ALLEN CAREER INSTITUTE KOTA (RAJASTHAN)
path to success

PRE-MEDICAL

PHYSICAL CHEMISTRY

ENTHUSIAST | LEADER | ACHIEVER

EXERCISE

Ionic Equilibrium

ENGLISH MEDIUM

EXERCISE-I (Conceptual Questions)

Build Up Your Understanding

INTRODUCTION

1. The formula weight of H_2SO_4 is 98. The weight of the acid in 400mL of 0.1 M solution is:-
(1) 2.45 g (2) 3.92 g (3) 4.90 g (4) 9.8 g
IE0001

2. Normality of 2M sulphuric acid is:-
(1) 2 N (2) 4N (3) N/2 (4) N/4
IE0002

3. If pH = 3.31, then find out $[H^+]$ (Approx)
(1) 3.39×10^{-4} M (2) 5×10^{-4} M
(3) 3.0×10^{-3} M (4) 2×10^{-4} M
IE0003

4. If $[OH^-] = 5.0 \times 10^{-5}$ M then pH will be :-
(1) 5 - log 5 (2) 9 + log 5
(3) log 5 - 5 (4) log 5 - 9
IE0004

5. Basicity of H_3PO_3 and H_3PO_2 are respectively :-
(1) 1 and 2 (2) 2 and 3
(3) 3 and 2 (4) 2 and 1
IE0005

6. Find out pH of solution having 2×10^{-3} moles of OH^- ions in 2 litre solution :-
(1) pH = 3 (2) pH = 3 + log2
(3) pH = 3 – log2 (4) pH = 11
IE0006

7. pH of tomato juice is 4.4. Then concentration of H_3O^+ will be :-
(1) 39×10^{-4} M (2) 3.9×10^{-5} M
(3) 3.9×10^{-4} M (4) 3.9×10^{5} M
IE0007

8. 8 g NaOH is dissolved in one litre of solution, the molarity of the solution is:-
(1) 0.2 M (2) 0.4 M (3) 0.02 M (4) 0.8 M
IE0008

9. The amount of acetic acid present in 100 mL of 0.1M solution is :-
(1) 0.30 g (2) 3.0 g (3) 0.60 g (4) None
IE0009

10. The number of milli equivalents of acid in 100 mL of 0.5N HCl solution is:-
(1) 50 (2) 100 (3) 25 (4) 200
IE0010

11. If the molar concentration of $MgCl_2$ is 1.5×10^{-3} mol L^{-1}, the concentration of chloride ions in g ion L^{-1} is:-
(1) 3.0×10^{-3} (2) 6.0×10^{-3}
(3) 0.3×10^{-3} (4) 0.6×10^{-6}
IE0011

OSTWALD'S DILUTION LAW

12. Degree of dissociation of 0.1 N CH_3COOH is :-
(Dissociation constant = 1×10^{-5})
(1) 10^{-5} (2) 10^{-4} (3) 10^{-3} (4) 10^{-2}
IE0012

13. The degree of dissociation of acetic acid is given by the expression $\alpha = 0.1 \times C^{-1}$ (where C = concentration of the acid) What is the pH of the solution :-
(1) 1 (2) 2 (3) 3 (4) 4
IE0014

14. Ostwald's dilution law is not applicable for strong electrolytes because:-
(1) Strong electrolytes are completely ionised
(2) Strong electrolytes are volatile
(3) Strong electrolytes are unstable
(4) Strong electrolytes often contain metal ions
IE0015

15. The degree of ionisation of a compound depends upon :
(1) Size of the solute molecules
(2) Nature of the solute molecules
(3) Nature of the container taken
(4) The amount of current passed
IE0016

16. Find out K_a for 10^{-2} M HCN acid, having pOH = 10 :-
(1) $K_a = 10^{-4}$ (2) $K_a = 10^{-2}$
(3) $K_a = 10^{-5}$ (4) None of these
IE0017

17. Which of the following will occur if a 1.0 M solution of a weak acid is diluted to 0.01 M at constant temperature:-
(1) Percentage ionisation will increase
(2) $[H^+]$ will decrease to 0.01M
(3) K_a will increase
(4) pH will decrease by 2 units
IE0018

18. The extent of ionisation of weak electrolytes increases :-
(1) With the increase in concentration of solute
(2) On decreasing the temp. of solution
(3) On addition of excess of water to the solution
(4) On stirring the solution vigorously
IE0020

19. If K_a of HCN = 4×10^{-10}, then the pH of 2.5×10^{-1} molar HCN (aq) is:-
(1) 4.2 (2) 4.7 (3) 0.47 (4) 5.0
IE0021

20. The molarity of nitrous acid solution at which its pH becomes 2.($K_a = 4.5 \times 10^{-4}$) :-
(1) 0.3333 (2) 0.4444 (3) 0.6666 (4) 0.2222
IE0022

EXPLANATION OF WATER

21. Ionic product of water will increase, if :-
(1) Decrease the pressure
(2) Add H^+
(3) Add OH^-
(4) Increase the temperature
IE0024

22. For water at 25° C, 2×10^{-7} moles per litre is the correct answer for which one of the followoing
(1) $[H^+] + [OH^-]$ (2) $[H^+]^2$
(3) $[OH^-]^2$ (4) $[H^+] - [OH^-]$
IE0025

23. At 25^0C, the dissociation constant for pure water is given by :-
(1) $(55.4 \times 10^{14})^{-1}$ (2) 1×10^{-14}
(3) $\frac{1 \times 10^{-14}}{18}$ (4) None of these
IE0026

24. Ionic product of water is equal to :-
(1) Dissociation constant of water $\times [H_2O]$
(2) Dissociation constant of water $\times [H^+]$
(3) Product of $[H_2O]$ and $[H^+]$
(4) Product of $[OH^-]^2$ and $[H^+]$
IE0027

25. For pure water, addition of H^+ and OH^- ion concentrations at 90^0C is :-
(1) 10^{-14} (2) 10^{-12}
(3) 2×10^{-6} (4) 2×10^{-7}
IE0028

26. At a certain temperature, pure water has $[H_3O^+] = 10^{-6.7}$ mol L^{-1} .What is the value of K_W at this temperature :-
(1) 10^{-6} (2) 10^{-12} (3) 10^{-67} (4) $10^{-13.4}$
IE0029

27. At 373 K, temp. the pH of pure H_2O can be:-
(1) < 7 (2) > 7 (3) = 7 (4) = 0
IE0030

28. Which of the following is a true statement :
(1) The ionisation constant and ionic product of water are same.
(2) Water is a strong electrolyte.
(3) The value of ionic product of water is less than that of its ionisation constant.
(4) At 298K, the number of H^+ ions in a litre of water is 6.023×10^{16}.
IE0033

SALTS, TYPES OF SALT & CONJUGATE THEORY

29. Which of the following is not an acidic salt :-
(1) $NaHSO_4$ (2) HCOONa
(3) NaH_2PO_3 (4) None of these
IE0035

30. Which is a basic salt :–
(1) $MgCl_2$ (2) KCl
(3) NaCl (4) Mg(OH)Cl
IE0354

31. The process of neutralisation invariably results in the production of :-
(1) H^+ ions
(2) OH^- ions
(3) Both H^+ and OH^- ions
(4) Molecules of water
IE0037

32. Which of the following is an acidic salt :-
(1) Na_2S (2) Na_2SO_3
(3) $NaHSO_3$ (4) Na_2SO_4
IE0038

33. The mixed salt among the following is :-
(1) CH(OH)COONa
|
CH(OH)COONa
(2) $NaKSO_4$
(3) $CaCl_2$ (4) All
IE0039

HYDROLYSIS OF SALTS

34. At 90^0 C, the pH of 0.1M NaCl aqueous solution is:-
(1) < 7 (2) > 7 (3) 7 (4) 0.1
IE0040

35. What will be the pH of 1.0 M ammonium formate solution, If $K_a = 1 \times 10^{-4}$ acid $K_b = 1 \times 10^{-5}$:-

(1) 6.5 (2) 7.5 (3) 8.0 (4) 9.0

IE0041

36. Which salt will not undergo hydrolysis :-

(1) KCl (2) Na_2SO_4 (3) NaCl (4) All

IE0042

37. $HCOO^- + H_2O \rightleftharpoons HCOOH + OH^-$

Degree of hydrolysis for above reaction is given by:-

(1) $h = \sqrt{K_h}$ (2) $h = \sqrt{\frac{K_h}{C}}$

(3) $h = \sqrt{\frac{K_h}{V}}$ (4) $K_h = \sqrt{hC}$

IE0044

38. The pH of aqueous solution of sodium acetate is

(1) 7 (2) Very low

(3) > 7 (4) < 7

IE0045

39. If pK_b for CN^- at 25°C is 4.7. The pH of 0.5M aqueous NaCN solution is :-

(1) 12 (2) 10 (3) 11.5 (4) 11

IE0046

40. The highest pH value is of :-

(1) 0.1 M NaCl

(2) 0.1 M NH_4Cl

(3) 0.1 M CH_3COONa

(4) 0.1 M CH_3COONH_4

IE0047

41. pH of K_2S solution is:-

(1) 7 (2) Less than 7

(3) More than 7 (4) 0

IE0048

42. For anionic hydrolysis, pH is given by:-

(1) $pH = \frac{1}{2}pK_W - \frac{1}{2}pK_b - \frac{1}{2}\log C$

(2) $pH = \frac{1}{2}pK_W + \frac{1}{2}pK_a - \frac{1}{2}pK_b$

(3) $pH = \frac{1}{2}pK_W + \frac{1}{2}pK_a + \frac{1}{2}\log C$

(4) None of above

IE0049

43. Ionisation constant of a weak acid is 10^{-4}. Find out equilibrium constant for the reaction of this weak acid with strong base :-

