(3) No change
(4) The solution starts turning blue

52. Saturated solution of KNO_3 with agar-agar is used to make salt bridge because:

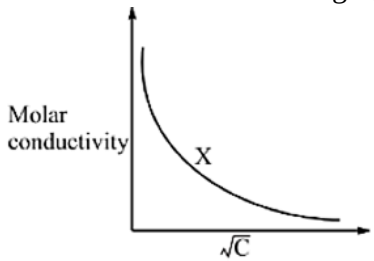
(1) Size of K^+ ion is greater than that of NO_3^- ion

(2) Velocity of NO_3^- ion is greater than that of K^+ ion

(3) Velocity of K^+ and NO_3^- ions are nearly the same

(4) Both velocity and size of K^+ and NO_3^- ions are same

53. The variation of molar conductivity with concentration of an electrolyte (X) in aqueous solution is shown in the following figure:



The electrolyte X is:

(1) NaCl (2) HCl
(3) CH_3COOH (4) KNO_3

(3) Less than K_{SP} (4) Is very small

56. Given below are two statements. One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : pH of x M HCl is less than pH of x M CH_3COOH.

Reason (R) : The degree of ionization of HCl and CH_3COOH are equal.

(1) Both **Assertion(A)** and **Reason(R)** are true and **Reason(R)** is the correct explanation of **Assertion(A)**.

(2) Both **Assertion(A)** and **Reason(R)** are true but **Reason(R)** is not the correct explanation of **Assertion(A)**.

(3) **Assertion(A)** is true and **Reason(R)** is false.

(4) **Assertion(A)** is false and **Reason(R)** is true

57. What will be the emf for the given cell?

$Pt|H_2\ (g, P_1)\ |\ H^+\ (aq)\ ||\ H^+\ (aq)\ |\ H_2\ (g, P_2)\ Pt$

(1) $\frac{RT}{F}\ln\frac{P_1}{P_2}$ (2) $\frac{RT}{2F}\ln\frac{P_1}{P_2}$

(3) $\frac{RT}{F}\ln\frac{P_2}{P_1}$ (4) None of these

58. Resistance of 0.1 M KCl solution in a conductance cell is 300 ohm and conductivity is 0.013 S cm^{-1}. The value of cell constant is:

(1) 3.9 cm^{-1}

(2) 39 m^{-1}

(3) 3.9 m^{-1}

(4) None of the above

59. Given below are two statements. One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Salt bridge is used generally in the electrochemical cell.

Reason (R) : The ions of the electrolyte used in the salt bridge should have the nearly same transport numbers.

(1) Both **Assertion(A)** and **Reason(R)** are true and **Reason(R)** is the correct explanation of **Assertion(A)**.

(2) Both **Assertion(A)** and **Reason(R)** are true but **Reason(R)** is not the correct explanation of **Assertion(A)**.

(3) **Assertion(A)** is true and **Reason(R)** is false.

(4) **Assertion(A)** is false and **Reason(R)** is true.

60. An example of a salt dissolved in water to give acidic solution is:

(1) Ammonium chloride

(2) Sodium acetate

(3) Potassium nitrate

(4) Barium bromide

61. Which is incorrect?

(1) Conjugate acid of H_2O is H_3O^+

(2) Conjugate base of HCO_3^- is CO_3^{2-}

(3) Conjugate base of NH_3 is NH_2^-

(4) Conjugate base of HOCl is Cl^-

62. Match **List-I with List-II** to find out the **correct** option:

List-I (Property)		List-II (Unit)	
(I)	Conductance	**(A)**	S m^{-1}
(II)	Conductivity	**(B)**	S^{-1} m
(III)	Molar conductivity	**(C)**	S m^2 mol^{-1}
(IV)	Resistivity	**(D)**	S

(1) I → A; II → B; III → C; IV → D

(2) I → A; II → B; III → D; IV → C

(3) I → B; II → A; III → C; IV → D

(4) I → D; II → A; III → C; IV → B

63. The solubility product of AgBr is 4.9×10^{-9}. The solubility of AgBr will be:

(1) 7×10^{-4} mole/litre

(2) 7×10^{-5} g/litre

(3) 1.316×10^{-2} g/litre

(4) 1×10^{-3} mole/litre

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

(1) KCl (2) NaCl

(3) Na_2CO_3 (4) $CuSO_4$

65. In a buffer solution containing equal concentrations of B^- and HB, the K_b for B^- is 10^{-10}. The pH of buffer solution is:

(1) 10 (2) 7

(3) 6 (4) 4

66. Given below are two statements. One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Molar conductivity of 0.1 M NH_4OH solution is less than that of 0.001 M NH_4OH solution.

