NEET UG (2024) Chemistry Quiz-14

SECTION - A

- **51.** Work done in a reversible isothermal expansion of a gas is given by:
 - (1) $w = -2.303 \text{ nRT} \log \frac{V_f}{V_i}$ (2) $w = -2.303 \text{ nRT} \log \frac{P_i}{P_f}$
 - (3) w=2.303 nRT log $\frac{V_{f}}{V}$
 - (4) Both (1) and (2)
- **52.** Unit of cell constant is:
 - (1) cm^{-1}
 - (2) Ω^{-1}
 - (3) $\Omega \text{ cm}^{-1}$
 - (4) Ω cm
- **53.** For the process dry ice $\rightarrow CO_2(g)$:
 - (1) ΔH is positive and ΔS is negative.
 - (2) Both ΔH and ΔS are negative.
 - (3) Both Δ H and Δ S are positive.
 - (4) ΔH is negative and ΔS is positive.
- 54. In electrolysis, oxidation takes place at:
 - (1) Anode
 - (2) Cathode
 - (3) The anode as well as cathode
 - (4) The surface of electrolyte solution
- **55.** 2 mole of an ideal gas expands isothermally and reversibly from 1L to 10 L at 300 K, what is enthalpy change in kJ?
 - (1) 4.98
 - (2) 11.47
 - (3) -11.47
 - (4) 0
- **56.** In electrolysis, mass of the substance liberated at cathode is proportional to:
 - (1) Strength of the current passed.
 - (2) Time of passage of current.
 - (3) Quantity of electricity passed.
 - (4) None of these.
- **57.** For the reaction, $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$:
 - (1) $\Delta H = \Delta U$ (2) $\Delta H < \Delta U$
 - (3) $\Delta H > \Delta U$ (4) None of these
- **58.** Which of the following has maximum ionic mobility in aqueous solution?
 - (1) F⁻ (2) Cl⁻
 - (3) Br⁻ (4) I⁻

- **59.** Which of the following is a correct statement related to an isolated system?
 - (1) Exchange of both energy and matter are possible.
 - (2) Exchange of neither energy nor matter is possible.
 - (3) Exchange of only energy is possible.
 - (4) Exchange of only matter is possible.
- **60.** One Faraday is equal to:
 - (1) 96500 Coulombs
 - (2) 10000 Coulombs
 - (3) 9650 Coulombs
 - (4) 19650 Coulombs
- **61**. The change in internal energy, if 60 J of heat is given to the system at constant pressure and 30 J of work is done by the system, will be:
 - (1) -90 J (2) +90 J
 - $(3) 30 J \qquad (4) + 30 J$
- **62.** The unit of equivalent conductivity is:
 - (1) S cm⁻²
 - (2) ohm cm^2 (g equivalent)
 - (3) ohm cm
 - (4) $ohm^{-1} cm^2 (g equivalent)^{-1}$
- **63.** Which of the following is not an extensive property?
 - (1) Enthalpy (2) Entropy
 - (3) Density (4) Internal energy
- **64.** Water is decomposed into hydrogen and oxygen by means of electric current by the process:
 - (1) electrolysis (2) electric heating
 - (3) electroplating (4) None of these
- 65. Third law of thermodynamics states that:
 - (1) The entropy of any pure crystalline substance approaches zero at absolute zero temperature.
 - (2) For an isolated system, entropy will increase in the direction of spontaneity.
 - (3) If a reaction takes place in several steps, then its standard reaction enthalpy is the sum of the standard enthalpies of the intermediate steps.
 - (4) The energy of an isolated system is constant.
- **66.** As the dilution of an electrolyte increases:
 - (1) Specific conductance decreases.
 - (2) Molar conductance decreases.
 - (3) Resistance increases.
 - (4) No change takes place in conductance.