(1) 10^{-10} (2) 10^{10} (3) 10^{-9} (4) 10^{9}

IE0050

44. Hydroxyl ion concentration $[OH^-]$ in the case of sodium acetate can be expressed as (where K_a is dissociation constant of CH_3COOH and C is the concentration of sodium acetate):-

(1) $[OH^-] = (CK_w . K_a)^{1/2}$

(2) $[OH^-] = C.K_w \sqrt{K_a}$

(3) $[OH^-] = \left(\frac{C.K_w}{K_a}\right)^{1/2}$

(4) $[OH^-] = C. K_a. K_w.$

IE0051

45. Consider :-

(a) $FeCl_3$ in water - Basic

(b) NH_4Cl in water - Acidic

(c) Ammonium acetate in water - Acidic

(d) Na_2CO_3 in water - Basic

Which is/are not correctly matched:-

(1) b and d (2) b only

(3) a and c (4) d only

IE0052

46. Which of the following salts undergoes hydrolysis in water:-

(1) Na_3PO_4 (2) CH_3COONa

(3) $NaNO_3$ (4) Both (1) and (2)

IE0053

47. A salt 'X' is dissolved in water of pH = 7. The resulting solution becomes alkaline in nature. The salt is made up of:-

(1) A strong acid and strong base

(2) A strong acid and weak base

(3) A weak acid and weak base

(4) A weak acid and strong base

IE0054

SOLUBILITY & SOLUBILITY PRODUCT(K_{sp})

48. The solubility product of sparingly soluble uni-univalent salt (AB type) is defined as the product of ionic concentration in a:-

(1) 1 M solution

(2) Concentration solution

(3) Very dilute solution

(4) Saturated solution

IE0057

49. If solubility of salts M_2X, QY_2 and PZ_2 are equal, then the relation between their K_{sp} will be :-
(1) $K_{sp}(M_2X) > K_{sp}(QY_2) > K_{sp}(PZ_2)$
(2) $K_{sp}(M_2X) = K_{sp}(QY_2) < K_{sp}(PZ_2)$
(3) $K_{sp}(M_2X) > K_{sp}(QY_2) = K_{sp}(PZ_2)$
(4) $K_{sp}(M_2X) = K_{sp}(QY_2) = K_{sp}(PZ_2)$
IE0058

50. The expression of solubility product of mercurous iodide is :-
(1) $[2\,Hg^+]^2 \times 2\,[I^-]^2$ (2) $[Hg^{++}]^2 \times [2I^-]^2$
(3) $[Hg_2^{2+}] \times [I^-]^2$ (4) $[Hg^{2+}]^2 \times [I^-]^2$
IE0059

51. At 25^0C, the K_{sp} value of AgCl is 1.8×10^{-10}. If 10^{-5} moles of Ag^+ are added to solution then K_{sp} will be :-
(1) 1.8×10^{-15} (2) 1.8×10^{-10}
(3) 1.8×10^{-5} (4) $18 \times 10^{+10}$
IE0060

52. At 25^0C, the volume of water required to dissolve 1g $BaSO_4$ ($K_{sp} = 1.0 \times 10^{-10}$) will be (Molecular weight of $BaSO_4$ = 233) :-
(1) 820 L. (2) 1 L.
(3) 205 L. (4) 430 L.
IE0061

53. Concentration of Ag^+ ions in saturated solution of Ag_2CrO_4 at 20^0C is 1.5×10^{-4} mol L^{-1}. At 20^0C, the solubility product of Ag_2CrO_4 is :-
(1) 3.3750×10^{-12} (2) 1.6875×10^{-10}
(3) 1.68×10^{-12} (4) 1.6875×10^{-11}
IE0062

54. If the concentration of CrO_4^{2-} ion in a saturated solution of silver chromate will be 2×10^{-4} M, solubility product of silver chromate will be -
(1) 4×10^{-8} (2) 8×10^{-12}
(3) 32×10^{-12} (4) 6×10^{-12}
IE0064

55. If the solubility of AgCl (formula mass=143) in water at 25°C is 1.43×10^{-4} g/100 mL of solution then the value of K_{sp} will be :–
(1) 1×10^{-5} (2) 2×10^{-5}
(3) 1×10^{-10} (4) 2×10^{-10}
IE0065

56. The solubility product of As_2S_3 is given by the expression :-
(1) $K_{sp} = [As^{3+}]\ [S^{-2}]$
(2) $K_{sp} = [As^{3+}]^1\ [S^{-2}]^1$
(3) $K_{sp} = [As^{3+}]^3\ [S^{-2}]^2$
(4) $K_{sp} = [As^{3+}]^2\ [S^{-2}]^3$
IE0067

57. If the solubility of $PbBr_2$ is 'S' g molecules per litre, considering 100% ionisation its solubility product is :-
(1) $2S^3$ (2) $4S^2$ (3) $4S^3$ (4) $2S^4$
IE0068

58. If the solubility of lithium sodium hexafluoro aluminate $Li_3Na_3(AlF_6)_2$ is 'S' mol L^{-1}. Its solubility product is equal to :-
(1) S^8 (2) $12\ S^3$ (3) $18S^3$ (4) $2916\ S^8$
IE0069

59. One litre of saturated solution of $CaCO_3$ is evaporated to dryness, when 7.0 g of residue is left. The solubility product for $CaCO_3$ is:-
(1) 4.9×10^{-3} (2) 4.9×10^{-5}
(3) 4.9×10^{-9} (4) 4.9×10^{-7}
IE0070

APPLICATION OF SOLUBILITY PRODUCT(K_{sp})

60. Solubility of AgBr will be minimum in :-
(1) Pure water (2) 0.1 M $CaBr_2$
(3) 0.1 M NaBr (4) 0.1 M $AgNO_3$
IE0072

61. In which of the following, the solution of AgSCN will be unsaturated :-
(1) $[Ag^+]\ [SCN^-] = K_{sp}$ (2) $[Ag^+]\ [SCN^-] < K_{sp}$
(3) $[Ag^+]\ [SCN^-] > K_{sp}$ (4) $[Ag^+]\ [SCN^-]^2 < K_{sp}$
IE0073

62. If 's' and 'S' are solubility and solubility product of a sparingly soluble binary electrolyte respectively then :–
(1) s = S (2) $s = S^2$
(3) $s = S^{1/2}$ (4) $s = \frac{1S}{2}$
IE0074

63. The solubility product of CuS , Ag_2S and HgS are 10^{-37}, 10^{-44} and 10^{-54} respectively. The solubility of these sulphides will be in the order
(1) HgS > Ag_2S > CuS (2) Ag_2S > HgS > CuS
(3) CuS > Ag_2S > HgS (4) Ag_2S > CuS > HgS
IE0075

64. If the maximum concentration of $PbCl_2$ in water is 0.01 M at 298 K, its maximum concentration in 0.1 M NaCl will be:-
(1) 4×10^{-3} M (2) 0.4×10^{-4} M
(3) 4×10^{-2} M (4) 4×10^{-4} M
IE0076

65. M_2SO_4 (M^+ is a monovalent metal ion) has a K_{sp} of 1.2×10^{-5} at 298 K. The maximum concentration of M^+ ion that could be attained in a saturated solution of this solid at 298 K is :-
(1) 3.46×10^{-3} M (2) 2.89×10^{-2} M
(3) 2.8×10^{-3} M (4) 7.0×10^{-3} M
IE0077

66. Which of the following has maximum solubility (K_{sp} value is given in brackets) :-
(1) HgS (1.6×10^{-54}) (2) $PbSO_4$ (1.3×10^{-8})
(3) ZnS (7.0×10^{-26}) (4) AgCl (1.7×10^{-10})
IE0078

67. Maximum soluble is :- (K_{sp} is given)
(1) CuS (8.5×10^{-36}) (2) CdS (3.6×10^{-28})
(3) ZnS (1.2×10^{-28}) (4) MnS (1.4×10^{-10})
IE0079

68. In which of the following, the solubility of AgCl will be maximum :-
(1) 0.1 M $AgNO_3$ (2) Water
(3) 0.1 M NaCl (4) 0.1 M KCl
IE0080

69. The solubility product of three sparingly soluble salts are given below :

No.	Formula	Solubility product
1	PQ	4.0×10^{-20}
2	PQ_2	3.2×10^{-14}
3	PQ_3	2.7×10^{-35}

The correct order of decreasing molar solublity is:-
(1) 1, 2, 3 (2) 2, 1, 3
(3) 3, 2, 1 (4) 2, 3, 1
IE0081

70. The K_{sp} value for $Gd(OH)_3$ is 2.8×10^{-23}. Find the pH of saturated solution of $Gd(OH)_3$:-
(1) 6.08 (2) 5.08 (3) 8.47 (4) 4.08
IE0082

71. If the solubility product of $AgBrO_3$ and Ag_2SO_4 are 5.5×10^{-5} and 2×10^{-5} respectively, the relationship between their solubilities can be correctly represented as :-
(1) $S_{AgBrO_3} > S_{Ag_2SO_4}$ (2) $S_{AgBrO_3} = S_{Ag_2SO_4}$
(3) $S_{AgBrO_3} < S_{Ag_2SO_4}$ (4) Unpredictable
IE0083

72. Solubility product of $Mg(OH)_2$ is 1×10^{-11}. At what pH, precipitation of $Mg(OH)_2$ will begin from 0.1 M Mg^{2+} solution :-
(1) 9 (2) 5 (3) 3 (4) 7
IE0085

