to the solution, what is the $\left[1^{-}\right]$ when $AgCl$ begins to precipitate

$\left[K_{sp}(AgI) = 1.5 \times 10^{-16}, K_{sp}(AgCl) = 1.8 \times 10^{-10}\right]$

A. 3.5×10^{-7}

B. 6.1×10^{-8}

C. 2.2×10^{-7}

D. 8.3×10^{-8}

Answer: D

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5. if 500 mL of 0.4 M $AgNO_3$ is mixed with 500 mL of $2MNH_3$ solution the what is the concentration of $Ag\left(NH_3\right)^+$ in solution?

[Given : $K_{f_1}\left[Ag\left(NH_3\right)^+\right] = 10^3, K_{f_2}\left[Ag\left(NH_3\right)_2^+\right] = 10^4\right]$

A. $3.33 \times 10^{-7}M$

B. $3.\ 33 \times 10^{-5}M$

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

D. 10^{-7}

Answer: B

Watch Video Solution

6. The simultaneous solubility of Ag CN $\left(K_f = 2.5 \times 10^{-16}\right)$ and $AgCl\left(Ksp = 1.6 \times 10^{-10}\right)$ in 1. 0M NH_3 (aq) are respectively : $\left[Given,\ K_f\left[Ag\left(NH_3\right)_2^+\right] = 10^7\right]$

A. $0.037, 5.78 \times 10^{-8}$

B. $5. 78 \times 10^{-8}, 0. 037$

C. $0.04, 6.25 \times 10^{-8}$

D. $1. 58 \times 10^{-3}, 1.26 \times 10^{-5}$

Answer: A

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7. Solubility of Ag CN is maximum in:

A. acidic buffer solution

B. basic buffer solution

C. in pure water

D. equal in all solution

Answer: A

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8. $AgBr_s + 2S_2O_{3(aq)}^{2-} \Leftrightarrow Ag(S_2O_3)_{2(aq)}^{3-} + Br_{aq}^-$

[Using : $K_{sp}(AgBr) = 5 \times 10^{-13} K_f\left(Ag(S_2O_3)_2^{3-}\right) = 5 \times 10^{13}$]

What is the molar solubility of AgBr in 0.1 M $Na_2S_2O_3$

A. $0.5M$

B. $0.45M$

C. $0.045M$

D. None of these

Answer: C

Watch Video Solution

9. What is $\left[Ag^{+}\right]$ in a solution made by dissolving both Ag_2CrO_4 and $Ag_2C_2O_4$ until saturation is reached with respect to both salts ? $\left[K_{sp}\left(Ag_2C_2O_4\right) = 2 \times 10^{-11}, K_{sp}\left(Ag_2CrO_4\right) - 2 \times 10^{-12}\right)\right]$

A. 2.80×10^{-4}

B. 7.6×10^{-5}

C. 6.63×10^{-6}

D. 3.52×10^{-4}

Answer: D

Watch Video Solution

10. H_3A is a weak triprotic acid $\left(K_{a_1} = 10^{-5}, K_{a_2} = 10^{-13}\right)$. What is the value of pX of 0.1 M $H_3A(aq.)$ solution ? Where pX $= -\log X$ and $X = \frac{\left[A^{3-}\right]}{\left[HA^{2-}\right]}$

A. 7

B. 8

C. 9

D. 10

Answer: D

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11. A buffer solution 0.04 M in Na_2HPO_4 and 0.02 M in Na_3PO_4 is prepared. The electrolytic oxidation of 1.0 milli -mole of the organic compound RNHOH is carried out in 100 mL of the buffer. The reaction is

$RNHOH + H_2O \rightarrow RNO_2 + 4H^+ + 4e^-$

The approximate pH of solution after the oxidation is complete is:

[Given : for $H_3OPO_4, pK_{a_1} = 7.20, pK_{a_2} = 12\Big]$

A. 6.90

B. 7.20

C. 7. 5

D. None of these

Answer: C

Watch Video Solution

12. When a 20 mL of 0.08 M weak base BOH is titrated with $0.08HCl$, the pH of the solution at the end point is 5. What will be the pOH if 10 mL 0.04 M NaOH is added to the resulting solution?

