

NEET ANSWER KEY & SOLUTIONS

SUBJECT :- CHEMISTRY

CLASS :- 12th

PAPER CODE :- CWT-2

CHAPTER :- ELECTROCHEMISTRY

ANSWER KEY

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

SOLUTIONS

SECTION-A

1. (A)
Sol. In galvanic cell/electro chemical cell electrical energy is produced due to some chemical reaction.

2. (B)

3. (C)

Sol. KCl can make precipitate with AgNO_3 , $\text{Pb}(\text{NO}_3)_2$ so can't be used along these electrolyte.

4. (D)

Sol. E°_{OP} for $\text{Cr}^{2+} / \text{Cr}^{3+}$ is maximum +0.41 V and this Cr^{2+} will be easily oxidised to Cr^{3+} .

5. (A)

Sol. More -ve value of E° means larger reducing power.

6. (A)

Sol. E°_{OP} of K > E°_{OP} of Al.

7. (A)

Sol. $E^\circ_{\text{Fe}^{2+}/\text{Fe}} = -0.441 \text{ V}$
 $E^\circ_{\text{Fe}^{3+}/\text{Fe}} = -0.771 \text{ V}$
 $E^\circ_{\text{cell}} = E^\circ_{\text{OP}_{\text{Fe}/\text{Fe}^{2+}}} + E^\circ_{\text{RP}_{\text{Fe}^{3+}/\text{Fe}^{2+}}}$ (see redox change)
 $= +0.441 + 0.771 = 1.212 \text{ V}$

8. (A)

Sol. $E^\circ_{\text{cell}} = E^\circ_{\text{cell}} - \frac{2.303}{F} \frac{RT}{n} \log \left[\frac{[\text{Ni}]}{[\text{Ni}^{2+}]} \right]$
 $= -0.25 - \frac{0.06}{2} \log \left(\frac{1}{0.1} \right)$ ($\because n = 2$)
 $= -0.25 - 0.03 \times 1$
 $E_{\text{cell}} = -0.28 \text{ V}$

9. (C)

Sol. $E_{\text{cell}} = E^\circ_{\text{Pb}^{2+}/\text{Pb}} - E^\circ_{\text{Zn}^{2+}/\text{Zn}}$
 $= -0.12 - (-0.76)$
 $= +0.64 \text{ V}$
 $E_{\text{cell}} = E^\circ_{\text{cell}} - \frac{0.0591}{n} \log \frac{[\text{Zn}^{2+}]}{[\text{Pb}^{2+}]}$
 $= 0.64 - \frac{0.0591}{n} \log 0.1$
 $= 0.64 + 0.02955 = 0.667 \text{ V}$

10. (A)

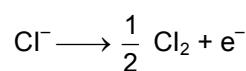
Sol. Net redox change is zero.

11. (C)

Sol. $\text{Zn} \longrightarrow \text{Zn}^{2+}_{(\text{C}_1)} + 2e^-$
 $\text{Zn}^{2+}_{(\text{C}_2)} + 2e^- \longrightarrow \text{Zn}$
 $\text{Zn}^{2+}_{(\text{C}_2)} \rightleftharpoons \text{Zn}^{2+}_{(\text{C}_1)}$
 $E = 0 - \frac{0.0591}{2} \log \frac{C_1}{C_2}$
 $E \rightarrow +ve$ When $C_1 < C_2$

12. (A)

Sol. Oxidation occurs at anode;



13. (C)

Sol. After decomposition of Cu^{2+} ions. H^+ ion will be discharged at cathode as its SRP is higher than of Fe^{2+} and Zn^{2+} .

14. (A)

15. (D)

Sol. Faraday's laws are independent of all other external factors and $W \propto Q$.

16. (D)
Sol. $8\text{H}^+ + 5\text{e}^- + \text{MnO}_4^- \longrightarrow \text{Mn}^{+2} + 4\text{H}_2\text{O}$
 (1 mole)
 5 mole $\text{e}^- = 5$ Faraday.