73. A solution, containing 0.01 M Zn^{+2} and 0.01 M Cu^{2+} is saturated by passing H_2S gas. The S^{-2} concentration is 8.1×10^{-21} M, K_{sp} for ZnS and CuS are 3.0×10^{-22} and 8.0×10^{-36} respectively. Which of the following will occur in the solution:-
(1) ZnS will precipitate
(2) CuS will precipitate
(3) Both ZnS and CuS will precipitate
(4) Both Zn^{2+} and Cu^{2+} will remain in the solution
IE0086

74. What will happen if the pH of the solution of 0.001 M $Mg(NO_3)_2$ solution is adjusted to pH = 9 ($K_{sp}Mg(OH)_2 = 8.9 \times 10^{-12}$)
(1) precipitation will take place
(2) precipitation will not take place
(3) Solution will be saturated
(4) None of these
IE0088

75. The solubility product constant K_{sp} of $Mg(OH)_2$ is 9.0×10^{-12}. If a solution is 0.010 M with respect to Mg^{2+} ion, what is the maximum hydroxide ion concentration which could be present without causing the precipitation of $Mg(OH)_2$:-
(1) 1.5×10^{-7} M (2) 3.0×10^{-7} M
(3) 1.5×10^{-5} M (4) 3.0×10^{-5} M
IE0089

76. When HCl gas is passed through a saturated solution of common salt, pure NaCl is precipitated because:-
(1) The impurities dissolve in HCl
(2) HCl is slightly soluble in water
(3) The ionic product $[Na^+] \times [Cl^-]$ exceeds the solubility product of NaCl
(4) The solubility product of NaCl is lowered by Cl^- from aq. HCl
IE0090

FEW IMPORTANT POINTS

77. Two monobasic weak acids have the same moles of H^+ ions. What is the relationship between dissociation constant and dilution:-
(1) $Ka_1V_1 = Ka_2V_2$ (2) $Ka_1V_2 = Ka_2V_1$
(3) $[Ka_1V_1]^{\frac{1}{2}} = Ka_2V_2$ (4) $Ka_1V_1 = [Ka_2V_2]^{\frac{1}{2}}$
IE0096

78. Two solutions having same concentration of H^+ ions are called:-
(1) Isotonic solutions
(2) Isohydric solutions
(3) Hypotonic solutions
(4) Hypertonic solutions
IE0097

79. The pH of a formic acid which is 0.1% dissociated is equal to 4. What will be the pH of another weak monobasic acid (same concentration) which is 1% dissociated
(1) 2 (2) 3 (3) 1 (4) 4
IE0098

pH

80. pH of water is 7. When any substance Y is dissolved in water then pH becomes 13. Substance Y is a salt of :-
(1) Strong acid and strong base
(2) Weak acid and weak base
(3) Strong acid and weak base
(4) Weak acid and strong base
IE0099

81. Minimum pH is shown by aqueous solution of :-
(1) 0.1 M $BaCl_2$ (2) 0.1 M $Ba(NO_3)_2$
(3) 0.1 M $BeCl_2$ (4) 0.1 M $Ba(OH)_2$
IE0100

82. Given :-
(a) 0.005 M H_2SO_4 (b) 0.1 M Na_2SO_4
(c) 10^{-2} M NaOH (d) 0.01 M HCl
Choose the correct code having same pH :-
(1) a, c, d (2) b, d (3) a, d (4) a, c
IE0101

83. In the following solutions, the conc. of different acids are given, which mixture of the acid has highest pH :-
(1) $\frac{M}{10}H_2SO_4$, $\frac{M}{20}HNO_3$, $\frac{M}{10}HClO_4$
(2) $\frac{M}{20}H_2SO_4$, $\frac{M}{10}HNO_3$, $\frac{M}{20}HClO_4$
(3) $\frac{M}{20}H_2SO_4$, $\frac{M}{10}HNO_3$, $\frac{M}{40}HClO_4$
(4) $\frac{M}{20}H_2SO_4$, $\frac{M}{5}HNO_3$, $\frac{M}{5}HClO_4$
IE0104

84. If 100 mL of pH = 3 and 400 mL of pH = 3 solutions are mixed, what will be the final pH of mixture
(1) 3.2 (2) 3.0 (3) 3.5 (4) 2.8
IE0105

85. 10^{-6} M HCl is diluted 100 times. Its pH is :-
(1) 6.0 (2) 8.0 (3) 6.95 (4) 9.5
IE0106

86. pH of 0.001M acetic acid would be :-
(1) 2 (2) > 3 (3) 7 (4) 14
IE0107

87. At 90°C, the pH of 0.001M KOH solution will be
(1) 3 (2) 11 (3) 5 (4) 9
IE0108

88. The pH of solution is increased from 3 to 6. Its H^+ ion concentration will be :-
(1) Reduced to half
(2) Doubled
(3) Reduced by 1000 times
(4) Increased by 1000 times
IE0109

89. A solution has pOH equal to 13 at 298 K. The solution will be:-
(1) Highly acidic (2) Highly basic
(3) Moderately basic (4) Unpredictable
IE0110

90. The pH of the solution containing 10 mL of a 0.1M NaOH and 10 mL of 0.05M H_2SO_4 would be
(1) Zero (2) 1
(3) >7 (4) 7
IE0111

91. In a solution of pH = 5, more acid is added in order to reduce the pH upto 2. The increase in hydrogen ion concentration is:-
(1) 100 times (2) 1000 times
(3) 3 times (4) 5 times
IE0113

92. The hydrogen ion concentration in a given solution is 6×10^{-4} M. Its pH will be :-
(1) 6 (2) 3.22
(3) 4 (4) 2.
IE0114

93. The pOH of a solution is 10.0. The hydrogen ion concentration will be :–

(a) 10^{-10} (b) $\frac{Kw}{10^{-10}}$ (c) $\frac{Kw}{10^{-8}}$ (d) 10^{-4}

(1) a, d (2) b, c (3) a, b, c (4) None

IE0115

94. An aqueous solution whose pH = 0 is :-

(1) Basic (2) Acidic
(3) Neutral (4) Amphoteric

IE0116

95. Following five solution of KOH were prepare as–

First → 0.1 moles in 1 L
Second → 0.2 moles in 2 L
Third → 0.3 moles in 3 L
Fourth → 0.4 moles in 4 L
Fifth → 0.5 moles in 5 L

The pH of resultant solution is :–

(1) 2 (2) 1 (3) 13 (4) 7

IE0118

96. The pH of a 0.02 M ammonia solution which is 5% ionised will be :-

(1) 2 (2) 11 (3) 5 (4) 7

IE0119

97. For $\frac{N}{10}$ H_2SO_4, pH value is :-

(1) 1 (2) 0.586 (3) 0.856 (4) None

IE0120

98. An aqueous solution of HCl is 10^{-9} M HCl. The pH of the solution should be:-

(1) 9 (2) Between 6 and 7
(3) 7 (4) Unpredictable

IE0121

99. How many moles of HCl must be removed from 1 litre of aqueous HCl solution to change its pH from 2 to 3 :-

(1) 1 (2) 0.02 (3) 0.009 (4) 0.01

IE0123

100. 8 g NaOH and 4.9 g H_2SO_4 are present in one litre of the solution. What is its pH

(1) 1 (2) 13 (3) 12 (4) 2

IE0124

101. Calculate pH of a solution whose 100 mL contains 0.2 g NaOH dissolved in it :-

(1) 10.699 (2) 11.699
(3) 12.699 (4) 13.699

IE0125

102. What is the quantity of NaOH present in 250 cc of the solution, so that it gives a pH = 13 :-

(1) 10^{-13} g (2) 10^{-1} g (3) 1.0 g (4) 4.0 g

IE0127

103. 0.001 mol of the strong electrolyte $M(OH)_2$ has been dissolved to make a 20 mL of its saturated solution. Its pH will be : - $[K_w = 1 \times 10^{-14}]$

(1) 13 (2) 3.3 (3) 11 (4) 9.8

IE0128

104. Choose the wrong statement :-

(1) For a neutral solution : $[H^+] = [OH^-] = \sqrt{K_w}$

(2) For an acidic solution :
$[H^+] > \sqrt{K_w}$ & $[OH^-] < \sqrt{K_w}$

(3) For a basic solution :
$[H^+] < \sqrt{K_w}$ & $[OH^-] > \sqrt{K_w}$

(4) For a neutral solution :
$[H^+] = [OH^-] = 10^{-7}$ M (at all temperatures)

IE0129

105. The pH of 0.1 M solution of the following salts increases in order :-

(1) NaCl < NH_4Cl < NaCN < HCl
(2) NaCN < NH_4Cl < NaCl < HCl
(3) HCl < NaCl < NaCN < NH_4Cl
(4) HCl < NH_4Cl < NaCl < NaCN

IE0130

BUFFER SOLUTIONS and INDICATOR

106. In a buffer solution the ratio of concentration of NH_4Cl and NH_4OH is 1 : 1. When it changes to 2 : 1, pH of buffer :-

(1) Increases (2) Decreases
(3) No effect (4) None of these

IE0131

107. To 50 mL of 0.05M formic acid, how much volume of 0.10M sodium formate must be added to get a buffer solution of pH = 4.0 ?
(pK_a of the acid is 3.8)

(1) 50 mL (2) 4 mL
(3) 39.6 mL (4) 100 mL

IE0132

108. In the volumetric estimation of HCl, if we make use of phenolphthalein as an indicator, which base is unsuitable for the titration :-