- **67.** A reaction is spontaneous at all temperatures when:
 - (1) $\Delta_r H < 0$ and $\Delta_r S < 0$
 - (2) $\Delta_r H < 0$ and $\Delta_r S > 0$
 - (3) $\Delta_r H > 0$ and $\Delta_r S < 0$
 - (4) $\Delta_r H > 0$ and $\Delta_r S > 0$
- **68.** Which device converts electrical energy into chemical energy?
 - (1) Galvanic cell (2) Electrolytic cell
 - (3) Daniel cell (4) None of these
- **69.** Gas constant (R) equals to:

(1) $\frac{C_p}{C_v}$ (2) 1 (3) $C_v - C_p$ (4) $C_p - C_v$

- **70.** Aqueous solution of which of the following compounds is the best conductor of electric current?
 - (1) Ammonia, NH_3
 - (2) Fructose, $C_6H_{12}O_6$
 - (3) Acetic acid, $C_2H_4O_2$
 - (4) Hydrochloric acid, HCl
- **71.** Which of the following equations correctly represents the $\Delta_f H^\circ$ of ethane?
 - (1) $2C_{(diamond)} + 3H_{2(g)} \rightarrow C_2H_{6(g)}$
 - $(2) \quad C_2H_{4(g)} + H_{2(g)} \rightarrow C_2H_{6(g)}$
 - (3) $2C_{(graphite)} + 3H_{2(g)} \rightarrow C_2H_{6(g)}$
 - (4) $4C_{(graphite)} + 6H_{2(g)} \rightarrow 2C_2H_{6(g)}$
- 72. The electronic conductance depends upon:
 - (1) Temperature
 - (2) Nature of the metal
 - (3) Number of valence electrons per atom
 - (4) All of these
- **73.** Which of the following are not state functions?

I.	$\mathbf{q} + \mathbf{w}$	II.	q
III.	W	IV.	H - TS
(1)	I, II & III	(2)	II & III
(3)	I & IV	(4)	II, III & IV

- 74. Faraday's law of electrolysis is related to:
 - (1) Atomic number of cation
 - (2) Speed of cation
 - (3) Speed of anion
 - (4) Equivalent weight of electrolyte
- **75.** Hess's law deals with:
 - (1) heat changes in a chemical reaction
 - (2) rate of reaction
 - (3) equilibrium constant
 - (4) influence of pressure on volume of a gas

- **76.** The amount of electricity that can deposit 108 g of silver from silver nitrate solution is:
 - (1) 1 ampere
 - (2) 1 coulomb
 - (3) 1 faraday
 - (4) 2 ampere
- **77.** Heat of neutralisation of strong base and strong acid is 57.0 kJ. The heat released when 0.2 mole of HNO_3 solution is added to 0.5 mole of NaOH solution is:
 - (1) 57.0 kJ (2) 28.5 kJ (2) 24.0 LL (4) (4) 11.4 kJ
 - (3) 34.9 kJ (4) 11.4 kJ
- **78.** Fused NaCl on electrolysis giveson cathode:
 - (1) Chlorine (2) Sodium
 - (3) Sodium amalgam (4) Hydrogen
- **79.** For the reaction; $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$, at constant temperature, $\Delta H - \Delta U$ is: (1) 3RT (2) + RT
 - (3) RT (4) -3RT
- 80. The limiting molar conductivities Λ° for NaCl, KBr and KCl are 126, 152 and 150 S cm² mol⁻¹ respectively. The Λ° for NaBr is:
 - (1) $302 \text{ S cm}^2 \text{ mol}^{-1}$
 - (2) $176 \text{ S cm}^2 \text{ mol}^{-1}$
 - (3) $278 \text{ S cm}^2 \text{ mol}^{-1}$
 - (4) $128 \text{ S cm}^2 \text{ mol}^{-1}$
- **81.** Which of the following statements is incorrect as per IUPAC sign convention?
 - (1) The work done by the system on the surrounding is negative
 - (2) The work done by the surrounding on the system is positive
 - (3) The heat absorbed by the system from the surrounding is positive
 - (4) The heat absorbed by the surrounding from the system is positive
- **82.** What weight of copper will be deposited by passing 2 Faradays of electricity through a cupric salt? (Gram molecular mass of copper = 63.5 g)
- **83.** 3 moles of an ideal gas expands isothermally and reversibly from 2 litre to 20 litre at 27°C. The work done is:

