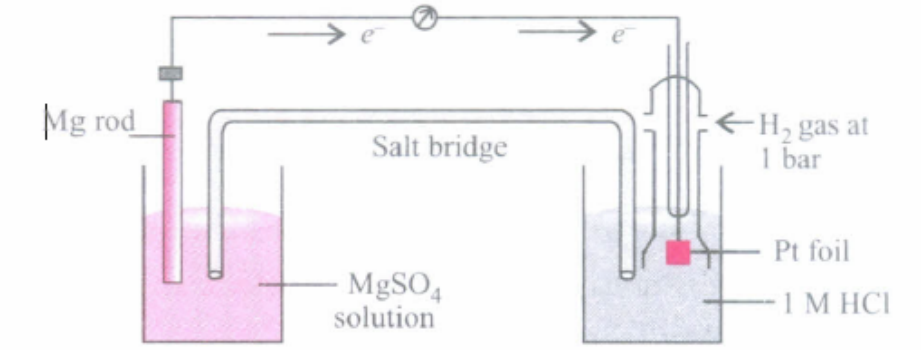
RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

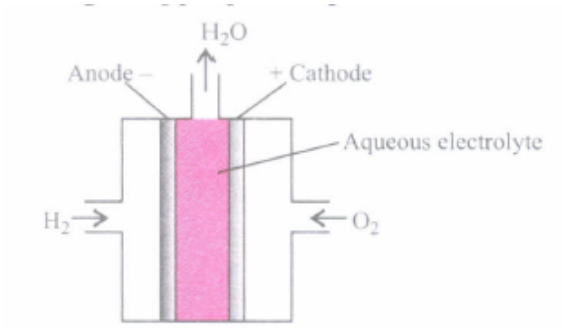
Time : 1 Mins **ELECTROCHEMISTRY 1** **Marks : 868**

1. The molar conductivity of a 0.5 mol/dm^3 solution of $AgNO_3$ with electrolytic conductivity of 5.76 X 10^{-3} S cm^{-1} at 298 K is :
   a) 2.88 S cm^2/mol b) 11.52 S cm^2/mol c) 0.086 S cm^2/mol d) 28.8 S cm^2/mol
2. A 5 current is passed through a solution of zinc sulphate for 40 min. The amount of zinc deposited at the cathode is :
   a) 40.65 g b) 0.4065 g c) 4.065 g d) 65.04 g
3. Units of the properties measured are given below. Which of the properties has not been matched correctly?
   a) Molar conductance = S m^2 mol^{-1} b) Cell Constant = ,m^{-1}
   c) Specific conductance = S m^2 d) Equivalent conductance = S m^2 (g eq)$^{-1}$
4. A cell is set up as shown in the figure. It is observed that EMF of the cell comes out to be 2.36 V. Which of the given statements is not correct about the cell?



   a) Reduction takes place at magnesium electrode and oxidation at SHE.
   b) Oxidation takes place at magnesium electrode and reduction at SHE.
   c) Standard electrode potential for Mg^{2+} / Mg will be -2.36 V.
   d) Electrons flow from magnesium electrode to hydrogen electrode.
5. Given below are few reactions with some expressions. Mark the expression which is not correctly matched.
   For concentration cell, $Ag|Ag^+(C_1)||Ag^+(C_2)|Ag$;
   a) $E_{cell} = \frac{0.0591}{1} log \frac{C_1}{C_2}$
   For the cell, $2Ag^+ + H_2$ (l atm) $\rightarrow$ $2Ag + 2H^+$ (1 M) ;
   b) $E_{cell} = \frac{0.0591}{1} log \frac{\left[Ag^+\right]^2}{\left[H^+\right]^2}$
   For an electrochemical reaction, at equilibrium
   $aA + bB \overset{ne^-}{\rightleftharpoons} cC + dD$;
   c) $E_{cell} = \frac{0.0591}{1} log \frac{[C]^c[D]^d}{[A]^a[B]^b}$
   For the cell, $M^{n+}_{(aq)} + ne^- \rightarrow M_{(s)}$;
   d) $E = E^0 - \frac{0.0591}{1} log \frac{1}{\left[M^{n+}\right]}$

6. For the galvanic cell, $Cu|Cu^{2+}||Ag^{+}|Ag$. Which of the following observations is not correct?
   a) Cu acts as anode and Ag acts as cathode.
   b) Ag electrode loses mass and Cu electrode gains mass.
   c) Reaction at anode, $Cu \rightarrow Cu^{2+} + 2e^{-}$ d) Copper is more reactive than silver.
7. Following reactions are taking place in a Galvanic cell,
   $Zn \rightarrow Zn^{2+} + 2e^{-}$; $Ag^{+} + e^{-} \rightarrow Ag$
   Which of the given representations is the correct method of depicting the cell?
   a) $Zn_{(s)}|Zn^{2+}_{(aq)}||Ag^{+}_{(aq)}|Ag_{(s)}$ b) Zn^{2+} I Zn II Ag I Ag^{+} c) $Zn_{(aq)}$ I $Zn^{2+}_{(s)}$II $Ag^{+}_{(s)}$ I $Ag_{(aq)}$
   d) $Zn_{(s)}$ I $Ag^{+}_{(aq)}$ II $Zn^{2+}_{(aq)}$ I $Ag_{(s)}$
8. Study the given cell carefully and fill in the blanks by choosing an appropriate option.



   In the given cell, hydrogen and oxygen are bubbled through porous $\underset{(i)}{_____}$electrodes into concentrated aqueous $\underset{(ii)}{_____}$solution. Catalysts like finely divided $\underset{(iii)}{_____}$or $\underset{(iv)}{_____}$metal are incorporated into the electrodes for increasing the rate of electrode reactions.

   a)

(i)	(ii)	(iii)	(iv)
hydrogen	potassium hydroxide	palladium	platinum

   b)

(i)	(ii)	(iii)	(iv)
oxygen	hydrogen chloride	manganese	iron

   c)

(i)	(ii)	(iii)	(iv)
carbon	sodium hydroxide	platinum	palladium

   d)

(i)	(ii)	(iii)	(iv)
graphite	sodium chloride	nickel	platinum

9. Use the data of and find out the most stable oxidised species.
   a) Cr^{3+} b) MnO_4^- c) $Cr_2O_7^{2-}$ d) Mn^{2+}
10. If $E^\circ Fe^{2+}/Fe = -0.441\ V$ and $E^\circ Fe^{3+}/Fe^{2+} = 0.771\ V$ the standard EMF of the reaction $Fe + 2Fe^{3+} \rightarrow 3Fe^{3+}$ will be
    a) 1.653V b) 1.212V c) 0.111V d) 0.330V
11. How much metal will be deposited when a current of 12 ampere with 75% efficiency is passed through the cell for 3 h? (Given: $Z = 4 \times 10^{-4}$)
    a) 32.4 g b) 38.8 g c) 36.0 g d) 22.4 g
12. **Assertion :** In electrolysis of aqueous NaCl the product obtained is H_2 gas.
    Reason: Gases are liberated faster than the metals.

a) If assertion is true but reason is false. b) If both assertion and reason are false.
c) If both assertion and reason are true and reason is the correct explanation of assertion.
d)
If both assertion and reason are true but reason is not the correct explanation of assertion.

13. **Assertion:** The conductivity of electrolytic solutions increases with increase of temperature.
Reason : Electronic conductance decreases with increase of temperature.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

14. E^o for the cell, $Zn\left|Zn^{2+}(ag)\right|\left|Cu^{2+}(ag)\right|Cu$ is 1.10 V at 25°C. The equilibrium constant for the reaction,
$Zn(s) + Cu^{2+}(aq) \rightleftharpoons Cu(s) + Zn^{2+}(aq)$ is of the order
a) 10^{-37} b) 10^{-28} c) 10^{18} d) 10^{17}

15. E^0 values for the half cell reactions are given below :
$Cu^{2+} + e^- \rightarrow Cu^+$; $E^0 = 0.15$ V
$Cu^{2+} + 2e^- \rightarrow Cu$; $E^0 = 0.34$ V
What will be the E^0 of the half -cell : $Cu^+ + e^- \rightarrow Cu$?
a) +0.49 V b) +0.19 V c) +0.53 V d) +0.30 V

16. During the electrolysis of molten sodium chloride, the time required to produce 0.10 mol of chlorine gas using a current of 3 amperes is :
a) 55 minutes b) 110 minutes c) 220 minutes d) 330 minutes

17. The e.m.f. of a Daniell cell at 298K is E1

$$Zn\left|\begin{matrix} ZnSO_4 & CuSO_4 \\ (0.01M) & (1.0M) \end{matrix}\right|Cu$$

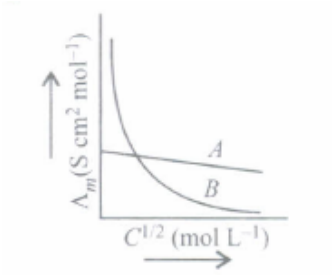
When the concentration of $ZnSO_4$ is 1.0M and that of $CuSO_4$ is 0.01 M, the e.m.f. changed to E_2. What is the relationship between E_1 and E_2?
a) $E_2 = 0 \neq E_1$ b) $E_1 > E_2$ c) $E_1 < E_2$ d) $E_1 = E_2$