(1) NaOH (2) RbOH (3) KOH (4) NH_4OH

IE0133

109. In a mixture of weak acid and its salt, the ratio of concentration of acid to salt is increased ten-fold. The pH of the solution :-
(1) Decreases by one
(2) Increases by one-tenth
(3) Increases by one
(4) Increases ten-fold

IE0134

110. pK_b for NH_4OH at certain temperature is 4.74. The pH of basic buffer containing equimolar concentration of NH_4OH and NH_4Cl will be:-
(1) 7.74 (2) 4.74 (3) 2.37 (4) 9.26

IE0135

111. What is the suitable indicator for titration of NaOH and oxalic acid:-
(1) Methyl orange (2) Methyl red
(3) Phenolphthalein (4) Starch solution

IE0136

112. Phenolphthalein does not act as an indicator for the titration between :-
(1) KOH and H_2SO_4
(2) NaOH and CH_3COOH
(3) Oxalic acid and $KMnO_4$
(4) $Ba(OH)_2$ and HCl

IE0137

113. Which can act as buffer :-
(1) NH_4OH + NaOH
(2) HCOOH + CH_3COONa
(3) 40 mL 0.1 M NaCN + 20 mL of 0.1 M HCl
(4) None of them

IE0138

114. The buffer solution play an important role in :-
(1) Increasing the pH value
(2) Decreasing the pH value
(3) Keeping the pH constant
(4) Solution will be neutral

IE0139

115. K_a for HCN is 5 x 10^{-10} at 25^0C. For maintaining a constant pH of 9, the volume of 5M KCN solution required to be added to 10mL of 2M HCN solution is-
(1) 4 mL (2) 7.95 mL
(3) 2 mL (4) 9.3 mL

IE0140

116. Buffering action of a mixture of CH_3COOH and CH_3COONa is maximum when the ratio of salt to acid is equal to -
(1) 1.0 (2) 100.0 (3) 10.0 (4) 0.1

IE0141

117 The pink colour of phenolphthalein in alkaline medium is due to -
(1) Negative ion (2) Positive ion
(3) OH^- ions (4) Neutral form

IE0142

118. Which indicator works in the pH range 8 – 9.8
(1) Phenolphthalein (2) Methyl orange
(3) Methyl red (4) Litmus

IE0143

119. A basic buffer will obey the equation $pOH - pK_b = 1$ only under condition:-
(1) [Conjugate acid] : [base] = 1 : 10
(2) [Conjugate acid] = [base]
(3) [Conjugate acid] : [base] = 10 : 1
(4) None of these

IE0144

120. For weak acid-strong base titration, the indicator used is :-
(1) Potassium dichromate
(2) Methyl orange
(3) Litmus
(4) Phenolphthalein

IE0145

121. For which of the following titration, methyl orange is a best indicator :-
(1) CH_3COOH + NaOH
(2) $H_2C_2O_4$ + NaOH
(3) HCl + NaOH
(4) CH_3COOH + NH_4OH

IE0146

122. The total number of different kind of buffers obtained during the titration of H_3PO_4 with NaOH are :-
(1) 3 (2) 1 (3) 2 (4) 0

IE0147

123. A certain acidic buffer solution contains equal concentration of X^- and HX. The K_b for X^- is 10^{-10}. The pH of the buffer is :-
(1) 4 (2) 7 (3) 10 (4) 14

IE0149

124. When 1.0 mL of dil. HCl acid is added to 100 mL of a buffer solution of pH 4.0. The pH of the solution
(1) Becomes 7 (2) Does not change
(3) Becomes 2 (4) Becomes 10

IE0150

125. The pH of blood is maintained by CO_2 and H_2CO_3 in the body and chemical constituents of blood. This phenomenon is called :-

(1) Colloidal (2) Buffer action

(3) Acidity (4) Salt balance

IE0151

126. Phenolphthalein is not a good indicator for titrating

(1) NaOH against oxalic acid

(2) NaOH against HCl

(3) NaOH against H_2SO_4

(4) HCl against NH_4OH

IE0152

127. Which of the following solutions does not act as buffer :–

(1) $H_3PO_4 + NaH_2PO_4$

(2) $NaHCO_3 + H_2CO_3$

(3) $NH_4Cl + HCl$

(4) $CH_3COOH + CH_3COONa$

IE0153

128. On addition of NaOH to CH_3COOH solution, 60% of the acid is neutralised. If pK_a of CH_3COOH is 4.7 then the pH of the resulting solution is :-

(1) More than 4.7 but less than 5.0

(2) Less than 4.7 but more than 4.0

(3) More than 5.0

(4) Remains unchanged

IE0155

129. 500 mL of 0.2 M acetic acid are added to 500 mL of 0.30 M sodium acetate solution. If the dissociation constant of acetic acid is 1.5×10^{-5} then pH of the resulting solution is:-

(1) 5.0 (2) 9.0 (3) 3.0 (4) 4.0

IE0156

130. Half of the formic acid solution is neutralised on addition of a KOH solution to it. If K_a (HCOOH) = 2×10^{-4} then pH of the solution is : (log 2 = 0.3010)

(1) 3.6990 (2) 10.3010

(3) 3.85 (4) 4.3010

IE0157

131. A solution contains 0.2M NH_4OH and 0.2M NH_4Cl. If 1.0 mL of 0.001 M HCl is added to it. What will be the $[OH^-]$ of the resulting solution

$[K_b = 2 \times 10^{-5}]$:-

(1) 2×10^{-5} (2) 5×10^{-10}

(3) 2×10^{-3} (4) None of these

IE0158

132. Henderson equation $pH - pK_a = 1$ will be applicable to an acidic buffer when :-

(1) [Acid] = [Conjugate base]

(2) [Acid] $\times$ 10 = [Conjugate base]

(3) [Acid] = [Conjugate base] $\times$ 10

(4) None of these

IE0159

133. 0.05 M ammonium hydroxide solution is dissolved in 0.001 M ammonium chloride solution. What will be the OH^- ion concentration of this solution: $K_b(NH_4OH) = 1.8 \times 10^{-5}$

(1) 3.0×10^{-3} (2) 9.0×10^{-4}

(3) 9.0×10^{-3} (4) 3.0×10^{-4}

IE0160

134. When 0.02 moles of NaOH are added to a litre of buffer solution, its pH changes from 5.75 to 5.80. What is its buffer capacity :-

(1) 0.4 (2) 0.05 (3) –0.05 (4) 2.5

IE0161

135. Calculate the pH of a buffer prepared by mixing 300 cc of 0.3 M NH_3 and 500 cc of 0.5 M NH_4Cl. K_b for $NH_3 = 1.8 \times 10^{-5}$:-

(1) 8.1187 (2) 9.8117

(3) 8.8117 (4) None of these

IE0162

136. Calculate the ratio of pH of a solution containing 1 mole of CH_3COONa + 1 mole of HCl per litre and of other solution containing 1 mole CH_3COONa + 1mole of acetic acid per litre :-

(1) 1 : 1 (2) 2 : 1 (3) 1 : 2 (4) 2 : 3

IE0166

137. When 20 mL of $\frac{M}{20}$ NaOH are added to 10 mL of $\frac{M}{10}$ HCl, the resulting solution will:-

(1) Turn blue litmus red

(2) Turn phenolphthalein solution

(3) Turn methyl orange red

(4) Will have no effect on either red or blue litmus

IE0167

138. 10 mL of a solution contains 0.1 M NH_4Cl + 0.01 M NH_4OH. Which addition would not change the pH of solution :–

(1) Adding 1 mL water

(2) Adding 5 mL of 0.1 M NH_4Cl

(3) Adding 5 mL of 0.1 M NH_4OH

(4) Adding 10 mL of 0.1 M NH_4Cl

IE0168

139. $\frac{N}{10}$ acetic acid was titrated with $\frac{N}{10}$ NaOH. When 25%, 50% and 75% of titration is over then the pH of solution will be :- [$K_a = 10^{-5}$]

(1) 5 + log 1/3, 5, 5 + log 3

(2) 5 + log 3, 4, 5 + log 1/3

(3) 5 – log 1/3, 5, 5 – log 3

(4) 5 – log 1/3, 4, 5 + log 1/3

IE0169

ACID AND BASE

140. The conjugate acid of O^{-2} is :-

(1) O_2^+ (2) H^+

(3) H_3O^+ (4) OH^-

IE0170

141. Ionization constant of AOH and BOH base are K_{b_1} and K_{b_2}. Their relation is $pK_{b_1} < pK_{b_2}$. Conjugate of following base, does not show maximum pH :