Reason (R) : Dilution increases the degree of ionization of NH_4OH.

(1) Both **Assertion(A)** and **Reason(R)** are true and **Reason(R)** is the correct explanation of **Assertion(A)**.

(2) Both **Assertion(A)** and **Reason(R)** are true but **Reason(R)** is not the correct explanation of **Assertion(A)**.

(3) **Assertion(A)** is true and **Reason(R)** is false.

(4) **Assertion(A)** is false and **Reason(R)** is true.

67. How many Faradays are required to reduce 0.25 g of Nb (V) to the metal?

(Atomic weight : Nb = 93 u)

(1) 2.7×10^{-3} (2) 1.3×10^{-2}

(3) 2.7×10^{-2} (4) 7.8×10^{-3}

68. For cell reaction,

$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$, cell representation is:

(1) $Zn \mid Zn^{2+} \parallel Cu^{2+} \mid Cu$

(2) $Cu \mid Zn^{2+} \parallel Zn \mid Cu^{2+}$

(3) $Cu \mid Zn^{2+} \parallel Zn \mid Cu$

(4) $Cu^{2+} \mid Zn \parallel Zn^{2+} \mid Cu$

69. The oxidation potentials of A and B are +2.37 V and +1.66 V respectively. In chemical reactions:

(1) A will be replaced by B

(2) A will replace B

(3) A will not replace B

(4) A and B will not replace each other

70. Which one of the following is the strongest oxidising agent?

$\left[E^{o}_{Fe^{3+}/Fe^{2+}} = 0.77V,\ E^{o}_{I_2/I^-} = 0.54\ V,\right.$

$\left. E^{o}_{Cu^{2+}/Cu} = 0.34V,\ E^{o}_{Ag^{+}/Ag} = 0.80\ V\right]$

(1) Ag^+ (2) Fe^{3+}

(3) Cu^{2+} (4) I_2

71. The dissociation constant of monobasic acids A, B and C are 10^{-4}, 10^{-6} and 10^{-10} respectively. The concentration of each monobasic acid is 0.1 M. Which of the following has been arranged in increasing order of pH?

(1) C < B < A

(2) A < B < C

(3) B < C < A

(4) B < A < C

72. Match **List-I** with **List-II** to find out the **correct** option:

List-I		List-II	
(I)	NaOH	**(A)**	Arrhenius base
(II)	NH_3	**(B)**	Bronsted base
(III)	HCl	**(C)**	Arrhenius acid
(IV)	$AlCl_3$	**(D)**	Lewis acid

(1) I $\rightarrow$ A; II $\rightarrow$ B; III $\rightarrow$ C; IV $\rightarrow$ D

(2) I $\rightarrow$ A; II $\rightarrow$ B; III $\rightarrow$ D; IV $\rightarrow$ C

(3) I $\rightarrow$ B; II $\rightarrow$ A; III $\rightarrow$ C; IV $\rightarrow$ D

(4) I $\rightarrow$ C; II $\rightarrow$ A; III $\rightarrow$ B; IV $\rightarrow$ D

73. pH of $Ba(OH)_2$ solution is 12. Its solubility product is:

(1) $10^{-6}\ M^3$ (2) $4 \times 10^{-6}\ M^3$

(3) $5 \times 10^{-7}\ M^3$ (4) $5 \times 10^{-6}\ M^3$

74. The degree of dissociation of acetic acid in a 0.1 M solution is 1.32×10^{-2}. Find out the dissociation constant of the acid?

(1) 1.50×10^{-4}

(2) 1.80×10^{-6}

(3) 1.76×10^{-5}

(4) 1.2×10^{-3}

75. Given below are two statements. One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Molten aluminium chloride when electrolysed using 0.1 F, deposits 0.1 g equivalent of aluminium.

Reason (R) : Mass of substance deposited depends on quantity of electricity passed through it.