18. The correct Nernst equation for the given cell $Pt_{(s)}$ I $Br_{2(l)}$ I Br^- (M) II H^+ (M) I $H_{2(g)}$ (1 bar) I $Pt_{(s)}$

a) $E_{cell} = E^0_{cell} - \frac{0.0591}{2} log \frac{\left[Br_{2(l)}\right]\left[H_2\right]}{\left[H^+\right]^2\left[Br^-\right]^2}$ b) $E_{cell} = E^0_{cell} - \frac{0.0591}{2} log \frac{\left[H^+\right]^2\left[Br^-\right]^2}{\left[Br_{2(l)}\right]\left[H_2\right]}$

c) $E_{cell} = E^0_{cell} - \frac{0.0591}{2} log \frac{\left[H^+\right]^2\left[H_2\right]}{\left[Br_{2(l)}\right]\left[Br^-\right]^2}$ d) $E_{cell} = E^0_{cell} - \frac{0.0591}{2} log \frac{\left[Br_{2(l)}\right]\left[Br^-\right]^2}{\left[H^+\right]^2\left[H_2\right]}$

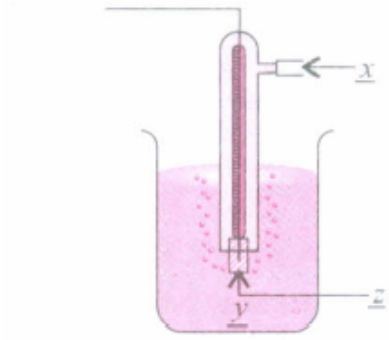
19. Mark the correct choice of electrolytes represented in the graph



a) A → NH_4OH, B → NaCl b) A → NH_4OH, B → NH_4Cl
c) A → CH_3COOH, B → CH_3COONa d) A → KCl, B → NH_4OH

20. The equivalent conductance of M/32 solution of a weak monobasic acid is 8.0 mho cm^2 and at infinite dilution is 400 mho cm^2. The dissociation constant of this acid is:
a) 1.25×10^{-6} b) 6.25×10^{-4} c) 1.25×10^{-4} d) 1.25×10^{-5}

21. Observe the given diagram and fill in the blanks by choosing the correct option.



a)

x	y	z
$H_{2(g)}$ at 1 atm	$10^{-2}MH^+$	Finely divided Pt

b)

x	y	z
$H_{2(g)}$ at 1 bar	$1.00MH^+$	Finely divided Pt

c)

x	y	z
$1.00M\ H^+$	$H_{2(g)}$ at 1 bar	Finely divided Ni

d)

x	y	z
$H_{2(g)}$ at 1 bar	$1.00M\ H^+$	Pt granules

22. $Cu^+_{(aq)}$ is unstable in solution and undergoes simultaneous oxidation and reduction according to the reaction :
$2Cu^+_{(aq)} \rightleftharpoons Cu^{2+}_{(aq)} + Cu_{(s)}$
Choose the correct E^0 for above reaction if E^0cu^{2+}/cu = 0.34 V and E^0cu^{2+}/cu^+= 0.15 V
a) - 0.38 V b) - 0.49 V c) 0.38 V d) - 0.19 V

23. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at one atm pressure. The oxidation potential of electrode would be?
a) 0.59 V b) 0.118 V c) 1.18 V d) 0.059 V

24. Molar conductivity of 0.15 M solution of KCl at 298 K, if its conductivity is 0.0152 S cm^{-1} will be
a) 124 Ω^{-1} cm^2 mol^{-1} b) 204 Ω^{-1} cm^2 mol^{-1} c) 101 Ω^{-1} cm^2 mol^{-1} d) 300 Ω^{-1} cm^2 mol^{-1}

25. Reduction potential for the following half-cell reactions are :
$Zn \longrightarrow Zn^{2+} + 2e^-$, ($E^0$ = - 0.76 V)
$Fe \longrightarrow Fe^{2+} + 2e^-$, ($E^0_{Fe2+/Fe}$ = -0,44 V) The EMF for the cell reaction :
a) + 0.32 V b) - 0.32 V c) + 1.20 V d) -1.20 V

26. Limiting molar conductivity of NH_4OH (i.e., Åm (NH_4OH) is equal to :

a) Å $_{m(NH_4Cl)}$ + Å $_{m(NaCl)}$ - Å $_{m(NaOH)}$ b) Å $_{m(NaOH)}$ + Å $_{m(NaCl)}$ - Å $_{m(NH_4Cl)}$

c) Å $_{m(NH_4OH)}$ + Å $_{m(NH_4Cl)}$ - Å $_{m(HCl)}$ d) Å $_{m(NH_4Cl)}$ + Å $_{m(NaOH)}$ - Å $_{m(NaCl)}$

27. Galvanic cell has electrical potential of 1.1 V. If an opposing potential of 1.1 V is applied to this cell, what will happen to the cell reaction and current flowing through the cell?
    a) The reaction stops and no current flows through the cell
    b) The reaction continuous but current flows in opposite direction.
    c) The concentration of reactants becomes unity and current flows from cathode to anode.
    d) The cell does not function as a galvanic cell and zinc is deposited on zinc plate

28. **Assertion:** Lithium has the lowest electrode potential.
    Reason : Lithium ion is the strongest oxidising agent.
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.

29. The position of some metals in the electrochemical series in decreasing electropositive character is given as Mg > Al > Zn > Cu > Ag. What will happen if a copper spoon is used to stir a solution of aluminium nitrate?
    a) The spoon will get coated with aluminium.
    b) An alloy of copper and aluminium is formed. c) The solution becomes blue.
    d) There is no reaction.

30. If the E^0_{cell} for a given reaction has a negative value, which of the following gives the correct relationships for the values of ΔG^0 and K_{eq}?
    a) $\Delta G^0 > 0$, $K_{eq} < 1$ b) $\Delta G^0 > 0$, $K_{eq} > 1$ c) $\Delta G^0 < 0$, $K_{eq} > 1$ d) $\Delta G^0 < 0$, $K_{eq} < 1$

31. Two solutions of X and Y electrolytes are taken in two beakers and diluted by adding 500 mL of water. A_m of X increases by 1.5 times while that of Y increases by 20 times, what could be the electrolytes X and Y?
    a) X → NaCl, Y → KCl b) X → NaCl, Y → CH3COOH c) X → KOH, Y → NaOH
    d) X → CH3COOH, Y → NaCl

32. In the cell, $Zn|Zn^{2+}||Cu^{2+}|$ Cu, the negative terminal is
    a) Cu b) Cu^{2+} c) Zn d) Zn^{2+}

33. The number of faradays (F) required to produced 20g of calcium from molten $CaCl_2$ (Atomic Mass of Ca = 40g mol^{-1}) is
    a) 4 b) 1 c) 2 d) 3

34. Limiting molar conductivity of NaBr is:
    a) Λ^0_mNaBr = Λ^0_mNaCl + Λ^0_mKBr b) Λ^0_mNaBr = Λ^0_mNaCl + Λ^0_mKBr - Λ^0_mKCl
    c) Λ^0_mNaBr = Λ^0_mNaOH + Λ^0_mNaBr Λ^0_mNaCl d) Λ^0_mNaBr = Λ^0_mNaCl - Λ^0_mNaBr

35. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at 1 atm pressure. The oxidation potential of electrode would be :
    a) 0.118 V b) 1.18 V c) 0.059 V d) 0.59 V

36. Which of the following expressions correctly represents the equivalent conductance at infinite dilution of $Al_2(SO_4)_3$. Given that $\overset{\circ}{\Lambda}Al^{3+}$ and $\Lambda_{SO_4^{2-}}$ are the equivalent conductances at infinite dilution of the respective ions?

a) $\frac{1}{3}\Lambda Al^{3+} + \frac{1}{3}\Lambda SO_4^2$ b) $2\Lambda Al^{3+} + 3\Lambda SO_4^{2-}$ c) $\overset{0}{\Lambda}Al^{3+} + \Lambda SO_4^{2-}$

d) $\left(\overset{o}{\Lambda}Al^{3+} + \Lambda SO_4^{2-} \right) > 6$

37. The weight of silver (atomic weight = 108), displaced by a quantity of electricity which displaces 5600 mL of O_2 at STP will be :
a) 5.4 g b) 10.8 g c) 54.0 g d) 108.0 g

38. Choose the option with correct words to fill in the blanks.
According to preferential discharge theory, out of number of ions the one which requires _____ energy will be liberated _____at a given electrode.
a) least, first b) least, last c) highest, first d) highest, last

39. In a Daniell cell,
a) the chemical energy liberated during the redox reaction is converted to electrical energy
b) the electrical energy of the cell is converted to chemical energy
c) the energy of the cell is utilised in conduction of the redox reaction
d) the potential energy of the cell is converted into electrical energy.

40. If a current of 1.5 ampere flows through a metallic wire for 3 hours, then how many electrons would flow through the wire?
a) 2.25×10^{22} electrons b) 1.13×10^{23} electrons c) 1.01×10^{23} electrons
d) 4.5×10^{23} electrons

41. Equivalent conductance of NaCl, HCl and C_2H_5COONa at infinite dilution are 126.45, 426.16 and 91 Ω^{-1} cm^2, respectively. The equivalent conductance of C_2H_5COOH is :
a) 201.28 Ω^{-1} cm^2 b) 390.71 Ω^{-1} cm^2 c) 698.28 Ω^{-1} cm^2 d) 540.48 Ω^{-1} cm^2

42. How much electricity in terms of Faraday is required to produce 100 g of Ca from molten $CaCl_2$?
a) 1 F b) 2 F c) 3 F d) 5 F

43. Which of the following statements is correct?
a) E_{cell} and D_rG of cell reaction both are extensive properties.
b) E_{cell} and D_rG of cell reaction both are intensive properties.
c) E_{cell} is an intensive property while D_rG of cell reaction is an extensive property.
d) E_{cell} is an extensive property while D_rG of cell reaction is an intensive property.