17. (C)
Sol. $\text{Ag}^+ + \text{e}^- \longrightarrow \text{Ag}$
 $\text{mole} = \frac{108}{108}$
 $= 1$ mole
 i.e. 1 faraday required

18. (A)
Sol. $\frac{W}{M} \times n = \frac{I \times t}{96500} ; \frac{0.838}{184} \times n$
 $= \frac{40 \times 60 \times 1.0}{96500}$
 $\Rightarrow n = 6.$

19. (A)
Sol. Eq. of Al = Eq. of Ag
 $\therefore \frac{W_{\text{Al}}}{9} = \frac{W_{\text{Ag}}}{108}$ or $\frac{W_{\text{Al}}}{W_{\text{Ag}}} = \frac{9}{108}$

20. (A)

21. (B)
Sol. Conductivity = Conductance \times Cell constant
 Hence, units of conductivity = $\text{ohm}^{-1} \times \text{cm}^{-1}$

22. (A)
Sol. $\Lambda^\infty_{\text{CH}_3\text{COOH}} = \lambda^\infty_{\text{H}^+} + \lambda^0_{\text{CH}_3\text{COO}^-}$
 $= (35 + 315) \text{ mho cm}^2 \text{ equ}^{-1}$
 $= 350 \text{ mho cm}^2 \text{ equ}^{-1}.$

23. (C)
Sol. $K_a = 25 \times 10^{-6}$ $\Lambda_{\text{eq}} = 19.6 \text{ Scm}^2 \text{ eq}^{-1}$, $C = 0.01$
 $K_a = 0.01 \times \alpha^2 \Rightarrow \alpha = \sqrt{\frac{25 \times 10^{-6}}{10^{-2}}} = 5 \times 10^{-2}$
 $\alpha = 5 \times 10^{-2} = \frac{19.6}{\Lambda_{\text{eq}}} \Rightarrow \Lambda_{\text{eq}}^\circ$
 $= \frac{19.6}{5 \times 10^{-2}} = 392 \text{ Scm}^2 \text{ eq}^{-1}.$

24. (D)
Sol. Salt bridge complete the electrical circuit and minimises the liquid - liquid junction potential.

25. (D)

26. (D)
Sol. The metal placed below in electrochemical series does not react with that metal salt solution which metal is placed above in series.

27. (C)
Sol. Lower S.R.P. containing ion can displace higher S.R.P. containing ion.

28. (A)
Sol. Lowest S.R.P., highest reducing power.

29. (D)
Sol. $\text{Fe}^{3+} + 3\text{e}^- \longrightarrow \text{Fe}$, -0.036 volt
 $\text{Fe} \longrightarrow \text{Fe}^{2+} + 2\text{e}^-$, 0.44 volt
 $\text{Fe}^{3+} + \text{e}^- \longrightarrow \text{Fe}^{2+}$
 $+ 3 \times 0.036f - 2 \times 0.44 \times f$
 $= -1 \times E^\circ \times f$
 $E^\circ = 0.772 \text{ Volt}$

30. (D)
Sol. For spontaneous reaction in every condition
 $E_{\text{cell}} > 0$, $\Delta G < 0$ and Q (reaction quotient) $< K$ (equilibrium constant).

31. (A)

32. (B)
Sol. $\text{H}_{2(p_1)} \longrightarrow 2\text{H}^+ + 2\text{e}^-$
 $2\text{H}^+ + 2\text{e}^- \longrightarrow \text{H}_{2(p_2)}$
 $\text{X}_{2(p_1)} \longrightarrow \text{X}_{2(p_2)}$

$$E = 0 - \frac{0.0591}{2} \log \frac{p_2}{p_1}$$

$P_2 < P_1$ for $E \rightarrow +ve$

33. (C)
Sol. $E = 0 - \frac{0.0591}{2} \log \frac{16}{4} = - \frac{0.0591}{2} \times 2$
 $\log 2 = -0.0591 \times 0.301$
 $= -0.0178 \text{ Volt}.$
 If connected in reverse direction, $E = 0.0178$ volt.