(1) AOH (2) BOH

(3) Both of them (4) None of these

IE0171

142. Select the species which can function as lewis base, bronsted acid and bronsted base:-

(a) H_2O (b) NH_4^+ (c) N^{-3}

Correct code is :-

(1) Only a (2) a, b (3) a, c (4) b, c

IE0172

143. Which ion does not show acid behaviour :-

(1) $[Al(H_2O)_6]^{+3}$ (2) $[Fe(H_2O)_6]^{+3}$

(3) HPO_4^{-2} (4) ClO_3^-

IE0173

144. An example of Lewis acid is:-

(1) CaO (2) CH_3NH_2

(3) SO_3 (4) None of these

IE0174

145. In the reaction $NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$ water behaves as :-

(1) Acid (2) Base

(3) Neutral (4) Both acid & Base

IE0175

146. Which acts as Lewis base in the reaction

$BCl_3 + :PH_3 \rightarrow Cl_3B \leftarrow PH_3$

(1) PH_3 (2) BCl_3

(3) Both 1 & 2 (4) None

IE0176

147. Which acts as Lewis acid in the reaction

$SnCl_2 + 2Cl^- \longrightarrow [SnCl_4]^{-2}$

(1) Cl^- (2) $SnCl_2$ (3) $SnCl_4$ (4) None

IE0177

148. The conjugate base of $(CH_3)_2\overset{+}{N}H_2$ is :-

(1) CH_3NH_2 (2) $(CH_3)_2N^+$

(3) $(CH_3)_2N$ (4) $(CH_3)_2NH$

IE0178

149. Which equilibrium can be described as Lewis acid base reaction but not Bronsted acid base reaction:-

(1) $H_2O + CH_3COOH \rightleftharpoons H_3O^+ + CH_3COO^-$

(2) $2NH_3 + H_2SO_4 \rightleftharpoons 2NH_4^+ + SO_4^{2-}$

(3) $NH_3 + CH_3COOH \rightleftharpoons NH_4^+ + CH_3COO^-$

(4) $Cu^{+2} + 4NH_3 \rightleftharpoons [Cu(NH_3)_4]^{2+}$

IE0179

150. Conjugate base of hydrazoic acid is :-

(1) HN_3^- (2) N_3^- (3) N^{3-} (4) N_2^-

IE0180

151. NH_3 gas dissolves in water to give NH_4OH, in this reaction, water acts as :-

(1) An acid (2) A base

(3) A salt (4) A conjugate base

IE0181

152. When ammonia is added to water, it decreases the concentration of which of the following ion

(1) OH^- (2) H_3O^+ (3) NH^+_4 (4) None

IE0183

153. The strongest acid among the following is -

(1) $ClO_3(OH)$ (2) $ClO_2(OH)$

(3) $SO(OH)_2$ (4) $SO_2(OH)_2$

IE0184

154. Which of the following is not a Bronsted acid :-

(1) $CH_3NH_4^+$ (2) CH_3COO^-

(3) H_2O (4) HSO_4^-

IE0185

155. Which of the following example behave as a Lewis acid BF_3 , $SnCl_2$, $SnCl_4$:-

(1) $SnCl_2$, $SnCl_4$

(2) BF_3 , $SnCl_2$

(3) Only BF_3

(4) BF_3 , $SnCl_2$, $SnCl_4$

IE0186

156. In the reaction

$HNO_3 + H_2O \rightleftharpoons H_3O^+ + NO_3^-$, the conjugate base of HNO_3 is :-

(1) H_2O (2) H_3O^+

(3) NO_3^- (4) H_3O^+ and NO_3^-

IE0187

157. The conjugate base of the weak acid in the reaction $HBr + H_2O \rightleftharpoons H_3O^+ + Br^-$ is

(1) HBr (2) H_2O

(3) Br^- (4) H_3O^+

IE0188

158. In the reaction, $AlCl_3 + Cl^- \rightarrow [AlCl_4]^-$, $AlCl_3$ acts as :-

(1) Salt (2) Lewis base

(3) Bronsted acid (4) Lewis acid

IE0189

159. Mg^{2+} is ______ than Al^{3+} :-

(1) Stronger Lewis acid

(2) Stronger Lewis base

(3) Weaker Lewis acid

(4) Weaker Lewis base

IE0190

160. The two Bronsted bases in the reaction

$HC_2O_4^- + PO_4^{3-} \rightleftharpoons HPO_4^{2-} + C_2O_4^{2-}$ are

(1) $HC_2O_4^-$ and PO_4^{2-}

(2) HPO_4^{2-} and $C_2O_4^{2-}$

(3) PO_4^{3-} and $C_2O_4^{-2}$

(4) $HC_2O_4^-$ and HPO_4^{2-}

IE0191

161. The compound HCl behaves as ---- in the reaction, $HCl + HF \rightleftharpoons H_2^+Cl + F^-$

(1) Strong acid (2) Strong base

(3) Weak acid (4) Weak base

IE0192

162. Which of the following is not a lewis base:-

(1) NH_3 (2) O^{2-} (3) H_2O (4) I^+

IE0193

163. Which of the following is Bronsted Lowry acid:-

(1) SO_4^{-2} (2) H_3O^+ (3) OH^- (4) Cl^-

IE0194

164. The conjugate base for bicarbonate ion is:-

(1) CO_3^{2-} (2) HCO_3^-

(3) CO_2 (4) H_2CO_3

IE0195

165. HCl does not behave as acid in :-

(1) NH_3 (2) C_2H_5OH

(3) H_2O (4) C_6H_6

IE0197

166. Which of the following is a base according to Bronsted-Lowry concept :-

(1) I^- (2) H_3O^+ (3) HCl (4) NH_4^+

IE0198

167. In which of the following reactions NH_3 acts as acid

(1) $NH_3 + HCl \rightarrow NH_4Cl$

(2) $NH_3 + H^+ \rightarrow NH_4^+$

(3) $NH_3 + Na \rightarrow NaNH_2 + \frac{1}{2}H_2$

(4) NH_3 cannot act as acid

IE0199

168. According to Bronsted concept, the acids in the following reaction $NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$ are :-

(1) NH_3 and NH_4^+ (2) H_2O and OH^-
(3) H_2O and NH_4^+ (4) NH_3 and OH^-

IE0200

169. CH_3COO^- ion is a :-

(1) Weak conjugate base
(2) Strong conjugate base
(3) Weak conjugate acid
(4) Strong conjugate acid

IE0202

170. Which of the following is strongest conjugate base

(1) ClO_4^- (2) HCO_3^-
(3) Cl^- (4) HSO_4^-

IE0203

171. Which of the following species can act as Lewis base :-

(1) Cu^{2+} (2) $AlCl_3$ (3) NH_3 (4) BF_3

IE0204

172. A compound having the formula NH_2CH_2COOH may behave :-

(1) Only as an acid
(2) Only as a base
(3) Both as an acid and base
(4) Neither acid nor base

IE0205

173. Which of the following can act both as Bronsted acid and Bronsted base :-

(1) Na_2CO_3 (2) O^{2-}
(3) CO_3^{-2} (4) NH_3

IE0207

174. The strongest conjugate base is :-

(1) NO_3^- (2) Cl^-
(3) SO_4^{2-} (4) CH_3COO^-

IE0208

175. Aluminium chloride is :-

(1) Bronsted Lowry acid
(2) Arrhenius acid
(3) Lewis acid
(4) Lewis base

IE0209

176. Water is a :-

(1) Protogenic solvent (2) Protophilic solvent
(3) Amphiprotic solvent (4) Aprotic solvent

IE0210

177. Ammonium ion is :-

(1) A conjugate acid
(2) A conjugate base
(3) Neither an acid nor a base
(4) Both an acid and a base

IE0211

178. Species which do not act both as Bronsted acid and base is :-

(1) $(HSO_4)^{-1}$ (2) Na_2CO_3
(3) NH_3 (4) OH^{-1}

IE0212

179. Which one of the following is strong Lewis base & Bronsted acid & bronsted base:-

(1) NH_3 (2) PH_3
(3) CH_4 (4) BH_3

IE0213

180. Which of the following is not a correct statement

(1) Arrhenius theory of acids-bases is capable of explaining the acidic or basic nature of the substances in the solvents other than water
(2) Arrhenius theory does not explain acidic nature of $AlCl_3$
(3) The aqueous solution of Na_2CO_3 is alkaline although it does not contain OH^- ions
(4) Aqueous solution of CO_2 is acidic although it does not contain H^+ ions

IE0215

181. For the reaction $NH_4^+ + S^{-2} \rightleftharpoons NH_3 + HS^-$,$NH_3$ and S^{-2} are a group of :-

(1) Acids
(2) Bases
(3) Acid-base pair
(4) None of these

IE0216

182. According to Arrhenius theory, acids are substances that dissociate in water to give ...(X) ... ions and bases are substances that produce ...(Y).... ions. Here, (X) and (Y) refer to

(1) hydronium, hydroxyl
(2) hydroxyl, hydrogen
(3) hydrogen, hydroxyl
(4) hydroxyl, hydronium

IE0355

183. 'An acid is substance that is capable of donating a proton (H^+) and base is a substance capable of accepting a proton (H^+).

The above statement is justified by

(1) Arrhenius concept

(2) Bronsted-Lowry theory

(3) Lewis concept

(4) All of these

IE0356

EXERCISE-I (Conceptual Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**2**	**2**	**2**	**2**	**4**	**4**	**2**	**1**	**3**	**1**	**1**	**4**	**1**	**1**	**2**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**4**	**1**	**3**	**4**	**4**	**4**	**1**	**1**	**1**	**3**	**4**	**1**	**4**	**2**	**4**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**4**	**3**	**2**	**1**	**1**	**4**	**2**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	**4**	**4**	**4**	**4**	**3**	**2**	**4**	**3**	**3**	**3**	**4**	**3**	**4**	**1**	**2**
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	**2**	**3**	**4**	**4**	**2**	**2**	**4**	**2**	**4**	**3**	**3**	**1**	**2**	**2**	**4**
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	**3**	**2**	**2**	**2**	**4**	**3**	**3**	**3**	**2**	**3**	**2**	**4**	**3**	**1**	**4**
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans.	**2**	**2**	**4**	**2**	**3**	**2**	**1**	**2**	**3**	**2**	**3**	**3**	**1**	**4**	**4**
Que.	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	**2**	**3**	**4**	**1**	**4**	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**1**	**3**	**4**
Que.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
Ans.	**3**	**1**	**1**	**2**	**2**	**4**	**3**	**1**	**1**	**1**	**1**	**2**	**2**	**1**	**3**
Que.	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
Ans.	**3**	**4**	**1**	**1**	**4**	**2**	**1**	**4**	**3**	**1**	**1**	**2**	**4**	**4**	**2**
Que.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165
Ans.	**1**	**2**	**1**	**2**	**4**	**3**	**2**	**4**	**3**	**3**	**4**	**4**	**2**	**1**	**4**
Que.	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans.	**1**	**3**	**3**	**2**	**2**	**3**	**3**	**4**	**4**	**3**	**3**	**1**	**2**	**1**	**1**
Que.	181	182	183												
Ans.	**2**	**3**	**2**												

EXERCISE-II (Previous Year Questions) AIPMT/NEET

AIPMT 2009

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

(1) 5.65×10^{-12} (2) 5.65×10^{-10}
(3) 6.50×10^{-12} (4) 5.65×10^{-13}

IE0225

2. What is the $[OH^-]$ in the final solution prepared by mixing 20.0 mL of 0.050 M HCl with 30.0 mL of 0.10M $Ba(OH)_2$?