(1) Both **Assertion(A)** and **Reason(R)** are true and **Reason(R)** is the correct explanation of **Assertion(A)**.

(2) Both **Assertion(A)** and **Reason(R)** are true but **Reason(R)** is not the correct explanation of **Assertion(A)**.

(3) **Assertion(A)** is true and **Reason(R)** is false.

(4) **Assertion(A)** is false and **Reason(R)** is true.

76. pH of a 0.001 M $Ba(OH)_2$ solution is:

$[\log_{10} 2 = 0.3]$

(1) 9 (2) 11

(3) 11.3 (4) 12.3

77. When 0.05 moles of the following acids are dissolved in 1000 mL of H_2O, the $[H^+]$ will be greatest in:

(1) HNO_2 : $pK_a = 3.0$

(2) HCOOH : $pK_a = 3.75$

(3) HCN : $pK_a = 9.4$

(4) CH_3COOH : $pK_a = 4.75$

78. A volume of 20 mL of 0.8 M HCN solution is mixed with 80 mL of 0.4 M NaCN solution. The pH of the resulting solution is:

[K_a of HCN = 2.5×10^{-10}, log 2 = 0.3, log 5 = 0.7]

(1) 9.9 (2) 9.3

(3) 4.1 (4) 4.7

79. Given below are two statements. One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : HCl and NaCl cannot form buffer solution.

Reason (R) : Buffer solution is formed by a weak acid and its conjugate salt.

(1) Both **Assertion(A)** and **Reason(R)** are true and **Reason(R)** is the correct explanation of **Assertion(A)**.

(2) Both **Assertion(A)** and **Reason(R)** are true but **Reason(R)** is not the correct explanation of **Assertion(A)**.

(3) **Assertion(A)** is true and **Reason(R)** is false.

(4) **Assertion(A)** is false and **Reason(R)** is true.

80. If $E^{o}_{Fe^{2+}/Fe} = -0.441$ V and

$E^{o}_{Fe^{3+}/Fe^{2+}} = 0.771$ V, then the standard emf of the reaction,

$Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}$ will be:

(1) 0.330 V (2) 1.653 V
(3) 1.212 V (4) 0.111 V

81. The standard potential at 25°C for the following half reactions are given as

$Zn^{2+} + 2e^{-} \rightarrow Zn$; $E^{o} = -0.762$ V

$Mg^{2+} + 2e^{-} \rightarrow Mg$; $E^{o} = -2.37$ V

When zinc dust is added to a solution of magnesium chloride:

(1) Zinc chloride is formed
(2) Zinc dissolves in solution
(3) Magnesium is precipitated
(4) No reaction will take place

82. The expression connecting E^{o}_{cell} and K_{eq} of the reaction occurring in a Galvanic cell is:

(1) $\log K_{eq} = nFE^{o}/RT$
(2) $\log K_{eq} = -nFE^{o}/RT$
(3) $\ln K_{eq} = nFE^{o}/RT$
(4) $\ln K_{eq} = \dfrac{-nFE^{o}}{RT}$

83. The standard free energy change of the reaction

$Cu^{2+}(aq) + Sn(s) \rightarrow Cu(s) + Sn^{2+}(aq)$

(Given $E^{o} = 0.48$ V) is:

(1) –31.8 kJ mol^{-1} (2) –62.1 kJ mol^{-1}
(3) –79.2 kJ mol^{-1} (4) –92.64 kJ mol^{-1}

84. Calculate the molar concentration of a solution of acetic acid (HOAc) that has a pH of 3.
[$K_a = 1.8 \times 10^{-5}$]

(1) 1.0×10^{-3} (2) 1.0×10^{-6}
(3) 0.057 (4) 0.010

85. Given below are two statements. One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : pH of 10^{-8} M HCl solution is approximately 6.9.

Reason (R) : HCl is a strong acid.

(1) Both **Assertion(A)** and **Reason(R)** are true and **Reason(R)** is the correct explanation of **Assertion(A)**.
(2) Both **Assertion(A)** and **Reason(R)** are true but **Reason(R)** is not the correct explanation of **Assertion(A)**.
(3) **Assertion(A)** is true and **Reason(R)** is false.
(4) **Assertion(A)** is false and **Reason(R)** is true.