(1)	−17.2 kJ	(2)	+17.2 kJ
(3)	+11.5 kJ	(4)	−11.5 kJ

- **84.** Which of the following solution will have highest specific conductance?
 - (1) 0.01 M CH₃COOH
 - (2) 0.01 M NH₄OH
 - (3) 0.01 M NaCl
 - (4) 0.01 M K₂SO₄
- **85.** Assertion: Energy can neither be created nor destroyed.

Reason: Total energy of the universe is constant.

- (1) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
- (2) Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion.
- (3) Assertion is correct but Reason is incorrect.
- (4) Assertion is incorrect but Reason is correct.

<u>SECTION – B</u>

86. What is S.I. unit of Resistivity?

(1)	$\Omega \mathrm{m}^2$	(2)	Ωm
(-/		(-)	

- (3) $\Omega \, \text{cm}$ (4) $\Omega \, \text{m}^{-1}$
- 87. Assume each reaction is carried out in an open container. For which reaction will $\Delta H = \Delta U$?
 - (1) $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$
 - (2) $C(s) + 2H_2O(g) \rightarrow 2H_2(g) + CO_2(g)$
 - (3) $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$
 - (4) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$
- **88.** In electrolysis:
 - (1) Positive ions move toward the positive electrode and negative ions towards the negative electrode.
 - (2) positive ions move towards negative electrode and negative ions towards the positive electrode.
 - (3) both ions move towards both the electrodes in equal amounts until they are balanced.
 - (4) none of the above
- **89.** The heat required to raise the temperature of a body by 1 K is called:
 - (1) specific heat
 - (2) heat capacity
 - (3) water equivalent
 - (4) none of these
- **90.** The reciprocal of resistivity of a conductor is:
 - (1) conductance
 - (2) capacitance
 - (3) conductivity
 - (4) none of these

- 91. $H_2(g) + Br_2(g) \rightarrow 2HBr(g); \Delta H^{\Theta} = -72.40 \text{ kJ}$ $\Delta G^{\Theta} = -106.49 \text{ kJ}, T = 298 \text{ K}$ The value of ΔS^{Θ} is:
 - (1) 114.3 JK^{-1}
 - (2) -114.3 JK^{-1}
 - (3) 1363.6 JK^{-1}
 - (4) None of these
- **92.** The molar conductances of NaCl, HCl and CH₃COONa at infinite dilution are 126.45, 426.16 and 91 ohm⁻¹ cm² mol⁻¹ respectively. The molar conductance of CH₃COOH at infinite dilution is:
 - (1) $698.28 \text{ ohm}^{-1} \text{ cm}^2 \text{mol}^{-1}$
 - (2) $540.48 \text{ ohm}^{-1} \text{ cm}^2 \text{mol}^{-1}$
 - (3) $201.28 \text{ ohm}^{-1} \text{ cm}^2 \text{mol}^{-1}$
 - (4) $390.71 \text{ ohm}^{-1} \text{ cm}^2 \text{mol}^{-1}$





The line representing isochoric process is:

- (1) OA (2) OB (4) OD
- (3) OC (4) OD
- **94.** Statement-I : Conductivity of an electrolytic solution decreases on dilution.

Statement-II : On dilution, number of ions per unit volume decreases.

- (1) Statement-I is true but statement II is false.
- (2) Statement-II is true but statement I is false.
- (3) Statement I and statement II both are false.
- (4) Statement I and Statement II both are true.
- **95. Statement I:** Combustion is an endothermic process.

Statement II: Combustion is always a non-spontaneous process.