(1) 0.12 M (2) 0.10 M
(3) 0.40 M (4) 0.0050M

IE0226

3. The dissociation constants for acetic acid and HCN at 25°C are 1.5×10^{-5} and 4.5×10^{-10}, respectively. The equilibrium constant for the equilibrium

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

would be :-

(1) 3.3×10^{4} (2) 3.0×10^{5}
(3) 3.3×10^{-5} (4) 3.0×10^{-4}

IE0227

AIPMT 2010

4. If pH of a saturated solution of $Ba(OH)_2$ is 12, the value of its K_{sp} is :-

(1) 5.00×10^{-7} M^3 (2) 4.00×10^{-6} M^3
(3) 4.00×10^{-7} M^3 (4) 5.00×10^{-6} M^3

IE0228

5. Find the pH of a buffer solution containing equal concentration of B^- and HB. (K_b for B^- is 10^{-10}) :-

(1) 4 (2) 10 (3) 7 (4) 6

IE0229

AIPMT Mains 2011

6. In qualitative analysis, the metals of Group I can be separated from other ions by precipitating them as chloride salts. A solution initially contains Ag^+ and Pb^{2+} at a concentration of 0.10 M. Aqueous HCl is added to this solution until the Cl^- concentration is 0.10 M. What will the concentrations of Ag^+ and Pb^{2+} be at equilibrium ?

(K_{sp} for AgCl=1.8×10^{-10}, K_{sp} for $PbCl_2$=1.7×10^{-5})

(1) $[Ag^+] = 1.8 \times 10^{-11}$ M ; $[Pb^{2+}] = 1.7 \times 10^{-4}$ M;
(2) $[Ag^+] = 1.8 \times 10^{-7}$ M ; $[Pb^{2+}] = 1.7 \times 10^{-6}$ M;
(3) $[Ag^+] = 1.8 \times 10^{-11}$ M ; $[Pb^{2+}] = 8.5 \times 10^{-5}$ M;
(4) $[Ag^+] = 1.8 \times 10^{-9}$ M ; $[Pb^{2+}] = 1.7 \times 10^{-3}$ M;

IE0232

7. A buffer solution is prepared in which the concentration of NH_3 is 0.30 M and the concentration of NH_4^+ is 0.20 M. If the equilibrium constant, K_b for NH_3 equals 1.8×10^{-5}, what is the pH of this solution ? (log 2.7 = 0.43)

(1) 9.08 (2) 9.43 (3) 11.72 (4) 8.73

IE0233

AIPMT Mains 2012

8. Buffer solutions have constant acidity and alkalinity because:

(1) they have large excess of H^+ or OH^- ions
(2) they have fixed value of pH
(3) these give unionised acid or base on reaction with added acid or alkali
(4) acids and alkalies in these solutions are shielded from attack by other ions

IE0236

9. Equimolar solutions of the following substances were prepared separately. Which one of the these will record the highest pH value?

(1) LiCl (2) $BeCl_2$ (3) $BaCl_2$ (4) $AlCl_3$

IE0237

NEET UG 2013

10. Which is the strongest acid in the following ?

(1) H_2SO_3 (2) H_2SO_4
(3) $HClO_3$ (4) $HClO_4$

IE0239

AIPMT 2014

11. Which of the following salts will give highest pH in water ?

(1) KCl (2) NaCl
(3) Na_2CO_3 (4) $CuSO_4$

IE0241

AIPMT 2015

12. The K_{sp} of Ag_2CrO_4, AgCl, AgBr and AgI are respectively, 1.1×10^{-12}, 1.8×10^{-10}, 5.0×10^{-13}, 8.3×10^{-17}. Which one of the following salts will precipitate last if $AgNO_3$ solution is added to the solution containing equal moles of NaCl, NaBr, NaI and Na_2CrO_4 ?

(1) AgCl (2) AgBr (3) Ag_2CrO_4 (4) AgI

IE0242

Re-AIPMT 2015

13. Which one of the following pairs of solution is not an acidic buffer ?
(1) H_2CO_3 and Na_2CO_3
(2) H_3PO_4 and Na_3PO_4
(3) $HClO_4$ and $NaClO_4$
(4) CH_3COOH and CH_3COONa

IE0243

14. What is the pH of the resulting solution when equal volumes of 0.1 M NaOH and 0.01 M HCl are mixed?
(1) 7.0 (2) 1.04 (3) 12.65 (4) 2.0

IE0244

NEET-I 2016

15. MY and NY_3, two nearly insoluble salts, have the same K_{sp} values of 6.2×10^{-13} at room temperature. Which statement would be **true** in regard to MY and NY_3 ?
(1) The molar solubilities of MY and NY_3 in water are identical.
(2) The molar solubility of MY in water is less than that of NY_3
(3) The salts MY and NY_3 are more soluble in 0.5 M KY than in pure water.
(4) The addition of the salt of KY to solution of MY and NY_3 will have no effect on their solubilities.

IE0247

NEET-II 2016

16. The percentage of pyridine (C_5H_5N) that forms pyridinium ion ($C_5H_5N^+H$) in a 0.10 M aqueous pyridine solution (K_b for $C_5H_5N = 1.7 \times 10^{-9}$) is
(1) 0.77% (2) 1.6%
(3) 0.0060% (4) 0.013%

IE0248

17. The solubility of AgCl(s) with solubility product 1.6×10^{-10} in 0.1 M NaCl solution would be
(1) 1.6×10^{-11} M (2) zero
(3) 1.26×10^{-5} M (4) 1.6×10^{-9} M

IE0249

NEET(UG) 2017

18. Concentration of the Ag^+ ions in a saturated solution of $Ag_2C_2O_4$ is 2.2×10^{-4} mol L^{-1} Solubility product of $Ag_2C_2O_4$ is :-
(1) 2.66×10^{-12} (2) 4.5×10^{-11}
(3) 5.3×10^{-12} (4) 2.42×10^{-8}

IE0255

NEET(UG) 2018

19. Following solutions were prepared by mixing different volumes of NaOH and HCl of different concentrations :

a. $60\text{mL}\,\frac{M}{10}\text{HCl} + 40\text{mL}\,\frac{M}{10}\text{NaOH}$

b. $55\text{mL}\,\frac{M}{10}\text{HCl} + 45\text{mL}\,\frac{M}{10}\text{NaOH}$

c. $75\text{mL}\,\frac{M}{5}\text{HCl} + 25\text{mL}\,\frac{M}{5}\text{NaOH}$

d. $100\text{mL}\,\frac{M}{10}\text{HCl} + 100\text{mL}\,\frac{M}{10}\text{NaOH}$

pH of which one of them will be equal to 1 ?
(1) b (2) a (3) d (4) c

IE0258

20. The solubility of $BaSO_4$ in water 2.42×10^{-3} gL^{-1} at 298 K. The value of solubility product (K_{sp}) will be
(Given molar mass of $BaSO_4$ = 233 g mol^{-1})
(1) 1.08×10^{-10} mol^2 L^{-2}
(2) 1.08×10^{-12} mol^2 L^{-2}
(3) 1.08×10^{-14} mol^2 L^{-2}
(4) 1.08×10^{-8} mol^2 L^{-2}

IE0259

NEET(UG) 2019

21. pH of a saturated solution of $Ca(OH)_2$ is 9. The solubility product (K_{sp}) of $Ca(OH)_2$ is :-
(1) 0.5×10^{-15} (2) 0.25×10^{-10}
(3) 0.125×10^{-15} (4) 0.5×10^{-10}

IE0357

22. Which will make basic buffer ?
(1) 50 mL of 0.1 M NaOH + 25 mL of 0.1 M CH_3COOH
(2) 100 mL of 0.1 M CH_3COOH + 100 mL of 0.1M NaOH
(3) 100 mL of 0.1 M HCl + 200 mL of 0.1 M NH_4OH
(4) 100 mL of 0.1 M HCl + 100 mL of 0.1 M NaOH

IE0358

NEET(UG) (Odisha) 2019

23. The pH of 0.01 M NaOH (aq) solution will be
(1) 7.01 (2) 2 (3) 12 (4) 9

IE0359

24. Which of the following cannot act both as Bronsted acid and as Bronsted base ?
(1) HCO_3^- (2) NH_3
(3) HCl (4) HSO_4^-
IE0360

25. The molar solubility of CaF_2 ($K_{sp} = 5.3 \times 10^{-11}$) in 0.1 M solution of NaF will be
(1) 5.3×10^{-11} mol L^{-1} (2) 5.3×10^{-8} mol L^{-1}
(3) 5.3×10^{-9} mol L^{-1} (4) 5.3×10^{-10} mol L^{-1}
IE0361