44. The standard reduction potential for Cu^{2+}/Cu is +0.34 V What will be the reduction potential at pH = 14? [Given: K_{sp} of $Cu(OH)_2$ is 1.0×10^{-19}]
a) 2.2 V b) 3.4 V c) -0.22 V d) -2.2 V

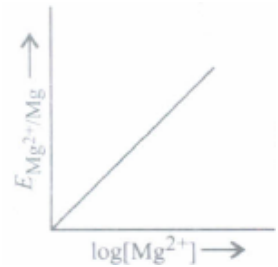
45. Limiting molar conductivity for some ions is given below (in S cm2 mol ") :
Na^+ - 50.1, Cl^- 76.3, H^+ - 349.6, CH_3COO^- - 40.9, Ca^{2+} - 119.0.
What will be the limiting molar conductivities of $CaCl_2$, CH_3COONa and NaCl respectively?

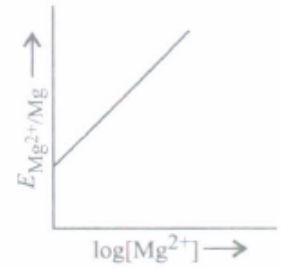
a) 97.65, 111.0 and 242.8 S cm^2 mol^{-1} b) 195.3,182.0 and 26.2 S cm^2 mol^{-1}
c) 271.6,91.0 and 126.4 S cm^2 mol^{-1} d) 119.0, 1024.5 and 9.2 S cm^2 mol^{-1}

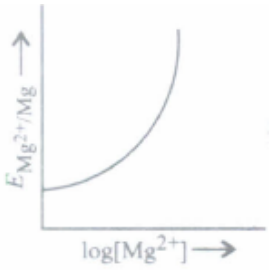
46. Electrode potential for Mg electrode varies according to the equation

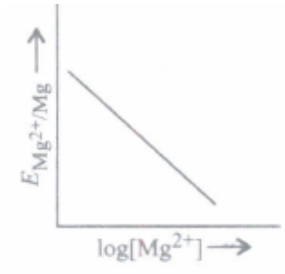
$$E_{Mg^{2+}|Mg} = E^{o}_{Mg^{2+}|Mg} - \frac{0.059}{2}\log\frac{1}{[Mg^{2+}]}$$

The graph of $E_{Mg^{2+}|Mg} vs \log[Mg^{2+}] is$

a) 

b) 

c) 

d) 

47. Without losing its concentration $ZnCl_2$ solution cannot be kept in contact with
a) Au b) Al c) pb d) Ag

48. The EMF of a cell corresponding to the reaction;
$Zn_{(s)} + 2H^+_{(aq)} \rightarrow Zn^{2+}$ (0.1M) $+H_{2(g)}$(1atm) is 0.28 volt at 15^0C
The pH of the solution at the hydrogen electrode is
(Given $E^0_{Zn^{2+}/Zn} = -0.76$ volt; $E^0_{H^+/H_2}$ = 0 volt)
a) 7.05 b) 8.62 c) 8.75 d) 9.57

49. Which of the following statements is not correct about an inert electrode in a cell?
a) It does not participate in the cell reaction.
b) It provides surface either for oxidation or for reduction reaction.
c) It provides surface for conduction of electrons. d) It provides surface for redox reaction.

50. NaCl, $MgCl_2$ and $CaSO_4$ are known as
The variation in A_m with concentration for a strong electrolyte can be represented by the equation,

$$A_m = A^0_m - AC^{1/2}$$

The value of constant A for a given solvent and temperature depends upon the type of electrolyte i.e., cations and anions produced on dissociation of electrolyte in the solution.
a) 1 - 1, 2 - 1, and 2 - 2 type electrolytes respectively
b) strong, weak and strong electrolytes respectively c) electrolytes with different value of A
d) electrolytes with same molar conductivity.

51. **Assertion :** In electrolysis, the quantity of electricity needed for depositing 1 mole of silver is different from that required for 1 mole of copper.
Reason: The molecular weights of silver and copper are different.

a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

52. For the reaction, $Cu^{2+} + 2e^- \rightarrow Cu$; log[$Cu^{2+}$] vs E graph is of type as shown in figure where OA = 0.34 V, the electrode potential of the half-cell of
Cu|Cu^{2+}(0.1 M) will be
a) $-0.34 + \frac{0.0591}{2} V$ b) 0.34 + 0.0591 V c) 0.34 V d) none of these

53. Use the data given in and find out which of the following is the strongest oxidising agent.
$E^0_{Cr_2^{2-}/Cr^{3+}} = 1.33V; E^0_{Cl2/Cl^-} = 1.36V$
$E^0_{MnO_4^-/Mn^{2+}} = 1.51V; E^0_{Cr^{3+}/cr} = -0.74V$
a) Cl^- b) Mn^{2+} c) MnO_4^- d) Cr^{3+}

54. **Assertion:** The electrical resistance of any object decreases with increase in its length.
Reason: Electrical resistance of any object increases with increase in its area of cross-section.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

55. While charging the lead storage battery_____.
a) $PbSO_4$ anode is reduced to Pb b) $PbSO_4$ cathode is reduced to Pb
c) $PbSO_4$ cathode is oxidised to Pb d) $PbSO_4$ anode is oxidised to PbO_2

56. Assertion: EMF of the cell is the potential difference between the electrode potentials of the cathode and anode when no current is drawn through the cell.
Reason : Anode is kept on the right side and cathode on the left side while representing the galvanic cell.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

57. Match the column I with column II and mark the appropriate choice.

	Column - I		**Column - II**
(A)	Electrochemical equivalent	(i)	Potential difference x Quantity of charge
(B)	Faraday	(ii)	Mass of substance deposited by one coulomb of charge
(C)	Ampere	(iii)	Charge carried by one mole of electrons
(D)	Electrical energy	(iv)	One coulomb of electric charge passed through one second

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
b) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
c) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

58. In a cell reaction, $Cu_{(s)} + Ag^{+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + 2Ag_{(s)}$ E^{0}_{cell} = +0.46 V. If the concentration of Cu^{2+} ions is doubled then E^{0}_{cell} will be:
a) doubled b) halved c) increased by four times d) unchanged

59. The specific conductance of a saturated solution of AgCl at 25°C is 1.821 x 10^{-5} mho cm^{-1} . What is the solubility of AgCl in water (in g L^{-1}), if limiting molar conductivity of AgCl is 130.26 mho cm^2 mol^{-1}?
a) 1.89 x 10^{-3} g L^{-1} b) 2.78 x 10^{-2} g L^{-1} c) 2.004 x 10^{-2} g L^{-1} d) 1.43 x 10^{-3} g L^{-1}

60. In electrolysis of NaCl when Pt electrode is taken then H_2 is liberated at cathode while with Hg cathode it forms sodium amalgam. This is because:
a) Hg is more inert than Pt b) More voltage is required to reduce H^+ at Hg than at Pt
c) Na is dissolved in Hg while it does not dissolved in Pt
d) Conc. of H^+ ions is larger when Pt electrode is taken

61. The quantity of charge required to obtain one mole of aluminium from Al_2O_3 is_____
a) 1 F b) 6 F c) 3 F d) 2 F

62. The efficiency of a fuel cell is given by :
a) ΔG/ΔS b) ΔG/ΔH c) ΔS/ΔG d) ΔH/ΔG

63. Molar conductivities $\left(\Lambda_m\right)$ at infinite dilution of NaCl, HCl and CH_3COONa are 126.4, 425.9 and 91.0 S cm^2 mol^{-1} respectively. $\overset{\circ}{\Lambda}_m$ for CH_3COOH will be:
a) 425.5 S cm^2 mol^{-1} b) 180.5 S cm^2 mol^{-1} c) 290.8 S cm^2 mol^{-1} d) 390.5 S cm^2 mol^{-1}

64. Reduction potential for the following half-cell reactions are
$Zn \rightarrow Zn^{2+} + 2e^-$
$\left(E^{\circ}_{Zn^{2+}/Zn} = -0.76\ V\right)$
$Fe \rightarrow Fe^{2+} + 2e^-, \left(E^{\circ}Fe^{2+}/Fe = -0.44\ V\right)$
The EMF for the cell reaction,
$Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$ will be
a) +0.32 V b) -0.32 V c) +1.20 V d) -1.20 V

65. The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called _____.
a) cell potential b) cell emf c) potential difference d) cell voltage

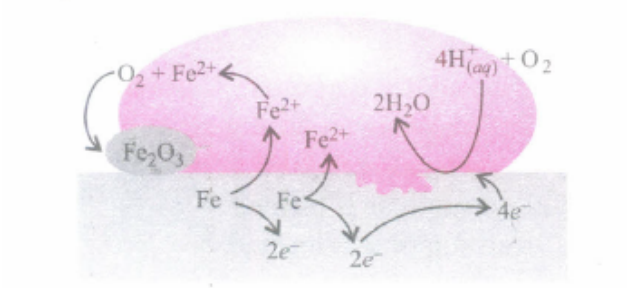
66. An electrochemical cell is shown below Pt, H_2 (1 atm) HCl (0.1)ml CH_3COH (0.1 m)1 H_2(1 atm), ft. The EMF of the cell will not be zero, because:
a) EMF depends on molanties of acids used
b) pH of 0.1 m HCl and 0.1 m CH_3COOH is not same c) the temperature is constant
d) acids used in two compartments are diflerent