- (1) Statement-I is true but statement II is false.
- (2) Statement-II is true but statement I is false.
- (3) Statement I and statement II both are false.
- (4) Statement I and Statement II both are true.
- **96.** Calculate the amount of heat required to raise the temperature of 13.5 g of aluminium from 300 K to 400 K, if specific heat of aluminium is $0.9 \text{ JK}^{-1} \text{ g}^{-1}$.

(1) 1215 J (2) 1512 J

(3) 3645 J (4) 4860 J

- **97.** For which of the following gas γ is equal to 1.40?
 - (1) Monoatomic
 - (2) Diatomic
 - (3) Triatomic
 - (4) Tetra-atomic
- **98.** In electrolysis, reduction takes place at:
 - (1) Anode
 - (2) Cathode
 - (3) The anode as well as cathode
 - (4) The surface of electrolyte solution

- **99.** In which reaction ΔS is positive:
 - (1) $H_2O_{(l)} \rightarrow H_2O_{(s)}$
 - (2) $3O_{2(g)} \rightarrow 2O_{3(g)}$
 - $(3) \quad H_2O_{(l)} \to H_2O_{(g)}$
 - $(4) \quad N_{2(g)}+3H_{2(g)} \rightarrow 2NH_{3(g)}$
- **100.** A solution of Ni(NO₃)₂ is electrolyzed between platinum electrodes using 6 Faraday electricity. How many moles of Ni will be deposited at the cathode?
 - (1) 6 (2) 3
 - (3) 4 (4) None of these

57. (**3**)

For the reaction $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$: $\Delta n_g = 2 - 1 = 1$ Hence, $\Delta H = \Delta U + \Delta n_g RT$ $\Delta H = \Delta U + 1RT$ $\Delta H > \Delta U$ (NCERT, Class 11^{th} – Page 143)

58. (4)

Size order of halide ions: $F^- < Cl^- < Br^- < I^-$

Hydration of an ion $\propto \frac{1}{\text{Size of ion}}$

Ionic mobility $\propto \frac{1}{\text{Hydration of ion}}$

Thus,

In aqueous medium ionic mobility order is: $F^- < Cl^- < Br^- < l^- \label{eq:F-state}$

59. (2)

Exchange of neither energy nor matter is possible in an isolated system. (NCERT, Class 11th – Page 137 – 138)

60. (1)

One Faraday is equal to 96500 Coulombs. (NCERT, Class 12th – Page 52)

61. (4)

From 1st law of thermodynamics; $\Delta U = q + w$ = +60 J + (-30 J) = + 60 J - 30 J = + 30 J(NCERT, Class 11th – Page 140)

62. (4)

The correct option is 4. ohm⁻¹. cm² (g – equivalent)⁻¹

63. (3)

Enthalpy : Extensive property Entropy : Extensive property Density : Intensive property Internal energy: Extensive property (NCERT, Class 11th – Page 144)

64. (1)

Electrolysis of water is the decomposition of water (H₂O) into oxygen (O₂) and hydrogen gas (H₂) due to an electric current being passed through the water. (NCERT, Class 12^{th} – Page 52 – 53)

65. (1)

Third law of thermodynamics states that "the entropy of any pure crystalline substance approaches zero at absolute zero temperature." (NCERT, Class 11^{th} – Page 161)

66. (1)

On dilution, number of ions per unit volume decreases, so specific conductance decreases. (NCERT, Class 12th – Page 43)

67. (2)

From the relation; $\Delta_r G = \Delta_r H - T \Delta_r S$ When $\Delta_r H < 0$ and $\Delta_r S > 0$, then $\Delta_r G$ will be negative. For a spontaneous reaction $\Delta_r G$ must be negative. (NCERT, Class 11th – Page 157 – 161)

68. (2)

Eelectrolytic cell converts electrical energy of a spontaneous reaction into chemical energy. (NCERT, Class 12th – Page 51)

69. (4)

By Mayer's formula, we have $C_p - C_v = R$ Where C_p and C_v are the moalr specific heats of gas at constant pressure and constant volume, respectively. (NCERT, Class 11th – Page 145)