[Given : $\log 2 = 0.30$ and $\log 3 = 0.48)$

A. 5.40

B. 5.88

C. 4.92

D. None of these

Answer: B

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13. A solution is $0.01MKl$ and $0.1MKCl$. If solid $AgNO_3$ is added to the solution, what is the $\left[1^{-}\right]$ when $AgCl$ begins to precipitate

$\left[K_{sp}(Agl) = 1.5 \times 10^{-16}, K_{sp}(AgCl) = 1.8 \times 10^{-10}\right]$

A. 3.5×10^{-7}

B. 6.1×10^{-8}

C. 2.2×10^{-7}

D. 8.3×10^{-8}

Answer: D

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14. if 500 mL of 0.4 M $AgNO_3$ is mixed with 500 mL of $2MNH_3$ solution the what is the concentration of $Ag(NH_3)^+$ in solution?

[Given : $K_{f_1}\left[Ag(NH_3)^+\right] = 10^3, K_{f_2}\left[Ag(NH_3)_2^+\right] = 10^4\right]$

A. $3.33 \times 10^{-7}M$

B. $3.33 \times 10^{-5}M$

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

D. 10^{-7}

Answer: B

Watch Video Solution

15. The simultaneous solubility of Ag CN $\left(K_f = 2.5 \times 10^{-16}\right)$ and $AgCl\left(Ksp = 1.6 \times 10^{-10}\right)$ in 1. 0M NH_3 (aq) are respectively : $\left[Given, K_f\left[Ag(NH_3)_2^+\right] = 10^7\right]$

A. $0.037, 5.78 \times 10^{-8}$

B. $5.78 \times 10^{-8}, 0.037$

C. $0.04, 6.25 \times 10^{-8}$

D. $1.58 \times 10^{-3}, 1.26 \times 10^{-5}$

Answer: A

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16. Solubility of Ag CN is maximum in:

A. acidic buffer solution

B. basic buffer solution

C. in pure water

D. equal in all solution

Answer: A

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17. $AgBr_s + 2S_2O_{3(aq)}^{2-} \Leftrightarrow Ag(S_2O_3)_{2(aq)}^{3-} + Br_{aq}^-$

[Using : $K_{sp}(AgBr) = 5 \times 10^{-13} K_f\left(Ag(S_2O_3)_2^{3-}\right) = 5 \times 10^{13}$]

What is the molar solubility of AgBr in 0.1 M $Na_2S_2O_3$

A. $0.5M$

B. $0.45M$

C. $0.045M$

D. None of these

Answer: C

Watch Video Solution

18. What is $[Ag^+]$ in a solution made by dissolving both Ag_2CrO_4 and $Ag_2C_2O_4$ until saturation is reached with respect to both salts ? $\left[K_{sp}(Ag_2C_2O_4) = 2 \times 10^{-11}, K_{sp}(Ag_2CrO_4) - 2 \times 10^{-12})\right]$

A. 2.80×10^{-4}

B. 7.6×10^{-5}

C. 6.63×10^{-6}

D. 3.52×10^{-4}

Answer: D

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ADDITIONAL PRACTICE EXERCISE (LEVEL -II PRACTICE SHEET (ADVANCED) (More than One correct answer Type Questions))

1. What is the concentration of CN^{-} ions in a solution with 0.1 M HCl and 0.01 M HCN where K_a of HCN is 10^{-6} ?

A. $\left[H^{+}\right]_{\text{total}} \approx \left[H^{+}\right]$ from first step ionization of acid H_2A

B. Concentration of OH^{-} in solution is 10^{-3} M

C. The value of K_{a_1} is nearly 10^{5}

D. $p^{ka_2} - p^{ka_1} = 9$

Answer: A::C

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2. What is/are correct statement (s)?

A. CH_3cOONH_4 have greater degree of hydrolysis in 0.2M solution in comparison of 0.4 M solution

B. Anion have lesser basic strength than OH^- , does not undergo hydrolysis in comparison of $HCOO^-$ when their salt solution have equal concentration

C. The CH_3COO^- have greater degree of hydrolysis in compreson of $HCOO^-$ when their salt solution have equal concentration

D. SO_4^{2-} does hydrolysis but HSO_4^- does not undergo hydrolysis

Answer: C::D

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3. H_2A is a weak diptotic acid . IF the pH of 0.1 M H_2A solution is 3 and concentration of $A^2 is 10^{-12}$ at $25^\circ C$ Select correct statement (s)

A. $\left[H^+\right]_{\text{total}} \approx \left[H^+\right]$ from first step ionization of acid H_2A

B. Concentration of OH^- in solution is 10^{-3} M

C. The value of K_{a_1} is nearly 10^5

D. $p^{ka_2} - p^{ka_1} = 9$

Answer: A::C

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4. Which are correct statement ?