67. The equivalent conductance of Ba^{2+} and Cl^- are 127 and 76 Ω^{-1} cm^{-1} eq^{-1} respectively at infinite dilution. The equivalent conductance of $BaCl_2$ at infinite dilution will be:
a) 139.52 b) 203 c) 279 d) 101.5

68. On the basis of the following E^0 values, the strongest oxidising agent is :
$[Fe(CN)_6]^{4-} \longrightarrow [Fe(CN)_6]^{3-} + e^-$, $E^0 = -0.35$ V
$Fe^{2+} \longrightarrow Fe^{3+} + e^-$, $E^0 = -0.77$ V
a) $[Fe(CN)_6]^{4+}$ b) Fe^{2+} c) Fe^{3+} d) $[Fe(CN)_6]^{3-}$

69. An increase in equivalent conductance of a strong electrolyte with dilution is mainly due to :
a) increase in ionic mobility of ions b) 100% ionisation of electrolye at normal dilution
c) increase in both i.e. number of ions and ionic mobility of ions
d) increase in number of ions

70. The given figure shows the corrosion of iron in atmosphere



Fill in the blanks by choosing an appropriate option.
At a particular spot of an object made of iron, $\underset{(i)}{\_\_\_\_\_}$ of iron to ferrous ion takes place and that spot behaves as $\underset{(ii)}{\_\_\_\_\_}$. Electrons released at anodic spot move through the metal and go to another spot on the metal and reduce oxygen in presence of H+. This spot behaves as $\underset{(iii)}{\_\_\_\_\_}$. The ferrous ions are further oxidised by atmospheric oxygen to ferric ions which come out as rust, $\underset{(iv)}{_____}$and with further production of $\underset{(v)}{\_\_\_\_\_}$ ions.

a)

(i)	(ii)	(iii)	(iv)	(v)
oxidation	anode	cathode	$Fe_2O_3.xH_2O$	hydrogen

b)

(i)	(ii)	(iii)	(iv)	(v)
reduction	cathode	anode	Fe_3O_4	hydroxide

c)

(i)	(ii)	(iii)	(iv)	(v)
oxidation	cathode	anode	$Fe_2O_3.xH_2O$	hydrogen

d)

(i)	(ii)	(iii)	(iv)	(v)
oxidation	anode	cathode	$Fe_2O_3.H_2O$	ferrous

71. For the cell reaction,

$$Cu^{2+}\left(C_1, aq\right) + Zn(s) \rightleftharpoons Zn^{2+}\left(C_2, aq\right) + Cu(s)$$

of an electrochemical cell, the change in free energy (G) at a given temperature is a function of
a) $\ln(C_1)$ b) $\ln(C_2/C_1)$ c) $\ln(C_2)$ d) $\ln(C_2+C_1)$

72. A current of 1.40 ampere is passed through 500 mL of 0.150 M solution of zinc sulphate for 200 seconds. What will be the molarity of Zn^{2+} ions after deposition of zinc?
a) 0.154 M b) 0.177 M c) 2 M d) 0.180 M

73. Standard electron potential of three metals X, Y and Z are -1.2 V + 0.5 V and -3.0 V respectively. The reducing power of these metals will be :
a) Y > X > Z b) Z > X > Y c) X > Y > Z d) Y > Z > X

74. A standard hydrogen electrode has a zero potential because

a) hydrogen can be most easily oxidised b) hydrogen has only one electron
c) the electrode potential is assumed to be zero d) hydrogen is the lightest element.

75. Same amount of electric current is passed through the solutions of $AgNO_3$ and HC!. If LOS g of silver is obtained from $AgNO_3$ solution, the amount of hydrogen liberated at STP will be
a) 1.008 g b) 11.2 g c) 0.01 g d) 1.1 g

76. Standard electrode potential for Sn^{4+}/Sn^{2+} couple is +0.15 V and that for the Cr^{3+}/Cr couple is - 0.74. These two couples in their standard state are connected to make a cell. The cell potential will be :
a) + 0.89 V b) + 0.18 V c) + 1.83 V d) + 1.199 V

77. A button cell used in watches functions as following
$Zn_{(s)} + Ag_2O_{(s)} + H_2O_{(l)} \rightleftharpoons 2\,Ag_{(s)} + Zn^{2+}_{(aq)} + 20H^-_{(aq)}$
If half-cell potentials are :
$Zn^{2+}_{(aq)} + 2e^- \longrightarrow Zn_{(s)}$, $E^0 = -0.76$ V
$Ag_2O_{(s)} + H_2O_{(l)} + 2e^- \longrightarrow 2Ag_{(s)} + 2OH^-_{(aq)}$, $E^0 = 0.34$ V
The cell potential will be :
a) 1.10 V b) 0.42 V c) 0.84 V d) 1.34 V

78. Which of the following is not an application of electrochemical series?
a) To compare the relative oxidising and reducing power of substances.
b) To predict evolution of hydrogen gas on reaction of metal with acid.
c) To predict spontaneity of a redox reaction
d) To calculate the amount of metal deposited on cathode.

79. The amount of chlorine evolved by passing 2 A of current in an aqueous solution of NaCl for 30 minutes is:
a) 2.64 g b) 1.32 g c) 3.62 g d) 4.22 g

80. The cell constant of a conductivity cell_____
a) changes with change of electrolyte
b) changes with change of concentration of electrolyte
c) changes with temperature of electrolyte d) remains constant for a cell

81. An electric charge of 5 Faradays is passed through three electrolytes $AgNO_3$, $CuSO_4$ and $FeCl_3$ solution. The grams of each metal liberated at cathode will be:
a) Ag = 10.8 g, Cu = 12.7 g, Fe = l.11 g b) Ag = 540 g, Cu = 367.5 g, Fe = 325 g
c) Ag = 108 g, Cu = 63.5 g, Fe = 56 g d) Ag = 540 g, Cu = 158.8 g, Fe = 93.3 g

82. 4.5 g of aluminium (atomic mass 27u) is deposited at cathode from Al^{3+} solutions by a certain quantity of electric charge. The volume of hydrogen produced at STP from H^+ ions in solution by the same quantity of electric charge will be :
a) 44.8 L b) 22.4 L c) 11.2 L d) 5.6 L

83. What would be the equivalent conductivity of a cell in which 0.5 N salt solution offers a resistance of 40 ohm whose electrodes are 2 em apart and 5 cm^2 in area?
a) 10 $ohm^{-1}\ cm^{-2}\ eq^{-1}$ b) 20 $ohm^{-1}\ cm^{-2}\ eq^{-1}$ c) 30 $ohm^{-1}\ cm^{-2}\ eq^{-1}$
d) 25 $ohm^{-1}\ cm^{-2}\ eq^{-1}$

84. At 25^0C molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 $\Omega^{-1}\ cm^2\ mol^{-1}$ and at infinite dilution, its molar conductance is 238 $\Omega^{-1}\ cm^2\ mol^{-1}$. The degree of ionisation of ammonium hydroxide at the same concentration and temperature is :

a) 2.080 % b) 20.800 % c) 4.008 % d) 40.800 %

85. When water is added to an aqueous solution of an electrolyte, what is the change in specific conductivity of the electrolyte?
    a) Conductivity decreases b) Conductivity increases c) Conductivity remains same
    d) Conductivity does not depend on number of ions.

86. For the cell reaction $2Cu^{+}_{(aq)} \rightarrow Cu_{(s)} + Cu^{2+}_{(aq)}$ the standard cell potential is 0.36 V The equilibrium constant for the reaction is
    a) 1.2×10^6 b) 7.4×10^{12} c) 2.4×10^6 d) 5.5×10^8

87. The weight of silver (at wt = 108) displaced by a quantity of electricity which displaces 5600 mL of O_2, at STP will be:
    a) 5.4 g b) 10.8 g c) 54.9g d) 108.0 g

88. Ionic mobility of which of the following alkali metals ions is lowest when aqueous solution of their salts are put under an electric field:
    a) K b) Rb c) Li d) Na

89. Aqueous solution of which of the following compounds is the best conductor of electric current?
    a) Acetic acid, $C_2H_4O_2$ b) Hydrochloric acid, HCl c) Ammonia, NH_3
    d) Fructose, $C_6H_{12}O_6$

90. Standard electrode potentials are : Fe^{+2}/Fe
    $\left[E^\circ = -0.44\right]; Fe^{+3}/Fe^{+2} E^\circ = +0.77;$ if Fe^{2+}, Fe^{3+} and Fe blocks are kept together, then:
    a) Fe^{2+} increases b) Fe^{3+} decreases c) $\frac{Fe^{+2}}{Fe^{+3}}$ remains unchanged d) Fe^{+2} decreases

91. Consider the half-cell reduction reaction:
    $Mn^{2+} + 2e^- \rightarrow Mn, E^\circ = -1.18$ V
    $Mn^{2+} \rightarrow Mn^{3+} + e^-, E^\circ = -1.51$ V
    The E^o for the reaction $3Mn^{2+} \rightarrow Mn^\circ + 2Mn^{3+}$, and possibility of the forward reaction are, respectively
    a) -2.69 V and no b) -4.18 V and yes c) +0.33 V and yes d) +2.69 V and no