70. (4)

HCl → strong electrolyte (Best conductor) CH₃COOH → weak electrolyte NH₃ → weak electrolyte C₆H₁₂O₆ → non-electrolyte (NCERT, Class 12th – Page 48 – 49)

71. (3)

 $\begin{aligned} & 2C (graphite) + 3H_2(g) \rightarrow C_2H_6(g) \\ & \Delta_r H^o = \Delta_f H^o \\ & (NCERT, Class \ 11^{th} - Page \ 149 - 150) \end{aligned}$

72. (4)

Metallic or electronic conductance depends on

- (a) Temperature
- (b) Nature of metal
- (c) Number of valence electrons per atom. (NCERT, Class 12^{th} Page 42)

73. (2)

$q + w = \Delta U$	State function
q	Path function
W	Path function
H - TS = G	State function
(NCERT, Class 11	th – Page 138)

74. (4)
Faraday's law of electrolysis is related to equivalent weight of electrolyte. (NCERT, Class 12th – Page 51 – 52)

75. (1)

Hess law deals with the heat changes in a chemical reaction. (NCERT, Class 11^{th} – Page 151 - 152)

76. (3)

Ag⁺ (aq) + e⁻ → Ag(s) 1 mol Ag i.e., 108 g Ag is deposited by 1 mole electrons. = 96500 C = 1 F (NCERT, Class 12^{th} - Page 51 - 52)

77. (4)

 $\begin{array}{l} HNO_3 + NaOH \rightarrow NaNO_3 + H_2O\\ 0.2 \mbox{ mol } 0.5 \mbox{ mol } \\ (Limiting reagent)\\ Heat released due to neutralisation\\ = 0.2 \times 57 = 11.4 \mbox{ kJ} \end{array}$

78. (2)

Fused NaCl means only NaCl undergoes electrolysis. So, it can be seen as NaCl \rightarrow Na⁺ + Cl⁻ So, we will obtain sodium on cathode and chlorine gas on anode. (NCERT, Class 12th – Page 52 – 53)

79. (4)

For the reaction; $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$, $\Delta n_g = 3 - 6 = -3$ Hence, $\Delta H = \Delta U + \Delta n_g RT$ $\Delta H = \Delta U + (-3) RT$ $\Delta H = \Delta U - 3RT$ $\Delta H - \Delta U = -3 RT$ (NCERT, Class 11th – Page 143)

80. (4)

Balanced reaction is: NaCl + KBr \rightarrow NaBr + KCl From Kohlrausch's law, $\Lambda^{\circ}_{m(NaBr)} = \Lambda^{\circ}_{m(NaCl)} + \Lambda^{\circ}_{m(KBr)} - \Lambda^{\circ}_{m(KCl)}$ = 126 + 152 - 150 = 278 - 150 = 128 S cm² mol⁻¹ (NCERT, Class 12th - Page 49 - 50)

81. (4)

If energy enters the system, its sign is positive. If energy leaves the system, its sign is negative. If work is done on the system, its sign is positive. If work is done by the system, its sign is negative. (NCERT, Class 11^{th} – Page 139 - 142)

82. (3)

1 mol electrons = 1 Faraday electricity $Cu^{2+} + 2e^- \rightarrow Cu$ Here, 2 F electricity gives Cu metal = 1 mol = 63.5 g (NCERT, Class 12th – Page 51 – 52)

83. (1)

$$w = -2.303 \text{ nRT} \log \left(\frac{V_2}{V_1}\right)$$
$$w = -2.303 \times 3 \times 8.314 \times 10^{-3} \times 300 \times \log$$
$$w = -17.2 \text{ kJ}$$

 $\left(\frac{20}{2}\right)$

(NCERT, Class 11th – Page 140 – 142)

84. (4)

 $K_{2}SO_{4} \rightarrow 2K^{+}_{(aq)} + SO_{4}^{2-}_{(aq)}$

 $K_2SO_4 \rightarrow$ strong electrolyte \rightarrow Highest specific conductance (NCERT, Class 12th – Page 43)

85. (1)

Universal laws: If the total energy of the universe is not constant, it must be created or destroyed. Hence, statement II is the correct explanation of statement-I.