A. CH_3cOONH_4 have greater degree of hydrolysis in 0.2M solution in comparison of 0.4 M solution

B. Anion have lesser basic strength than OH^- , does not undergo hydrolysis in comparison of $HCOO^-$ when their salt solution have equal concentration

C. The CH_3COO^- have greater degree of hydrolysis in compreson of $HCOO^-$ when their salt solution have equal concentration

D. SO_4^{2-} does hydrolysis but HSO_4^- does not undergo hydrolysis

Answer: C::D

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ADDITIONAL PRACTICE EXERCISE (LEVEL -II PRACTICE SHEET (ADVANCED) (Linked Comprehension Type Questions))

1. For a general reaction given below, the value of solubility product can be given us

A_xB_y	$= xA^{+y}$	$+yB^{-x}$
a	0	0
$a - s$	xs	ys

$K_{sp} = (xs)^x.(ys)^y($ or $)K_{sp} = x^x y^y (S)^{x+y}$

Solubility product gives us not only an idea about the solubility of an electrolyte in a solvent but also helps in explaining concept of precipitation and calculation $\left[H^+\right]$ ion, $\left[OH^-\right]$ ion. It is also useful in qualitative analysis for the idetification and separation of basic radicals

Potussium chromate is slowly aded toa solution containing 0.20M Ag NO_3, and 0.20M $Ba\left(NO_3\right)_2$. Describe what happensif the K_{sp} for Ag_2, CrO_4, is 1.1×10^{-12} and the K_{sp} of $BaCiO_4$, is 1.2×10^{-10},

A. The Ag_2CrO_4 pecipitates first out of solution and then $BaCrO_4$ preciptates.

B. The $BaCrO_4$ pecipitates first out of solution and then Ag_2CrO_4 preciptates

C. Both Ag_2CrO_4 and $BaCrO_4$ precipitate simultaneously out of solution

D. Neither Ag_2CrO_4 nor $BaCrO_4$ precipitates

Answer: A

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2. For a general reaction given below, the value of solubility product can be given us

$A_xB_y \quad = xA^{+y} \quad + yB^{-x}$

$a \quad 0 \quad 0$

$a - s \quad xs \quad ys$

$K_{sp} = (xs)^x.(ys)^y(\text{ or })K_{sp} = x^x y^y (S)^{x+y}$

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What is the molar solubility of $Cu(OH)_2$, in 1.0 M NH_3 if the deep blue complex ion $\left[Cu\left(NH_3\right)_4\right]^{2+}$ is formed. The K_{sp}, of $Cu(OH)_2$, is 1.6×10^{-19} and K_3, of $\left[Cu\left(NH_3\right)_4\right.$ is 1.1×10^{13}

A. $7.1 \times 10^{-4}M$

B. $7.6 \times 10^{-3}M$

C. $6.67 \times 10^{-3}M$

D. $5.6 \times 10^{-4} M$

Answer: B

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3. For a general reaction given below, the value of solubility product can be given us

$A_xB_y \quad = xA^{+y} \quad + yB^{-x}$

$a \qquad 0 \qquad 0$

$a - s \quad xs \qquad ys$

$K_{sp} = (xs)^x . (ys)^y (\text{ or }) K_{sp} = x^x y^y (S)^{x+y}$

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C. Both Ag_2CrO_4 and $BaCrO_4$ precipitate simultaneously out of solution

D. Neither Ag_2CrO_4 nor $BaCrO_4$ precipitates

Answer: A

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4. For a general reaction given below, the value of solubility product can be given us

$$\begin{array}{lll} A_xB_y & = xA^{+y} & +yB^{-x} \\ a & 0 & 0 \\ a-s & xs & ys \end{array}$$

$K_{sp} = (xs)^x.(ys)^y(\text{ or })K_{sp} = x^xy^y(S)^{x+y}$

Solubility product gives us not only an idea about the solubility of an electrolyte in a solvent but also helps in explaining concept of precipitation and calculation $\left[H^+\right]$ ion, $\left[OH^-\right]$ ion. It is also useful in qualitative analysis for the idetification and separation of basic radicals

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A. $7.1 \times 10^{-4}M$

B. $7.6 \times 10^{-3}M$

C. $6.67 \times 10^{-3}M$

D. $5.6 \times 10^{-4}M$

Answer: B

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ADDITIONAL PRACTICE EXERCISE (LEVEL -II PRACTICE SHEET (ADVANCED) (Integer Type Questions))

1. A certain weak acid has $K_a, = 10^{-5}$. If the equilibrium constant for is its reaction with a strong base is repesented as $y \times 10^y$ then find the value of y.