92. Electrode potential data of few cells is given below. Based on the data, arrange the ions in increasing order of their reducing power.
    $Fe^{3+}_{(aq)} + e^- \rightarrow Fe^{2+}_{(aq)}; E^0$ = +0.77V
    $Al^{3+}_{(aq)} + 3e^- \rightarrow Al_{(s)}; E^0$ = -1.66V
    $Br_{2(aq)} + 2e^- \rightarrow 2Br^-_{(aq)}; E^0$ = +1.09 V
    a) $Br^- < Fe^{2+} < Al$ b) $Fe^{2+} < Al < Br^-$ c) $Al < Br^- < Fe^{2+}$ d) $Al < Fe^{2+} < Br^-$

93. When 0.1 mol MnO_4^{2-} is oxidized the quantity of electricity required to completely oxidize MnO_4^{2-} to MnO_4^- is :
    a) 96500 C b) 2 x 96500C c) 9650 C d) 96.50 C

94. The equilibrium constant of the reaction:

$Cu_{(s)} + 2Ag^{+}{}_{(aq)} \rightarrow Cu^{2+}{}_{(aq)} + 2Ag_{(s)}$:

$E^{\circ} = 0.46$ V it 298 K is

a) 2.0 x 10^{10} b) 4.0 x 10^{10} c) 4.0 x 10^{15} d) 2.4 x 10^{10}

95. A solution contains Fe^{2+}, Fe^{3+} and I ions. This solution was treated with iodine at 35°C. Eo for Fe^{3+}/Fe^{2+} is +0.77V and, E° for 0 $I_2/2I^{-} = 0.536$ V.1. The favourable redox reaction is:

a) I_2 will be reduced to I^- b) There will be no redox reaction c) I^- will be oxidised to I_2

d) Fe^{2+} will be oxidised io F^{3+}

96. **Assertion :** Kohlrausch law helps to find the molar conductivity of weak electrolyte at infinite dilution.

Reason : Molar conductivity of a weak electrolyte at infinite dilution cannot be determined experimentally.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

97. At 25^0C, Nernst equation is

a) $E_{cell} = E^0_{cell} - \frac{0.0591}{n} log \frac{[ion]_{RHS}}{[ion]_{LHS}}$ b) $E_{cell} = E^0_{cell} - \frac{0.0591}{n} log \frac{[M]_{RHS}}{[M]_{LHS}}$ c) $E_{cell} = E^0_{cell} + \frac{0.0591}{n} log \frac{[ion]_{RHS}}{[ion]_{LHS}}$

d) $E_{cell} = E^0_{cell} + \frac{0.0591}{n} log \frac{[ion]_{LHS}}{[ion]_{RHS}}$

98. A compound is formed by cation C and anion A. The anions form hexagonal close packed (hcp) lattice and the cations occupy 75% of octahedral voids. The formula of the compound is

a) C_3A_2 b) C_3A_4 c) C_4A_3 d) C_2A_3

99. How long would it take to deposit 50 g of Al from an electrolytic cell containing Al_2O_3 using a current of 105 ampere?

a) 1.54 h b) 1.42 h c) 1.32 h d) 2.15 h

100. In the silver plating of copper, $K[Ag(CN)_2]$ is used instead of $AgNO_3$. The reason is:

a) A thin layer of Ag is formed on Cu b) more voltage is required

c) Ag^+ ions are completely removed from solution

d) Less availability of Ag^+ ions, as Cu cannot displace Ag from $[Ag(CN)_2]^-$ ion

101. For the cell prepared from electrodes A and B;

Electrode A; $Cr_2O_7^{-2} | Cr^{3+}, E^0_{red} = 1.33V$

Electrode B; $Fe^{3+} | Fe^{2+}, E^0_{red} = 0.77V$

Which of the following statements is correct?

a) The electrons will flow from B to A when connections are made.

b) The standard EMF of the cell will be 0.56 V. c) A will be a positive electrode.

d) All of these.

102. The overall reaction of a hydrogen-oxygen fuel cell is

a) $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$ b) $2H_{2(g)} + 4OH^-_{(aq)} \rightarrow 4H_2O_{(l)} + 4e^-$

c) $O_{2(g)} + 2H_2O_{(l)} + 4e^- \rightarrow 4OH^-_{(aq)}$ d) $4OH^-_{(aq)} + 4e^- \rightarrow 2H_2O_{(l)}$

103. What will be the reduction potential for the following half-cell reaction at 298 K?

(Given: $[Ag^+]$ = 0.1 M and E^0_{cell} = + 0.80 V)

a) 0.741 V b) 0.80 V c) -0.80 V d) -0.741 V

104. A weak monobasic acid is 5% dissociated in 0.01 mol dm^{-3} solution. Limiting molar conductivity of acid at infinite dilution is 4 x 10^{-2} ohm $^{-l}$ m 2mol $^{-1}$. What will be the conductivity of 0.05 mol dm-3 solution of the acid?

a) 8.94 x 10^{-6} ohm^{-1} cm^2 mol^{-1} b) 8.92 x 10^{-4} ohm^{-1} cm^2 mol^{-1}

c) 4.46 x 10^{-6} ohm^{-1} cm^2 mol^{-1} d) 2.23 x 10^{-5} ohm^{-1} cm^2 mol^{-1}

105. Match the column I with column II and mark the appropriate choice

	Column - I		**Column -II**
(A)	$Pb_{(s)} + SO^{2-}_{4(aq)} \rightarrow PbSO_{4(s)} + 2e^-$	(i)	Rusting of iron
(B)	$2SO^{2-}_{4(aq)} \rightarrow S_2O^{2-}_{8(aq)} + 2e^-$	(ii)	Reaction at anode in lead storage battery
(C)	$2H_{2(g)} + 40H^-_{(aq)} \rightarrow 4H_2O_{(l)} + 4e^-$	(iii)	Electrolysis of concentrated H_2SO_4
(D)	$2Fe_{(s)} + O_{2(g)} + 4H^+_{(aq)} \rightarrow 2Fe^{2+}_{(aq)} + 2H_2O_{(l)}$	(iv)	Reaction at anode in fuel cell

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

b) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)

c) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

106. The equilibrium constant of the reaction, $Cu_{(s)} + 2Ag^+_{(aq)} \longrightarrow Cu^{2+}_{(aq)} + 2Ag_{(s)}$, E^0 = 0.46 V at 298 K is :

a) 2.0 x 10^{10} b) 4.0 x 10^{10} c) 4.0 x 10^{15} d) 2.4 x 10^{10}

107. **Assertion:** In mercury cell, the cell potential is approximately 1.35 V and remains constant during its life.

Reason : The overall reaction in mercury cell is represented as $Zn(Hg) + HgO_{(s)} \rightarrow ZnO_{(s)} + Hg_{(l)}$

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

108. The standard EMF of a galvanic cell involving cell reaction with n =2 is found to be 0.295 V at 25^0C. The equilibrium constant of the reaction would be: (Given F = 96500 C mol^{-1}, R = 8.34 JK^{-1} mol^{-1})

a) 2.0 x 10^{11} b) 4.0 x 10^{12} c) 1.0 x 10^2 d) 1.0 X 10^{10}

109. Which cell will measure standard electrode potential of copper electrode?$Pt_{(s)}|\ H_2$ (g.0.1 bar)H^+ (aq.,1M)||Cu^{2+}(aq.,1M)| Cu

a) $Pt_{(s)}|\ H_2$ (g.1 bar)H^+ (aq.,1M)||Cu^{2+}(aq.,1M)|Cu

b) $Pt_{(s)}|\ H_2$ (g.1 bar)H^+ (aq.,0.1M)||Cu^{2+}(aq.,1M)|Cu

c) $Pt_{(s)}|\ H_2$ (g.0.1 bar)H^+ (aq.,1M)||Cu^{2+}(aq.,1M)| Cu

d) $Pt_{(s)}|\ H_2$ (g.1 bar)H^+ (aq.,1M)||Cu^{2+}(aq.,2M)|Cu

110. The molar conductivity is maximum for the solution of concentration

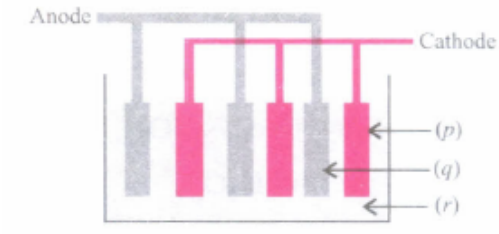
a) 0.004 M b) 0.002 M c) 0.005 M d) 0.001 M

111. **Assertion:** Molar conductivity increases with decrease in concentration.
Reason: Conductivity always decreases with decrease in concentration.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

112. Which of the statements about solutions of electrolytes is not correct?
a) Conductivity of solution depends upon size of ions.
b) Conductivity depends upon viscosity of solution.
c) Conductivity does not depend upon solvation of ions present in solution.
d) Conductivity of solution increases with temperature.