34. (D)
Sol. After removing cathode no net charge will flow but ions move randomly.

35. (C)
Sol. At anode $\text{Ag} \longrightarrow \text{Ag}^+ + \text{e}^-$
 At cathode $\text{Ag}^+ + \text{e}^- \longrightarrow \text{Ag}$
 So conc. of Ag^+ will remain same.

SECTION-B

36. (B)

Sol. Mole of Fe deposited = $\frac{1}{2} \times 3 = 1.5$ mole
 $W_{Fe} = 1.5 \times 56 = 84$ g.

37. (B)

Sol. $2H_2O + 2e^- \longrightarrow H_2 + 2OH^-$
 No. of Faraday passed = $\frac{9.65 \times 1000}{96500} = 0.1$ F
 n_{OH^-} formed = 0.1 mol
 $nNaOH = 0.1$ mol $\equiv 4$ g.

38. (C)

Sol. equivalence of $H_2 =$ equivalence of O_2
 $\frac{0.224}{22.4} \times 2 = \frac{\text{volume of } O_2}{22.4} \times 4$
 0.112 litre = volume of O_2 .

39. (C)

Sol. $\frac{0.55}{M} \times 3 = \frac{0.55 \times 100 \times 60}{96500}$
 $\Rightarrow M = 48.25$ g/mol

40. (B)

Sol. During the charging of a lead storage battery, the reaction at the anode and cathode are
 Anode : $PbSO_4 + 2e^- \longrightarrow Pb + SO_4^{2-}$
 Cathode : $PbSO_4 + 2H_2O \longrightarrow PbO_2 + 4H^+ + SO_4^{2-} + e^-$
 In both the reactions H_2SO_4 is regenerated.

41. (D)

42. (A)

Sol. For strong electrolyte
 $\Lambda_M^c = \Lambda_M^\infty - b\sqrt{C}$

43. (D)

Sol. $\Lambda_{m,BaSO_4} = (x_1 + x_2 - 2x_3)$
 $\Rightarrow \Lambda_{eq.,BaSO_4} = \frac{\Lambda_{eq.,BaSO_4}}{n\text{-factor}}$
 $\Lambda_{eq.,BaSO_4} = \frac{(x_1 + x_2 - 2x_3)}{2}$

44. (D)

Sol. $K_a = C\alpha^2 = 0.1 \times \left(\frac{7}{380.8}\right)^2 = 3.38 \times 10^{-5}$

45. (D)

46. (B)

Sol. At infinite dilution, when dissociation is complete, each ion makes a definite contribution towards molar conductivity of the electrolyte irrespective of the nature of the other ion with which it is associated.

Hence $\Lambda_{Al_2(SO_4)_3} = \Lambda_{Al^{3+}} + \Lambda_{SO_4^{2-}}$

47. (D)

Sol. EMF of a cell = Reduction potential of cathode – Reduction potential of anode
 = Reduction potential of cathode + Oxidation potential of anode
 = Oxidation potential of anode – Oxidation potential of cathode.

48. (B)

Sol. We know, $R \propto \frac{l}{A}$ or $R = \rho \left(\frac{l}{A}\right)$, where proportionality constant ρ is called resistivity. If $l = 1m$ and $A = 1m^2$, then $R = \rho$ i.e. Resistance = Resistivity.

49. (D)

Sol. The formation of Zn is not possible by placing Cu plate in $ZnSO_4$ solution because Zn is placed above Cu in electrochemical series. Therefore, both assertion and reason are false.

50. (C)

Sol. Assertion is true but reason is false. Ions of inert electrolytes are not involved in any electrochemical change until they react chemically with the electrolytes in the two half-cells.