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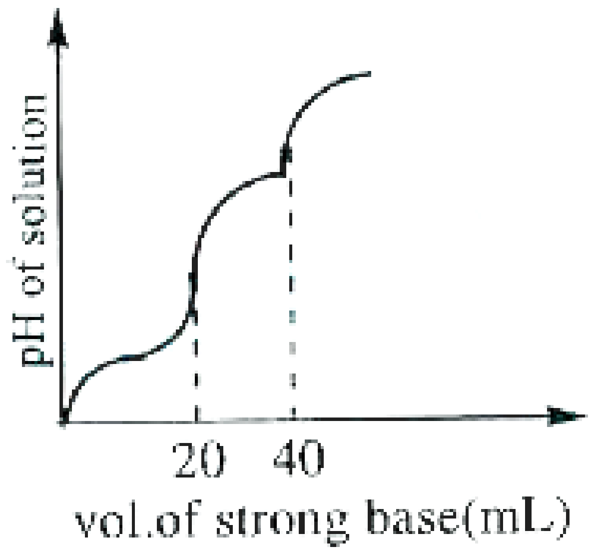
2. 10 mLof H,A (weak diprotic acid) solutions is titrated against 0.1M NaOH. pH of the solution is plotted against volume of strong base added and following observation is made. If pH of the solution at 1^{st} equivalence point is pH_1 and at 2^{nd} equivalnee point is pH_2, Cal the value $\left(pH_2, - pH_1\right)$ at $25\,^\circ$C. Given for $H_2, A, p^{Kal} = 4.6\&p^{Ka2} = 8$



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3. pH of aqueous solution of 0.1 M , NH_4Cl is found to be 5. The equilibrium constant for the neutralization of NH_4OH by HCl is 10^y. The value of .y. is

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4. Calculate the solubility of CaF_2 in water at 298 K which is 70% dissociated. K_{sp} of CaF_2 is 1.7×10^{-10}. If answer is x $\times 10^{-4}$ mol/ltr then x = ____?

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5. A certain weak acid has K_a, $= 10^{-5}$. If the equilibrium constant for is its reaction with a strong base is repesented as $y \times 10^y$ then find the value of y.

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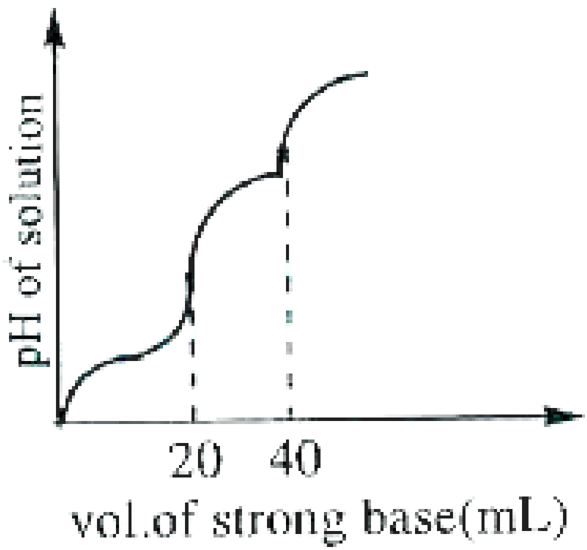
6. 10 mLof H,A (weak diprotic acid) solutions is titrated against 0.1M NaOH. pH of the solution is plotted against volume of strong base added and following observation is made. If pH of the solution at 1^{st} equivalence point is pH_1 and at 2^{nd} equivalnee point is pH_2, Cal the value $\left(pH_2, - pH_1\right)$ at 25 ° C. Given for $H_2, A, p^{Kal} = 4.6\&p^{Ka2} = 8$



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7. pH of aqueous solution of 0.1 M , NH_4Cl is found to be 5. The equilibrium constant for the neutralization of NH_4OH by HCl is 10^y. The value of .y. is

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8. Calculate the solubility of CaF_2 in water at 298 K which is 70% dissociated. K_{sp} of CaF_2 is 1.7×10^{-10}. If answer is x $\times 10^{-4}$ mol/ltr then x = ____?

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