113. When an aqueous solution of $AgNO_3$ is electrolysed between platinum electrodes, the substances liberated at anode and cathode are
a) silver is deposited at cathode and O_2 is liberated at anode
b) silver is deposited at cathode and H_2 is liberated at anode
c) hydrogen is liberated at cathode and O_2 is liberated at anode
d) silver is deposited at cathode and Pt is dissolved in electrolyte

114. Label the given diagram showing lead storage battery:



a)

p	q	r
Pb	PbO_2	5M H_2SO_4

b)

p	q	r
PbO_2	Pb	conc.H_2SO_4

c)

p	q	r
Pb_3O_4	PbO_2	50% H_2SO_4

d)

p	q	r
PbO_2	Pb	dil.38% H_2SO_4

115. In the electrolysis of aqueous sodium chloride solution which of the half cell reaction will occur at anode?
a) $Na^+_{(aq)} + e^- \rightarrow Na_{(s)}; E^0_{cell} = -2.71V$ b) $2H_2O_{(l)} \rightarrow O_{2(g)} + 4H^+_{(aq)} + 4e^-; E^0_{cell} = 1.23V$
c) $H^+_{(aq)} + e^- \rightarrow \frac{1}{2}H_{2(g)}; E^0_{cell} = 0.00V$ d) $Cl^-_{(aq)} \rightarrow \frac{1}{2}Cl_{2(g)} + e^-; E^0_{cell} = 1.36V$

116. For the fell reaction, Cu^{2+} (l) + $Zn_{(s)} \rightleftharpoons Zn^{2+}$ (l) + $Cu_{(s)}$ Of an electrochemical cell, the change in free energy (ΔG) at a given temperature is a function of :
a) ln (C_1) b) ln (C_1/C_1) c) ln (C_2) d) ln ($C_1 + C_2$)

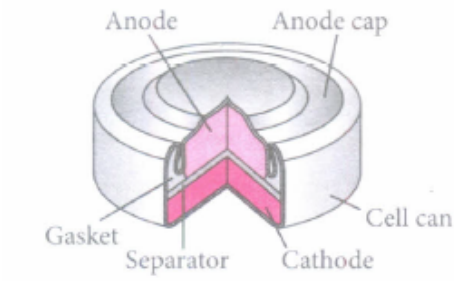
117. Without losing its concentration $ZnCl_2$ solution cannot be kept in contact with :
a) Au b) Al c) Pb d) Ag

118. Cell reaction is spontaneous when :
a) E^0_{red} is negative b) E^0_{red} is positive c) ΔG^0 is negative d) ΔG^0 is positive

119. The specific conductance of a 0.1 N KCl solution at 23°C is $0.012\Omega^{-1}\,cm^{-1}$. The resistance of cell containing the solution at the same temperature was found to be 55 . The cell constant will be:
a) 0.142 cm^{-1} b) 0.66 cm^{-1} c) 0.918 cm^{-1} d) 1.12 cm^{-1}

120. Which one of the following pairs of substances on reaction will not evolve H_2 gas?
a) Iron and H_2SO_4 (aq) b) Iron and steam c) Copper and HCl (aq)
d) Sodium and ethyl alcohol

121. Which of the given statements for mercury cell are incorrect?



(i) Mercury cell is suitable for low current devices like hearing aids, watches, ete.
(ii) It consists of zinc-mercury amalgam as anode and a paste of HgO and carbon as the cathode.
(iii) The electrolyte is a paste of $Zn(OH)_2$ and KO_2.
(iv) The electrode reactions for the cell are
At anode: $Zn(Hg)+H_2O \rightarrow ZnO_{(s)}+2OH^- +2e^-$
At cathode: $HgO + H_2O+ 2e^- \rightarrow Hg_{(l)} + 2OH^-$
a) (ii) and (iii) only b) (i) and (ii) only c) (i), (iii) and (iv) only d) (iii) and (iv) only

122. **Assertion:** Cu^{2+} ions get reduced more easily than H^+ ions.
Reason : Standard electrode potential of copper is 0.34 V.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

123. E^0_{cell} for the reaction $2H_2O \rightarrow H_3O^+ + OH^-$ at 25^0C - 0.8277 V. The equilibrium constant for the reaction is
a) 10^{-14} b) 10^{-23} c) 10^{-7} d) 10^{-21}

124. The charge required for reducing 1 mole of MnO_4^- to Mn^{2+} is:
a) 1.93 x 10^5 C b) 2.895 x 10^5 C c) 4.28 x 10^5 C d) 4.825 x 10^5 C

125. How many coulombs of electricity is required to reduce 1 mole of $Cr_2O_7^{2-}$ in acidic medium?
a) 4 x 96500 C b) 6 x 96500 C c) 2 x 96500 C d) 1 x 96500 C

126. The cell reaction of the galvanic cell : Cu(s) | $Cu^{2+}_{(aq)}$ || $Hg^{2+}_{(aq)}$ | $Hg_{(l)}$ is
a) $Hg + Cu^{2+} \rightarrow Hg^{2+} + Cu$ b) $Hg + Cu^{2+} \rightarrow Cu^+ + Hg^+$ c) $Cu + Hg \rightarrow CuHg$
d) $Cu + Hg^{2+} \rightarrow Cu^{2+} + Hg$

127. Standard electrode potentials are:
Fe^{2+}/Fe, $E^0 = -0.44$ V
Fe^{3+}/Fe^{2+}, $E^0 = 0.77$ V

Fe^{2+}, Fe^{3+} and Fe block are kept together, then :

a) Fe^{3+} increases b) Fe^{3+} decreases c) $\frac{Fe^{2+}}{Fe^{3+}}$ remains unchanged d) Fe^{2+} decreases

128. How much time is required to deposit 1 x 10^{-3} ern thick layer of silver (density is 1.05 g cm^{-3}) on a surface of area 100 cm^2 by passing a current of 5 A through $AgNO_3$ solution?
a) 125s b) 115s c) 18.7s d) 27.25s

129. **Assertion:** A standard hydrogen electrode is also called reversible electrode.
Reason: Standard hydrogen electrode can act both as anode as well as cathode in an electrochemical cell.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

130. In electrolysis of NaCl when Pt electrode is taken then H_2 is liberated at cathode while with Hg cathode it forms sodium amalgam because :
a) Hg is more inert than Pt b) more voltage is required to reduce H^+ at Hg than at Pt
c) Na is dissolved in Hg while it does not dissolve in Pt
d) concentration of H^+ ions is larger when Pt electrode is taken

131. Zinc can be coated on iron to produce galvanized iron but the reverse is not possible. It is because:
a) zinc is lighter than iron b) zinc has lower melting point than iron
c) zinc has lower negative electrode potential than iron
d) zinc has higher negative electrode potential than iron.

132. Match the column I with column II and mark the appropriate choice.

	Column I		**Column - II**
(A)	A_m	(i)	I/A
(B)	G*	(ii)	pl/A
(C)	k	(iii)	k/C
(D)	R	(iv)	G*/R

a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
b) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)
c) (A) → (ii), (B) → (iv), (C) → (iii), (D) → (i)
d) (A) → (iv), (B) → (ii), (C) → (i), (D) → (iii)

133. An electrochemical cellcan behave like an electrolytic cell when_____.
a) $E_{cell} = 0$ b) $E_{cell} > E_{ext}$ c) $E_{ext} > E_{cell}$ d) $E_{cell} = E_{ext}$

134. How long will it take for a uniform current of 6.00 A to deposit 78 g of gold from a solution of Au Cl_4^-? What mass of chlorine gas will be formed simultaneously at anode of the cell? (Atomic mass of Au = 197)
a) t = 3010 sec, w = 35.50 g b) t = 20306 sec, w = 45.54 g c) t = 19500 sec, w = 54.5 g
d) t = 19139.16 sec, w = 42.24 g

135. The formal potential of Fe^{3+}/Fe^{2+} in a sulphuric acid and phosphoric acid mixture (E^0 = +0.61 V)is much lower than the standard potential (E^0 = +0.77 V), This is due to
(i) formation of the species $[FeHPO_4]+$

(ii) lowering of potential upon complexation
(iii) formation of the species $[FeSO_4]^+$
(iv) high acidity of the medium.
a) (i) and (ii) only b) (i), (ii) and (iv) only c) (iii) only d) all of these.

136. Which reaction is not feasible?
a) $2KI + Br_2 \rightarrow 2KBr + I_2$ b) $2KBr + I_2 \rightarrow 2KI + Br_2$ c) $2KBr + Cl_2 \rightarrow 2KCl + Br_2$
d) $2H_2O + 2\,F_2 \rightarrow 4HF + O_2$

137. Standard electrode potential of three metals, X, Y and Z are -1.2 V, $+0.5$ V and -3.0 V respectively. The reducing power of three metals will be:
a) $Y > Z > X$ b) $X > Y > Z$ c) $Z > X > Y$ d) $Z > Y \geqslant X$

138. What will be standard cell potential of galvanic cell with the following reaction?
$2Cr_{(s)} + 3Cd^{2+}_{(aq)} \rightarrow 2Cr^{3+}_{(aq)} + 3Cd_{(s)}$
[Given: $E^0\ Cr^{3+}/Cr = -0.74$ V and $E^0\ Cd^{2+}/Cd = -0.40$ V]
a) 0.74 V b) 1.14 V c) 0.34 V d) -0.34 V

139. In electrolysis of dilute H_2SO_4, what is liberated at anode?
a) H_2 b) SO_4^{2-} c) SO_2 d) O_2

140. Molar conductivity of NH_4OH can be calculated by the equation,
a) $\Lambda^0_{NH_4OH} = \Lambda_{Ba(OH)_2} + \Lambda_{NH_4cl} - \Lambda_{Bacl_2}$ b) $\Lambda^0_{NH_4OH} = \Lambda_{Bacl_2} + \Lambda_{NH_4cl} - \Lambda_{Ba(OH)_2}$
c) $\Lambda^0_{NH_4OH} = \frac{\Lambda_{Ba(OH)_2} + 2\Lambda_{NH_4cl} - \Lambda_{Bacl_2}}{2}$ d) $\Lambda^0_{NH_4OH} = \frac{\Lambda_{NH_4cl} + \Lambda_{Ba(OH)_2}}{2}$