NEET (UG) 2020

26. Find out the solubility of $Ni(OH)_2$ in 0.1M NaOH. Given that the ionic product of $Ni(OH)_2$ is 2×10^{-15}.
(1) 1×10^{8} M (2) 2×10^{-13} M
(3) 2×10^{-8} M (4) 1×10^{-13} M
IE0414

NEET (UG) 2020 (COVID-19)

27. Which among the following salt solutions is basic in nature ?
(1) Ammonium chloride
(2) Ammonium sulphate
(3) Ammonium nitrate
(4) Sodium acetate
IE0415

28. The solubility product for a salt of the type AB is 4×10^{-8}. What is the molarity of its standard solution?
(1) 2×10^{-4} mol/L (2) 16×10^{-16} mol/L
(3) 2×10^{-16} mol/L (4) 4×10^{-4} mol/L
IE0416

NEET (UG) 2021

29. The pK_b of dimethylamine and pK_a of acetic acid are 3.27 and 4.77 respectively at T (K). The correct option for the pH of dimethylammonium acetate solution is:
(1) 8.50 (2) 5.50
(3) 7.75 (4) 6.25
IE0417

NEET(UG) 2021 (Paper-2)

30. Silver iodide is used in cloud seeding to produce rain $AgI_{(s)} \rightleftharpoons Ag^+ (aq) + I^- (aq)$; $K_{sp} = 8.5 \times 10^{-7}$
$AgNO_3$ and KI are mixed to give $[Ag^+] = 0.010M$; $[I^-] = 0.015$ M. Will AgI precipitate?
(1) Yes
(2) No
(3) Can't say
(4) Depends on $[NO_3^-]$ and $[K^+]$
IE0418

31. 100 ml of a mixture of NaOH and Na_2SO_4 is neutralised by 10 ml of 0.5 M H_2SO_4. Hence NaOH in 100 ml solution is
(1) 0.2g (2) 0.4 g (3) 0.6 g (4) 0.8 g
IE0419

32. 200 mL of 0.1 M H_3BO_3 solution on complete neutralisation requires .... mL of 0.5 M NaOH solution.
(1) 20 mL (2) 40 mL
(3) 120 mL (4) 80 mL
IE0420

NEET (UG) 2022

33. The pH of the solution containing 50 mL each of 0.10 M sodium acetate and 0.01 M acetic acid is [Given pK_a of $CH_3COOH = 4.57$]
(1) 3.57 (2) 4.57 (3) 2.57 (4) 5.57
IE0421

NEET (UG) 2022 (OVERSEAS)

34. The solubility product of $BaSO_4$ in water is 1.5×10^{-9}. The molar solubility of $BaSO_4$ in 0.1 M solution of $Ba(NO_3)_2$ is
(1) 0.5×10^{-8} M (2) 1.5×10^{-8} M
(3) 1.0×10^{-8} M (4) 2.0×10^{-8} M
IE0422

Re-NEET (UG) 2022

35. 0.01 M acetic acid solution is 1% ionised, then pH of this acetic acid solution is :
(1) 3 (2) 2 (3) 4 (4)1
IE0423

EXERCISE-II (Previous Year Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**2**	**2**	**1**	**1**	**1**	**4**	**2**	**3**	**3**	**4**	**3**	**3**	**3**	**3**	**2**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**4**	**4**	**3**	**4**	**1**	**1**	**3**	**3**	**3**	**3**	**2**	**4**	**1**	**3**	**1**
Que.	31	32	33	34	35										
Ans.	**2**	**2**	**4**	**2**	**3**										

EXERCISE-III (Analytical Questions) Master Your Understanding

1. The concentration of $[H^+]$ and concentration of $[OH^-]$ of a 0.1 M aqueous solution of 2% ionised weak acid is $[K_w = 1 \times 10^{-14}]$:-

(1) 0.02×10^{-3} M and 5×10^{-11} M

(2) 1×10^{-3} M and 3×10^{-11} M

(3) 2×10^{-3} M and 5×10^{-12} M

(4) 3×10^{-2} M and 4×10^{-13} M

IE0267

2. The solubility of $BaSO_4$ in water is 2.33×10^{-3} gL^{-1}. Its solubility product will be (molecular weight of $BaSO_4$ = 233) :-

(1) 1×10^{-5} (2) 1×10^{-10}

(3) 1×10^{-15} (4) 1×10^{-20}

IE0268

3. What will be the H^+ ion concentration when 4 g NaOH dissolved in 1000 mL of water:

(1) 10^{-1} (2) 10^{-13} (3) 10^{-4} (4) 10^{-10}

IE0269

4. When 10 mL of 0.1 M acetic acid (pK_a =5.0) is titrated against 10 mL of 0.1 M ammonia solution (pK_b = 5.0), the equivalence point occurs at pH:

(1) 5.0 (2) 6.0 (3) 7.0 (4) 9.0

IE0270

5. At 25°C, the dissociation constant of a base BOH is 1.0×10^{-8}. The concentration of hydroxyl ions in 0.01M aqueous solution of the base would be:

(1) 1.0×10^{-6} mol L^{-1} (2) 1.0×10^{-7} mol L^{-1}

(3) 2.0×10^{-6} mol L^{-1} (4) 1.0×10^{-5} mol L^{-1}

IE0271

6. The solubility product of $BaSO_4$ at 25°C is 1.0×10^{-9}. What would be the concentration of H_2SO_4 necessary to precipitate $BaSO_4$ from a solution of 0.01 M Ba^{+2} ions :-

(1) 10^{-9} (2) 10^{-8} (3) 10^{-7} (4) 10^{-6}

IE0272

7. pH of the solution of $HCOONH_4$ is 6.48. This can be explained by :-

(1) Hydrolysis of both cation and anion

(2) Hydrolysis of cation

(3) Hydrolysis of anion

(4) Hydrolysis of water

IE0273

8. The correct representation of solubility product of SnS_2 is :-

(1) $[Sn^{4+}][S^{2-}]^2$ (2) $[Sn^{4+}][S^{2-}]$

(3) $[Sn^{4+}][2S^{2-}]$ (4) $[Sn^{4+}][2S^{2-}]^2$

IE0274

9. A solution of $FeCl_3$ in water acts as acidic due to:-

(1) Acidic impurities (2) Ionisation

(3) Hydrolysis of Fe^{3+} (4) Dissociation

IE0275

10. The pK_a of HNO_2 is 3.37. The pH of HNO_2 in its 0.01 mol L^{-1} aqueous solution will be :-

(1) 5.37 (2) 2.69

(3) 1.69 (4) 0.69

IE0276

11. When 0.01 M HCl is added in aqueous solution of acetic acid then :-

(1) $[CH_3COO^-]$ decreases

(2) $[CH_3COOH]$ decreases

(3) $[CH_3COO^-]$ increases

(4) None of these

IE0277

12. Solubility of MX_2 type electrolyte is 0.5×10^{-4} mol L^{-1} then find out K_{sp} of electrolyte:-

(1) 5×10^{-12} (2) 25×10^{-10}

(3) 1×10^{-13} (4) 5×10^{-13}

IE0279

13. A solution of $MgCl_2$ in water has pH :

(1) < 7 (2) > 7

(3) 7 (4) 14.2

IE0280

14. K_{sp} of $Ca_3(PO_4)_2$ is :-

(1) $[Ca^{+2}][PO_4^{-3}]^2$ (2) $[Ca^{+2}]^3[PO_4^{-3}]^2$

(3) $[Ca^{+2}]^2[PO_4^{-3}]^3$ (4) $[Ca^{+2}][PO_4^{-3}]$

IE0284

15. An acid HA has dissociated in following manner $HA \rightleftharpoons H^+ + A^-$
It has concentration 1 M and pH = 5 then find out dissociation constant :-

(1) 1×10^{-10} (2) 1×10^{-5}

(3) 5×10^{-5} (4) 5

IE0285

16. Aqueous solution of $Al_2(SO_4)_3$ is :–

(1) Basic & acidic (2) Neutral

(3) Basic (4) Acidic

IE0288

17. In a saturated solution of the sparingly soluble salt $AgIO_3$ (Molecular mass = 283).
The equilibrium which sets in is

$$AgIO_{3(S)} \rightleftharpoons Ag^+_{(aq)} + IO^-_{3(aq)}$$

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

(1) 2.83×10^{-3} g (2) 1.0×10^{-7} g

(3) 1.0×10^{-4} g (4) 28.3×10^{-2} g

IE0289

18. The solubility product of AgCl is 1×10^{-10}, then molar solubility of AgCl is :-

(1) 1×10^{-10} (2) 1×10^{-7}

(3) 1×10^{-5} (4) 1×10^{-8}

IE0291

19. K_a for CH_3COOH is 1.8×10^{-5}. Find out the percentage dissociation of 0.2M CH_3COOH in 0.1M HCl solution

(1) 0.018 (2) 0.36 (3) 18 (4) 36

IE0293

20. The pK_a of a weak acid HA is 4.80. The pK_b of weak base BOH is 4.78. The pH of an aqueous solution of the corresponding salt BA will be :

(1) 9.58 (2) 4.79

(3) 7.01 (4) 9.22

IE0294

21. 0.2M solution of HCOOH is 3.2% ionised then find ionisation constant of acid :-

(1) 4.2×10^{-4} (2) 4.2×10^{-5}

(3) 2.1×10^{-4} (4) 2.1×10^{-5}

IE0295

22. Three reactions involving $H_2PO_4^-$ are given below :-

(i) $H_3PO_4 + H_2O \rightarrow H_3O^+ + H_2PO_4^-$

(ii) $H_2PO_4^- + H_2O \rightarrow HPO_4^{2-} + H_3O^+$

(iii) $H_2PO_4^- + OH^- \rightarrow H_3PO_4 + O^{2-}$

In which of the above does $H_2PO_4^-$ act as an acid ?