SECTION-B

86. A certain quantity of electricity is passed through the aqueous solutions of $AgNO_3$ and $CuSO_4$ in series. If the mass of Ag deposited is 1.08 g, the mass of Cu deposited will be:

(1) 0.635 g (2) 6.35 g
(3) 0.3175 g (4) 1.270 g

87. The standard reduction potentials, E^{o} for the half reactions are

$Zn^{2+} + 2e^{-} \rightarrow Zn$; $E^{o} = -0.76$ V

$Fe^{2+} + 2e^{-} \rightarrow Fe$; $E^{o} = -0.41$ V

The standard emf of the cell involving the reaction

$Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$ is :

(1) –0.35 V (2) +1.17 V
(3) +0.35 V (4) –1.17 V

88. In the Galvanic cell, true statement is:

(1) Current flows from anode to cathode
(2) Anode is positive terminal
(3) If $E_{cell} < 0$, it is a spontaneous reaction
(4) Cathode is positive terminal

89. For the given half-cell, $Al^{3+} + 3e^{-} \rightarrow Al$; on increasing $[Al^{3+}]$, the electrode potential:

(1) Increases
(2) Decreases
(3) No change
(4) First increases than decreases

90. The emf of a chemical cell is positive when free energy change of reaction:

(1) > 0
(2) < 0
(3) = 0
(4) No relationship of free energy change and emf

91. Boric acid (H_3BO_3) is

(1) Monobasic and weak Lewis acid
(2) Tribasic and strong Lewis acid
(3) Monobasic and weak Bronsted acid
(4) Tribasic and weak Bronsted acid

92. The coulombic charge on one mole electron is:

(1) 1.6×10^{-19} C
(2) 96500 C
(3) 6.02×10^{-23} C
(4) 1.6×10^{-23} C

93. The pK_w of water at 50ºC is 13.40. An aqueous solution at 50ºC has pH = 7. This solution is-

(1) Acidic (2) Alkaline

(3) Neutral (4) Amphoteric

94. The pH of 0.01 M sodium acetate solution is :
[K_a of $CH_3COOH = 2 \times 10^{-5}$]

(1) 7.25 (2) 6.5

(3) 8.05 (4) 8.35

95. Given below are two statements. One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : pH of 0.1 M HCl solution is less than 0.1 M HCN solution.

Reason (R) : In equimolar solutions, the number of ionizable H^+ present in HCl is less than present in HCN solution.

(1) Both **Assertion(A)** and **Reason(R)** are true and **Reason(R)** is the correct explanation of **Assertion(A)**.

(2) Both **Assertion(A)** and **Reason(R)** are true but **Reason(R)** is not the correct explanation of **Assertion(A)**.

(3) **Assertion(A)** is true and **Reason(R)** is false.

(4) **Assertion(A)** is false and **Reason(R)** is true.

96. Which of the given solutions have pOH = pK_b of NH_3 ?

(1) 10 mL of 0.1 M HCl + 10 mL of 0.2 M NH_3

(2) 10 mL of 0.1 M HCl + 20 mL of 0.1 M NH_3

(3) 50 mL of 0.2 M HCl + 20 mL of 1 M NH_3

(4) All of the above

97. For given cell :

$Zn \mid Zn^{2+}(C_1) \parallel Zn^{2+}(C_2) \mid Zn$; ΔG is negative if:

(1) $C_1 = C_2$

(2) $C_1 > C_2$

(3) $C_2 > C_1$

(4) Can't be predicted

98. The hydrogen electrode is dipped in a solution of pH = 3 at 25ºC. The reduction potential of the electrode would be:

(1) 0.177 V

(2) 0.087 V

(3) –0.177 V

(4) 0.059 V

99. What volume of 0.05 M H_2SO_4 must be added to 10 mL of 0.1 M NaOH solution to neutralize 50% base ?

(1) 10 mL

(2) 5 mL

(3) 7.5 mL

(4) 2.5 mL

100. 1 L of buffer solution contains one mole of $(CH_3COO)_2Ca$ and one mole of CH_3COOH. Which of the following statement is correct? ($pK_a = 4.7$)

(1) pH = 9

(2) pOH = 9

(3) pH = 4.4

(4) pOH = 8.6

55. (2)

Precipitation occurs only when ionic product > solubility product due to which the reaction shifts backward and solid precipitate is obtained.