141. Electrolysis of an aqueous solution of $AgNO_3$ with silver electrodes produces (i) at cathode while (ii) ions are dissolved from anode. When Pt electrodes are used (iii) is produced at anode and (iv) is cathode.

a)

(i)	(ii)	(iii)	(iv)
H_2	NO_3^-	OH^-	H_2

b)

(i)	(ii)	(iii)	(iv)
Ag	H^+	O_2	H_2

c)

(i)	(ii)	(iii)	(iv)
Ag	Ag^+	O_2	Ag

d)

(i)	(ii)	(iii)	(iv)
Ag	H^+	Ag^+	O_2

142. $E^0_{Fe^{2+}/Fe} = -0.441$ V and $E^0_{Fe^{3+}/Fe^{2+}} = 0.771$ V, the standard emf, of the reaction $Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}$ will be :
a) 0.111 V b) 0.330 V c) 1.653 V d) 1.212 V

143. The electrode potentials for
$Cu^{2+}_{(aq)} + e^- \longrightarrow Cu^+_{(aq)}$ and $Cu^+(aq) + e^- \longrightarrow Cu_{(s)}$ are + 0.15 V and + 0.50 V respectively. The value of $E^0_{Cu/Cu}$ will be :
a) 0.325 V b) 0.650 V c) 0.150 V d) 0.500 V

144. During electrolysis of a solution of $AgNO_3$, 9650 coulombs of charge is passed through the solution. What will be the mass of silver deposited on the cathode?
a) 108 g b) 10. 8 g c) 1.08 g d) 216 g

145. Which of the following is the cell reaction that occurs when the following half-cells are combined?
$I^2 + 2e^- \rightarrow 2I(1\ M)$; $E^o = +0.54$ V
$Br^2 + 2e^- \rightarrow 2Br^-\ (1\ M)$; $E^o = +1.09$ V
a) $2Br^- + I_2 \rightarrow Br_2 + 2I^-$ b) $I_2 + Br_2 \rightarrow 2I^- + 2Br^-$ c) $2I + Br_2 \rightarrow I_2 + 2Br^-$
d) $2I^- + 2Br^- \rightarrow I_2 + Br_2$

146. Fluorine is the best oxidising agent because it has
a) highest electron affinity b) highest reduction potential c) highest oxidation potential
d) lowest electron affinity

147. How many grams of cobalt metal will be deposited when a solution of cobalt (II) chloride is electrolyzed with a current of 10 amperes for 109 minutes (1 Faraday = 96,500 C; Atomic mass of Co = 59 u)
a) 0.66 b) 4.0 c) 20.0 d) 40.0

148. Zn gives hydrogen with H_2S0_4 and HCl but not with HNO_3 because
a) Zn acts as oxidising agent when reacts with HNO_3
b) HNO_3 is weaker acid than H_2SO_4 and HCl
c) Zn is above the hydrogen in electrochemical series
d) No_3^- is reduced in preference to H^+ ion.

149. Which of the following statements is true?
a) When an aqueous solution of NaCl is electrolysed, sodium metal is deposited at cathode.
b) There is no difference between specific conductivity and molar conductivity.
c) Silver nitrate solution can be stored in a copper container.
d) The addition of liquid bromine to iodide solution turns it violet.

150. When 0.1 mole of MnO_4^{2-} is oxidized, the quantity of electricity required to completely oxidize MnO_4^{2-} to MnO_4^- is :
a) 96500 C b) 2 x 96500 C c) 9650 C d) 96.50 C

151. **Assertion:** When a copper wire is dipped in silver nitrate solution, there is no change in the colour of the solution.
Reason: Copper cannot displace silver from its salt solution.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

152. $\triangle_r G^0$ for the cell with the cell reaction:
$Zn_{(s)} + Ag_2O_{(s)} + H_2O_{(l)} \rightarrow Zn^{2+}_{(aq)} + 2Ag_{(s)} + 20H^-_{(aq)}$
[$E^0_{Ag_2O/ag}$ = 0.344 V, $E^0_{Zn^{2+}/Zn}$ = -0.76 V]
a) 2.13 x 10^5 J mol^{-1} b) -2.13 x 10^5 J mol^{-1} c) 1.06 x 10^5 J mol^{-1} d) -1.06 x 10^5 J mol^{-1}

153. What will be the molar conductivity of Al^{3+} ions at infinite dilution if molar conductivity of $Al_2(SO_4)_3$ is 858 S cm^2 mol^{-l} and ionic conductance of SO_4^{2-} is 160 S cm^2 mol^{-1} at infinite dilution?
a) 189 S cm^2 mol^{-1} b) 698 S cm^2 mol^{-1} c) 1018 S cm^2 mol^{-1} d) 429 S cm^2 mol^{-1}

154. **Assertion:** To obtain maximum work from a galvanic cell charge has to be passed reversibly.
Reason: The reversible work done by a galvanic cell is equal to decrease in its Gibbs energy.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

155. In the electrochemical cell :

Zn $ZnSO_4$ (0.01 M) $CuSO_4$ (1.0M) Cu, the emf of this Daniel cell is E, When the concentration of $ZnSO_4$ is changed to 1.0 M and that of $CuSO_4$ changed to 0.01 M, the emf changes to E_2.

From the following, which one is the relationship between E_1 and E_4? (Given $\frac{RT}{F} = 0.059$)

a) $E_1 < E_2$ b) $E_1 > E_2$ c) $E_2 = 0 \neq E_1$ d) $E_1 = E_2$

156. Standard electrode potentials of few half-cell reactions are given below:

a) $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O; E^0 = 1.51V$ b) $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 7H_2O; E^0 = 1.33V$

c) $Fe^{3+} + e^- \rightarrow Fe^{2+} + E^0 = 0.77V$ d) $Cl_2 + 2e^- \rightarrow 2Cl^-; E^0 = 1.36V$

157. Kohlrauch's law states that at:

a)

finite dilution,each ion makes definite contribution to equivalent conductance of an electrolyte, whatever be the nature of the other ion of electrolyte.

b)

infinite diiution each ion makes definite contribution to equivalent conductance of an electrolyte depending on the nature of the other ion of the electrolyte.

c)

infinite dilution, each i.n makes. definite contribution to conductance of an electrolyte whatever be the nature of the other ion of the electrolyte

d)

infinite dilution, each ion makes definite contribution to equivalent conduction of an electrolyte whatever be the nature of the other ion of the electrolyte.

158. Standard free energies of formation (in kJ/mol) at 298 K are - 237.2, - 394.4 and - 8.2 for $H_2O_{(l)}$, $CO_{2(g)}$ and pentane (g), respectively. The value of E^0_{cel} for the pentane-oxygen fuel cell is :

a) 1.968 V b) 2.0968 V c) 1.0968 V d) 0.0968 V

159. For a cell reaction: $M^{n+}_{(aq)} + ne^- \rightarrow M_{(S)}$ the Nernst equation for electrode potential at any concentration measured with respect to standard hydrogen electrode is represented as

a) $E_{(M^{n+}/M)} = E^0_{(M^{n+}/M)} - \frac{RT}{nF} ln \frac{1}{[M^{n+}]}$ b) $E_{\left(M/M^{n+}\right)} = E^0_{(M/M^+)} - \frac{RT}{nF} ln \frac{M^{n+}}{[M]}$

c) $E_{(M^{n+}/M)} = E^0_{(M^{n+}/M)} - \frac{RT}{nF} log \frac{1}{[M]}$ d) $E_{(M^{n+}/M)} = E^0_{(M^{n+}/M)} - \frac{RT}{nF} ln[M^{n+}]$

160. Which of the following statements is correct regarding variations of molar conductivity with concentration?

The variation in A_m with concentration for a strong electrolyte can be represented by the equation,

$A_m = A^0_m - AC^{1/2}$

The value of constant A for a given solvent and temperature depends upon the type of electrolyte i.e., cations and anions produced on dissociation of electrolyte in the solution.

a) Molar conductivity decreases with decrease in concentration.

b) Variation in molar conductivity of weak and strong electrolytes is same.

c) Molar conductivity increases with decrease in concentration.

d)

When concentration of the solution approaches zero, the molar conductivity is known as conductance.

161. E^0 values of three metals are listed below.

$Zn^{2+}_{(aq)} + 2e^- \rightarrow Zn_{(s)}$; E^0 = -0.76 V

$Fe^{2+}_{(aq)} + 2e^- \rightarrow 2Fe_{(s)}$; E^0 = -0.44V

$Sn^{2+}_{(aq)} + 2e^- \rightarrow Sn_{(aq)}$; E^0 = -0.14 V

Which of the following statements are correct on the basis of the above information?

(i) Zinc will be corroded in preference to iron if zinc coating is broken on the surface.

(ii) If iron is coated with tin and the coating is broken on the surface then iron will be corroded.

(iii) Zinc is more reactive than iron but tin is less reactive than iron.

a) (i) and (ii) only b) (ii) and (iii) only c) (i), (ii) and (iii) d) (i) and (iii) only

162. Using the data given below find out the strongest reducing agent.

$E^0_{Cr_2{}^{2-}_7/Cr^{3+}} = 1.33V; E^0_{Cl2/Cl^-} = 1.36V$

$E^0_{MnO^-_4/Mn^{2+}} = 1.51V; E^0_{Cr^{3+}/cr} = -0.74V$

a) Cl^- b) Mn^{2+} c) Cr^{3+} d) Mn^{2+}

163. Which one of the following pairs of substances on reaction will not evolve H_2 gas?

a) Iron and $H_2SO_{4(aq)}$ b) Iron and steam c) Copper and $HCl_{(aq)}$

d) Sodium and ethyl alcohol

164. A gas X at 1 atm is bubbled through a solution containing a mixture of 1 M Y^- and 1 M Z^- at 25^0C. If the reduction potential of Z > Y> X, then

a) Y will oxidise X and not Z b) Y will oxidise Z and not X c) Y will oxidise both X and Z

d) Y will reduce both X and Z.