86. (2)

S.I. unit of resistivity is ohm metre (Ω m). (NCERT, Class 12th – Page 41)

87. (1)

$$\begin{split} H_2(g) + Br_2(g) &\rightarrow 2HBr(g) \\ \Delta n_g &= 0 \\ \Delta H &= \Delta U \\ (\text{NCERT, Class 11th} - \text{Page 143}) \end{split}$$

88. (2)

As unlike charges attract each other and like charges repel each other.

Thus, in electrolysis, positive ions move towards the negative electrode, whereas negative ions move toward the positive electrode. Hence option 2 is correct.

(NCERT, Class 12th – Page 51)

89. (2)

The heat required to raise the temperature of a body by 1 K is called heat capacity. (NCERT, Class 11^{th} – Page 144 - 145)

90. (3)

Reciprocal of resistivity is defined as conductivity.

 $\therefore \quad \text{conductivity } \mathbf{k} = \frac{1}{\rho} \Omega^{-1} \mathbf{m}^{-1}$ (NCERT, Class 12th – Page 41)

91. (1)

 $\Delta G^{\Theta} = \Delta H^{\Theta} - T\Delta S^{\Theta}$ -106.49 kJ = -72.40 -298 × ΔS^{Θ} -34.09 kJ = -298 × ΔS^{Θ} $\Delta S^{\Theta} = \frac{34090 \text{ J}}{298} = 114.3 \text{ Jk}^{-1}$ (NCERT, Class 11th - Page 160 - 161)

92. (4)

$$\begin{split} \Lambda_{m}^{\circ} (CH_{3}COOH) &= \Lambda_{m}^{\circ} (CH_{3}COONa) + \Lambda_{m}^{\circ} (HCl) - \Lambda_{m}^{\circ} (NaCl) \\ &= (91 + 426.16) - 126.45 \\ &= 390.71 \text{ ohm}^{-1} \text{ cm}^{2} \text{mol}^{-1} \\ (NCERT, Class \ 12^{\text{th}} - \text{Page} \ 49 - 50) \end{split}$$

93. (4)

In an isochoric process, volume remains constant.

94. (4)

Statement I: Conductivity of an electrolytic solution decreases on dilution. (True)

Statement II: On dilution, number of ions per unit volume decreases. (True)

Statement II is the correct explanation of statement I

(NCERT, Class 12th – Page 43)

95. (3)

Statement I: Combustion is an endothermic process. (False)
Combustion reactions are always exothermic.
Statement II: Combustion is always a non-spontaneous process. (False)
Combustion is always spontaneous after the initiation.
(NCERT, Class 11th – Page 152 – 153)

96. (1)

 $q = ms\Delta T$ = 13.6 g × 0.9 JK⁻¹ g⁻¹ × 100 K = 1215 J (NCERT, Class 11th – Page 144 – 146)

97. (2)

$$\gamma = \frac{C_p}{C}$$

Monoatomic gas	1.66
Diatomic gas	1.40
Triatomic gas	1.33
Tetra-atomic gas	1.22

98. (2)

In electrolysis, oxidation takes place at cathode. (NCERT, Class 12th – Page 51)

99. (3)

$$\begin{split} \Delta n_{(g)} &> 0 \\ \Delta S = + \ ve \\ (NCERT, \ Class \ 11^{th} - Page \ 158 - 159) \end{split}$$

100. (2)

1 mole e⁻ = 1 F electricity Ni²⁺ + 2e⁻ → Ni \therefore 2F electricity gives Ni metal = 1 mol \therefore 6 F electricity will give Ni metal = 3 mol (NCERT, Class 12th – Page 51 – 52)