(1) (i) only (2) (ii) only

(3) (i) and (ii) (4) (iii) only

IE0296

23. Given that for HA acid, $K_a = 10^{-6}$ and for MOH base $K_b = 10^{-6}$. The pH of 0.1 M MA salt solution will be :-

(1) 5 (2) 7

(3) 9 (4) 2

IE0297

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

(1) $\sqrt[2]{1.6\times10^{-30}}$ (2) $\sqrt[4]{1.6\times10^{-30}}$

(3) $\sqrt[4]{1.6\times10^{-30}/27}$ (4) $1.6 \times 10^{-30}/27$

IE0298

25. An acid HA ionises as

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

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

(1) 1×10^{-10} (2) 5

(3) 5×10^{-8} (4) 1×10^{-5}

IE0299

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

(1) 1×10^{-7} (2) 3×10^{-7}

(3) 1×10^{-3} (4) 1×10^{-5}

IE0300

27. What volume of 0.1M H_2SO_4 is needed to completely neutralize 40 mL of 0.2M NaOH solution–

(1) 10 mL (2) 40 mL (3) 20 mL (4) 80 mL

IE0302

28. If pH value of a solution is 3 and on adding water, it becomes 6, then the dilution is increased by :

(1) 10 times (2) 100 times

(3) 500 times (4) 1000 times

IE0303

29. In the reaction $I_2 + I^- \rightarrow I_3^-$, the Lewis base is :

(1) I^- (2) I_2

(3) I_3^- (4) None of these

IE0305

30. Which one of the following compounds is not a protonic acid :-

(1) $B(OH)_3$ (2) $PO(OH)_3$

(3) $SO(OH)_2$ (4) $SO_2(OH)_2$

IE0307

31. Which one of the following is NOT a buffer solution:-

(1) 0.8M H_2S + 0.8M KHS

(2) 2M $C_6H_5NH_2$ + 2M $C_6H_5N^+H_3Br$

(3) 3M H_2CO_3 + 3M $KHCO_3$

(4) 0.05M $KClO_4$ + 0.05M $HClO_4$

IE0308

32. The rapid change of pH near the end point of an acid–base titration is the basis of indicator detection. pH of the solution is related to ratio of the concentrations of the conjugate acid (HIn) and base (In^-) forms of the indicator by the expression:-

(1) $\log \frac{[HIn]}{[In^-]} = pK_{In} - pH$

(2) $\log \frac{[HIn]}{[In^-]} = pH - pK_{In}$

(3) $\log \frac{[In^-]}{[HIn]} = pH + pK_{In}$

(4) $\log \frac{[In^-]}{[HIn]} = pK_{In} - pH$

IE0309

33. The correct order of acidic strength is –

(1) $HClO_4 < HClO_3 < HClO_2 < HClO$

(2) $HClO_2 < HClO_3 < HClO_4 < HClO$

(3) $HClO_4 < HClO < HClO_2 < HClO_3$

(4) $HClO < HClO_2 < HClO_3 < HClO_4$

IE0311

34. Concentrations of NH_4Cl and NH_4OH in a buffer solution are in the ratio 1 : 10. If K_b for NH_4OH is 10^{-10}, then pH of the buffer is :–

(1) 4 (2) 5 (3) 9 (4) 11

IE0312

35. When HF is dissolved in formic acid, the equilibrium established is :–

$HF + HCOOH \rightleftharpoons F^- + HCOOH_2^+$

the pair of species acting as [acid, conjugate acid] and [Base, conjugate base] respectively are :–

(1) (HF, HCOOH) and ($HCOOH_2^+$, F^-)

(2) (HF, $HCOOH_2^+$) and (HCOOH, F^-)

(3) ($HCOOH_2^+$, HF) and (F^-, HCOOH)

(4) (HF, F^-) and ($HCOOH_2^+$, HCOOH)

IE0314

36. In a mixture of equimolar solutions of $NaHCO_3$ and NaOH, the species present in solution shall be:–

(1) Na_2CO_3 (2) $NaHCO_3$ + NaOH

(3) NaOH (4) $NaHCO_3$ + Na_2CO_3

IE0316

37. An aqueous solution contains $[H^+] = 10^{-4}$. If it is diluted by mixing equal volume of water then the concentration of OH^- in mol dm^{-3} will be :–

(1) $0{\cdot}5 \times 10^{-10}$ (2) 2×10^{-10}

(3) 10^{-6} (4) 10^{-8}

IE0317

38. Which of the following is right for diprotic acid :

(1) $K_{a_2} > K_{a_1}$ (2) $K_{a_1} > K_{a_2}$

(3) $K_{a_2} > \frac{1}{K_{a_1}}$ (4) $K_{a_2} = K_{a_1}$

IE0318

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

(1) 5.0×10^{15} (2) 5.0×10^{-15}

(3) 0.2×10^{5} (4) 5.0×10^{-5}

IE0319

40. 50 mL solution of 0.1M CH_3COOH (pK_a=4.73) is titrated with 0.1M NaOH solution, pH of solution when half of CH_3COOH is neutralized
(1) 4.53 (2) 4.63 (3) 4.73 (4) 4.83
IE0321

41. The pH of an aqueous solution of a 1×10^{-7} M solution of HCl will be :-
(1) 7
(2) slightly less than 7
(3) slightly greater than 7
(4) 1
IE0323

42. What will be the concentration of $H^{\oplus}$ ions in a solution containing 0.1M acetic acid and 0.1M sodium acetate if dissociation constant of acetic acid is 1.8×10^{-5} :-
(1) 1.8×10^{-7} (2) 1.8×10^{-5}
(3) 1.8×10^{-2} (4) 1.8×10^{-3}
IE0324

43. Which of the following pair constitutes a buffer :-
(1) HNO_2 & $NaNO_2$ (2) NaOH & NaCl
(3) HNO_3 & NH_4NO_3 (4) HCl & KCl
IE0218

44. The hydrogen ion concentration of a 10^{-8} M HCl aqueous solution at 298 K ($K_W = 10^{-14}$) is :-
(1) 1.0×10^{-6} M (2) 1.0525×10^{-7} M
(3) 9.525×10^{-8} M (4) 1.0×10^{-8} M
IE0219

45. Calculate the pOH of a solution at 25^0 C that contains 1×10^{-10}M of hydronium ions, i.e., H_3O^+
(1) 7.000 (2) 4.000 (3) 9.000 (4) 1.000
IE0221

46. A weak acid HA has a K_a of 1.00×10^{-5}. If 0.100 moles of this acid is dissolved in one litre of water. The percentage of acid dissociated at equilibrium is closest to :-
(1) 99.0% (2) 1.00% (3) 99.9% (4) 0.100%
IE0222

47. Equimolar solutions of the following were prepared in water separately. Which one of the solutions will record the highest pH?
(1) $BaCl_2$ (2) $MgCl_2$
(3) $CaCl_2$ (4) $SrCl_2$
IE0223

48. Equal volumes of three acid solutions of pH 3, 4 and 5 are mixed in a vessel. What will be the H^+ ion concentration in the mixture ?
(1) 3.7×10^{-4} M (2) 3.7×10^{-3} M
(3) 1.11×10^{-3} M (4) 1.11×10^{-4} M
IE0224

49. NaCl exists in ...(X)... state as a cluster of positively charged sodium ions and negatively charged chloride ions which are held together due to ...(Y).... interactions between oppositely charged species. Here, (X) and (Y) refer to
(1) solid, covalent
(2) solid, electrostatic
(3) gaseous, covalent
(4) gaseous, electrostatic
IE0362

50. At 25°C, calculate the pH of 500 mL of aqueous solution containing 0.74 gm of $Ca(OH)_2$?
(1) 1.4 (2) 12.6 (3) 2.8 (4) 11.2
IE0363

51. Determine the volume of water required to dissolve 20mg of $CaSO_4$ at 298 K.
(K_{sp} of $CaSO_4$ at 298K = 9×10^{-6})
(1) 4.9 ml (2) 490 ml
(3) 0.49 ml (4) 49 ml
IE0364

52. 0.01 M NaX solution is 1% hydrolysed. Find the ionisation constant of weak acid HX and pH of NaX solution.
(1) 10^{-6}, 8 (2) 10^{-8}, 9
(3) 10^{-8}, 8.5 (4) 10^{-8}, 10
IE0365

53. Point out the conjugate acids for the following Bronsted bases NH_2^-, NH_3 and $HCOO^-$ respectively

(1) NH_3, NH_2^- and HCOOH

(2) NH_3, NH_4^+ and HCOOH

(3) N^{-3}, NH_2^{-2} and HCOOH

(4) NH_2^-, NH_4^+ and HCOOH

IE0366

EXERCISE-III (Analytical Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**3**	**2**	**2**	**3**	**4**	**4**	**1**	**1**	**3**	**2**	**1**	**4**	**1**	**2**	**1**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**4**	**1**	**3**	**1**	**3**	**3**	**2**	**2**	**3**	**1**	**4**	**2**	**4**	**1**	**1**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**4**	**1**	**4**	**2**	**2**	**1**	**2**	**2**	**2**	**3**	**2**	**2**	**1**	**2**	**2**
Que.	46	47	48	49	50	51	52	53							
Ans.	**2**	**1**	**1**	**2**	**2**	**4**	**4**	**2**							