[New NCERT Class 11th Page No. 203]

56. (3)

HCl is a strong electrolyte and acetic acid is a weak electrolyte.

[New NCERT Class 12th Page No. 193]

57. (2)

Cell reaction at anode;

$$\underset{(P_1)}{H_2} \longrightarrow 2H^+ + 2e^-$$

Cell reaction at cathode;

$$2H^+ + 2e^- \longrightarrow \underset{(P_2)}{H_2}$$

Hence, $E_{cell} = E^o_{cell} - \frac{RT}{nF}\ln\frac{P_2}{P_1}$

Since both electrodes are identical

Hence $E^o_{cell} = 0$

Thus, $E_{cell} = 0 - \frac{RT}{nF}\ln\frac{P_2}{P_1} = -\frac{RT}{2F}\ln\frac{P_2}{P_1}$

$$= \frac{RT}{2F}\ln\frac{P_1}{P_2}$$

[New NCERT Class 12th Page No. 38]

58. (1)

Cell constant = $\kappa \times R$

$= 0.013 \times 300 = 3.9\ cm^{-1}$

[New NCERT Class 12th Page No. 44]

59. (2)

Salt bridge is used to maintain electrical neutrality of solution. Velocity of ions is nearly the same.

[New NCERT Class 12th Page No. 33]

60. (1)

An acidic salt gives acidic solution, NH_4Cl is made up of weak base and strong acid, hence gives acidic solution.

[New NCERT Class 11th Page No. 202]

61. (4)

$HOCl \rightarrow H^+ + OCl^{\ominus}$

Acid — Conjugate base

[New NCERT Class 11th Page No. 191]

62. (4)

The unit of conductance is S.

Resistivity is the reciprocal of conductivity.

Conductivity is the product of conductance and cell constant.

Molar conductivity is the conductivity for 1 molar electrolytic solution.

[New NCERT Class 12th Page No. 45]

63. (3)

$AgBr \rightleftharpoons Ag^{\oplus} + Br^{\ominus}$

$1 - S \quad S \quad S$

$K_{sp} = S^2 = 4.9 \times 10^{-9}$

$\Rightarrow \quad S = 7 \times 10^{-5}\ mol\ L^{-1}$

$= 7 \times 10^{-5} \times 188\ g\ L^{-1}$

$= 1.316 \times 10^{-2}\ g\ L^{-1}$

[New NCERT Class 11th Page No. 204]

64. (3)

Na_2CO_3 is a basic salt.

[New NCERT Class 11th Page No. 194]

65. (4)

According to Henderson – Hasselbach equation

$$pOH = pK_b + \log\frac{[salt]}{[base]} = 10 + \log 1 = 10$$

$\therefore \quad pH = 14 - pOH = 14 - 10 = 4$

[New NCERT Class 11th Page No. 203]

66. (1)

$$\Lambda_m = \frac{\kappa \times 1000}{M} \Rightarrow \Lambda_m \propto \frac{1}{M}$$

[New NCERT Class 12th Page No. 45]

67. (2)

$Nb^{5+}(aq) + 5e^- \rightarrow Nb(s)$

$\because$ 93 g Nb requires electricity = 5 F

$\therefore$ 0.25 g Nb will require electricity = 1.3×10^{-2} F

[New NCERT Class 12th Page No. 52]

68. (1)

Cu is reduced and Zn is oxidized. So, copper is present at cathode and zinc is present at anode.

[New NCERT Class 12th Page No. 38]

69. (2)

Follow ECS, A will replace B.

Greater the oxidation potential more is the reactivity.

[New NCERT Class 12th Page No. 37]

70. (1)

Oxidizing power $\propto$ standard reduction potential (SRP)

Since SRP of Ag^+/Ag is highest

So, Ag^+ will be most readily reduced to Ag.

$\therefore$ $Ag^+ \Rightarrow$ Strongest oxidizing agent.

[New NCERT Class 12th Page No. 38]

71. (2)

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

$$K_a = \frac{[H^+][A^-]}{[HA]}$$

Smaller the value of K_a, more will be the pH.

[New NCERT Class 12th Page No. 195]

72. (1)

Arrhenius acid can lose H^+ ions and Arrhenius bases can lose OH^- ions.

Lewis acids are electron deficient in nature.

[New NCERT Class 11th Page No. 190]

73. (3)

$[H^+] = 10^{-12}$ M

$[OH^-]$ 10^{-2} M = 2 S [$\therefore$ S = 5×10^{-3}]

$$Ba(OH)_2 \rightleftharpoons \underset{S}{Ba^{2+}} + \underset{2S}{2OH^-}$$

$\therefore$ $K_{SP} = 4\ S^3$

$\Rightarrow$ $K_{SP} = 4 \times (5 \times 10^{-3})^3$

$\Rightarrow$ $K_{SP} = 500 \times 10^{-9} = 5 \times 10^{-7}\ M^3$

[New NCERT Class 11th Page No. 198]

74. (3)

$$K_a = \frac{[CH_3COO^-][H^+]}{[CH_3COOH]}$$

$$= \frac{0.1 \times 0.0132 \times 0.1 \times 0.0132}{0.1(1 - 0.0132)} = 1.76 \times 10^{-5}$$

[New NCERT Class 11th Page No. 196]

75. (1)

$Al^{3+} + 3e^- \rightarrow Al$

3 mole charge = 1 g equivalent electron = 1 F charge is required to deposit 1 mole of Al.

$\therefore$ 0.1 F $\rightarrow$ 0.1 mole Al is deposited.

[New NCERT Class 12th Page No. 52]

76. (3)

$$\underset{10^{-3}\ M}{Ba(OH)_2} \rightarrow Ba^{2+} + \underset{2 \times 10^{-3}\ M}{2OH^-}$$

$$pOH = -\log[OH^-]$$

$$= -\log\left[2 \times 10^{-3}\right] = -\log 2 + 3\log 10$$

pH = 14 – pOH = 14 – 2.7 = 11.3

[New NCERT Class 11th Page No. 194]

77. (1)

Smaller is the pK_a, stronger will be the acid, greater will be the $[H^+]$.

[New NCERT Class 11th Page No. 195]

78. (1)

$$pH = pK_a + \log\frac{[CN^-]}{[HCN]}$$

$$= -\log(2.5 \times 10^{-10}) + \log\left[\frac{\frac{80}{100}(0.4)}{\frac{20}{100}(0.8)}\right] = 9.9$$

[New NCERT Class 12th Page No. 203]

79. (1)

Both assertion and reason are correct as strong acids and their salts do not form buffer solutions.

[New NCERT Class 11th Page No. 203]

80. (3)

For the reaction, $Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}$

E^o = 0.771 V + 0.441 V = 1.212 V

[New NCERT Class 12th Page No. 39]

81. (4)

$$E^o_{Zn^{2+}/Zn} > E^o_{Mg^{2+}/Mg}$$

$\therefore$ Zn cannot replace Mg^{2+} from its solution.

[New NCERT Class 12th Page No.37]

82. (3)

At equilibrium, E_{cell} = Zero

$$E_{cell} = E^o - \frac{RT}{nF}\ln K_{eq}$$

$$\ln K_{eq} = \frac{nFE^o}{RT}$$

[New NCERT Class 12th Page No. 39]

83. (4)

$\Delta G^o = -nF\ E^o_{cell}$

$= -2 \times 96500 \times 0.48$

$= -92640\ J\ mol^{-1}$

$= -92.64\ kJ\ mol^{-1}$

[New NCERT Class 12th Page No. 39]

84. (3)

$$K_a = \frac{[H^+][OAc^-]}{[HOAc]}$$

$$\text{or } 1.8\times10^{-5} = \frac{(10^{-3})^2}{[HOAc]}$$

or [HOAc] = $5.56 \times 10^{-2} = 0.056$ M

[New NCERT Class 11th Page No. 196]

85. (2)

HCl is indeed a strong acid.

For 10^{-8} M solution of HCl

$$[H^+] = 10^{-8} + \underset{\substack{\uparrow \\ \text{Due to} \\ \text{water}}}{10^{-7}} = 1.1\times10^{-7}$$

$\therefore$ $pH = -\log_{10}[H^+] = 6.9$

[New NCERT Class 11th Page No. 196]

86. (3)

$$\frac{\text{Mass of Cu deposited}}{\text{Mass of Ag deposited}} = \frac{\text{Eq.wt.of Cu}}{\text{Eq.wt.of Ag}}$$

$Cu^{2+} + 2e^- \rightarrow Cu$

Eq. wt. of Cu = $\frac{63.5}{2} = 31.75$

$Ag^+ + e^- \rightarrow Ag$

Eq. wt. of Ag = $\frac{108}{1} = 108$

Now, eq. (1) becomes,

$$W_{Cu} = \frac{31.75\times1.08}{108} = 0.3175 \text{ g}$$

[New NCERT Class 12th Page No. 47]

87. (3)

$$E^o_{cell} = E^o_{Fe^{2+}/Fe} - E^o_{Zn^{2+}/Zn}$$

= –0.71 V – (–0.76 V) = 0.35 V

[New NCERT Class 12th Page No. 38]

88. (4)

In Galvanic cell

- Current flows from cathode to anode
- Anode is negative terminal
- $\Delta G = -nF\,E_{cell}$
- If $E_{Cell} > 0$, ΔG = negative (spontaneous)
- Cathode is positive terminal

[New NCERT Class 12th Page No. 35]

89. (1)

$$E = E^o + \frac{0.059}{3}\log\frac{[Al^{3+}]}{[Al]}$$

So, if $[Al^{3+}]\uparrow = E\uparrow$

[New NCERT Class 12th Page No. 38]

90. (2)

$\Delta G = -nFE_{cell}$

If E_{cell} = positive then ΔG = negative

[less than zero]

[New NCERT Class 12th Page No. 40]

91. (1)

Boric acid H_3BO_3 is monobasic and weak Lewis acid according to the following reaction:

$H_3BO_3 + H_2O \rightarrow B(OH)_4^{\ominus} + H^{\oplus}$

92. (2)

Charge on 1 mole electrons $\Rightarrow 1.6\times10^{-19}\times N_A$

96500 C $\rightarrow$ known as 1 Faraday

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93. (2)

$$pH = \frac{13.40}{2} = 6.7 \text{ for neutral solution.}$$

pH > 6.7 will be for alkaline solution.

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94. (4)

$$pH = \frac{1}{2}[pK_w + pK_a + \log_{10} C]$$

$$= \frac{1}{2}[14 + 5 - \log 2 + \log_{10}10^{-2}] = 8.35$$

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95. (3)

HCl is stronger acid than HCN.

$\therefore$ pH of HCl is lesser than pH of HCN when both are equimolar.

Number of ionizable H^+ is 1 for both HCl and HCN.

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96. (4)

$$pOH = pK_b + \log\frac{[salt]}{[base]}$$

As [salt] = [base]

$pOH = pK_b$

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97. (3)

$Zn \,|\, \underset{(C_1)}{Zn^{2+}} \,||\, \underset{(C_2)}{Zn^{2+}} \,|\, Zn \rightarrow$ This is a concentration cell

$$E = E^o + \frac{0.059}{2}\log\frac{[Zn^{2+}]\text{ cathode}}{[Zn^{2+}]\text{ anode}}$$

$\left[E^o_{cell}\right]$ cathode and anode are same.

$$E_{cell} = 0 + \frac{0.059}{2}\log\frac{C_2}{C_1}$$

$\Rightarrow$ If $C_2 > C_1 \rightarrow E_{cell}$ = positive then ΔG

$\Rightarrow$ $(-)nFE^o_{Cell} \Rightarrow$ negative

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98. (3)

$pH = 3$, $pH = -\log_{10}[H^+]$

$3 = -\log_{10}[H^+]$

$$E = E^o + \frac{0.059}{2}\log\frac{[H^+]^2}{P_{H_2}}$$

$$\Rightarrow \quad 0 + \frac{0.059}{2}\log\frac{(10^{-3})^2}{1}$$

$$\Rightarrow \quad \frac{0.059}{2}(-6)\times\log 10$$

$\Rightarrow$ $(-)0.059\times 3 = -0.177$ V

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99. (2)

$V\times 0.05\times 2 = 0.5\times 10\times 0.1$

V = 5 mL

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100. (2)

$$pH = 4.7 + \log\frac{2}{1}$$

pH = 5 and hence pOH = 9

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