165. For the reduction of silver ions with copper metal the standard cell potential was found to be + 0.46 V at 25^0C. The value of standard Gibbs energy, ΔG^0 will be:

(F = 96500 C mol^{-1})

a) - 89.0 kJ b) - 89.0 J c) - 44.5 kJ d) - 98.0 kJ

166. The most convenient method to protect the bottom of ship made of iron is

a) Coating it with red load oxide b) White tin plating c) Connecting it with Mg block'

d) Connecting it with Pb block

167. The number of electrons delivered at the cathode during electrolysis by a current of 1 ampere in 60 second is: (charge on electron = 1.60 x 10^{-19} C)

a) 6 x 10^{23} b) 6 x 10^{20} c) 3.75 x 10^{20} d) 7.48 x 10^{23}

168. Al_2O_3 is reduced by electrolysis at low potential and high currents. If 4.0 x 10^4 A of current is passed through molten Al_2O_3 for 6 h, what mass of aluminium is produced? [Assume 100% current efficiency, atomic mass of Al = 27 g mol^{-1}]

a) 9.0 x 10^3 g b) 8.1 x 10^4 g c) 2.4 x 10^5 g d) 1.3 x 10^4 g

169. Mark the correct Nernst equation for the given cell

$Fe_{(s)}| Fe^{2+}(0.001 M)||H^+ (I M)|H_{2(g)} (I bar)|Pt_{(s)}$

a) $E_{cell} = E_{cell}^{o} - \frac{0.591}{2}\log\frac{[Fe^{2+}][H^{+}]^{2}}{[Fe][H_2]}$ b) $E_{cell} = E_{cell}^{o} - \frac{0.591}{2}\log\frac{[Fe][H^{+}]^{2}}{[Fe^{2+}][H_2]}$

c) $E_{cell} = E_{cell}^{o} - \frac{0.0591}{2}\log\frac{[Fe^{2+}][H_2]}{[Fe][H^{+2}]}$ d) $E_{cell} = E_{cell}^{o} - \frac{0.0591}{2}\log\frac{[Fe][H_2]}{[Fe^{2+}][H^{+}]^{2}}$

170. An electric current is passed through silver nitrate solution using silver electrodes. 15.25 g of silver was found to be deposited on cathode. What will be the weight of copper deposited on cathode if same amount of electricity is passed through copper sulphate solution using copper electrodes?
a) 4.49 g b) 6.4 g c) 12.5 g d) 3.2 g

171. When a lead storage battery is discharged,
a) lead sulphate is consumed b) oxygen gas is evolved c) lead sulphate is formed
d) lead sulphide is formed.

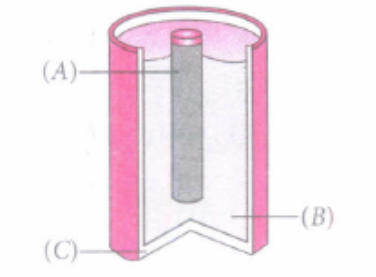
172. At 25ºC molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 ohm-1 cm^2 mol^{-1} and at infinite dilution its molar conductance is 238 ohm^{-1} cm^2 mol^{-1}. The degree or ionisation of ammonium hydroxide at the same concentration and temperature is:
a) 20.800 % b) 4.008 % c) 40.800 % d) 2.080 %

173. Which of the following is the correct cell representation for the given cell reaction?
$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
a) Zn I Zn^{2+}II H^+ I H_2 b) Zn I Zn^{2+} II H^+, H_2| Pt c) Zn I $ZnS0_4$|| H_2S0_4 I Zn
d) Zn IH_2S0_4 I I $ZnS0_4$| H_2

174. Fill in the blanks with appropriate words.
The electrolytic solution is always neutral because the total charge on (i) is equal to (ii) on (iii).Unlike the metallic conductor, the electrolyte conducts the electric current by virtue of movement of its (iv). The property due to which a metal tends to go into solution in term of positive ions is known as (v).
(ii), (iii), (iv) and (v) respectively are
a) (a) cations, partial charge, anions, electrons, reduction
b) cations, total charge, anions, ions, oxidation
c) cations, ionic charge, anions, atoms, dissolution
d) cations, partial charge, anions, molecules, electrolysis.

175. Specific conductance of 0.1 M NaCl solution is 1.01 x 10^{-2} ohm^{-1} cm^{-1} Its molar conductance in ohm^{-1} cm^{-2} mol^{-1} is
a) 1.01 x 10^2 b) 1.01 x 10^3 c) 1.01 x 10^4 d) 1.01

176. Label the parts represented by (A), (B), and (C).



a)

A	B	C
Zinc rod	$NH_4Cl+MgCl_2$	Graphite rod

b)

A	B	C
Carbon rod	NH_4OH+carbon	Zinc rod

c)

A	B	C
Carbon rod	MnO_2+C+NH_4Cl	Zinc can

d)

A	B	C
Zinc rod	MnO_2+NH_4Cl	Carbon rod

177. $\triangle G^0$ for the reaction $Cu^{2+} + Fe \rightarrow Fe^{2+} + Cu$ is (Given : $E^0_{cu^{2+}|Cu} = +0.34V, E^0_{Fe^{2+}|Fe} = -0.44V$)
a) 1l.44 kJ b) 180.8 kJ c) 150.5 kJ d) 28.5 kJ

178. The pressure of H_2 required to make the potential of H_2 electrode zero in pure water at 298 K is :
a) 10^{-10} atm b) 10^{-4} atm c) 10^{-14} atm d) 10^{-12} atm

179. Given,
(i) $Cu^{2+} + 2e^- \longrightarrow Cu$, $E^0 = 0.337$ V
(ii) $Cu^{2+} + e^- \longrightarrow Cu +$, $E^0 = 0.153$ V
Electrode potential, E^0 for the reaction, $Cu^+ + e^- \longrightarrow Cu$, will be :
a) 0.52 V b) 0.90 V c) 0.30 V d) 0.36 V

180. An acidic solution of Cu^{2+} containing 0.4 g of Cu^{2+}ions is electrolysed until all the copper is deposited.What is the volume of oxygen evolved at NTP?
a) 141 cc b) 31.75 cc c) 64 cc d) 32 cc

181. **Assertion:** Current stops flowing when E_{cell} = O.
Reason : Equilibrium of the cell reaction is attained.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

182. On the basis of the information available. from the reaction : $\frac{4}{3}Al + O_2 \longrightarrow \frac{2}{3}Al_2O_3$, ΔG = - 827 kJ mol^{-1} of O_2, the minimum EMF required to carry out the electrolysis of Al_2O_3 is : (F = 96500 C mol^{-1})
a) 2.14 V b) 4.28 V c) 6.42 V d) 8.56 V

183. The standard reduction potential for the half-cell reaction, $Cl^2 + 2e^- \rightarrow 2Cl^-$ will be ($Pt^2+2Cl^- \rightarrow Pt + Cl_2$, E^o_{cell} = -0.15 V ;$Pt^2+ + 2e^- \rightarrow Pt$, E^o= 1.20 V)
a) -1.35 V b) +1.35 V c) -1.05 V d) +1.05 V

184. A hypothetical electrochemical cell is shown below $A\left|A^+(xM) \parallel B^+(yM)\right|B$ The emf measured is +0.20. The cell reaction is
a) $A^+ + e^- \rightarrow A; B^+ + e^- \rightarrow B$ b) The cell reaction cannot be predicted
c) $A + B^+ \rightarrow A^+ + B$ d) $A^+ + B^+ \rightarrow A + B^+$

185. Calculate the equilibrium constant for the reaction, $2Fe^{3+} + 3I^- \leftrightharpoons 2Fe^{2+} + I_3^-$. The standard reduction potentials in acidic conditions are 0.77 V and 0.54 V respectively for $Fe^{3+}|Fe^{2+}$ and $I_3^-|I^-$ couples.
a) 4.25 x 10^7 b) 7.05 x 10^5 c) 6.25 x 10^5 d) 6.25 x 10^7

186. **Assertion:** Electrolytic cell uses electrical energy to carry non-spontaneous chemical reactions.
Reason : Chemical energy of a spontaneous redox reaction can be converted into electrical energy.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

187. How many moles of Pt may be deposited on the cathode when 0.80 F of electricity is passed through a 1.0 M solution of Pt^{4+}?
a) 0.1 mol b) 0.2 mol c) 0.4 mol d) 0.6 mol

188. Molar conductivity of 0.025 mol L^{-1} methanoic acid is 46.1 S cm^2 mol^{-1}, the degree of dissociation and dissociation constant will be
(Given : $\lambda^0_{H^+}$ = 349.6 S cm^2 mol^{-1} and λ^0_{HCOO} cm^2 mol^{-1})
a) 11.4%, 3.67 x 10^{-4} mol L^{-1} b) 22.8%, 1.83 x 10^{-4} mol L^{-1} c) 52.2%, 4.25 x 10^{-4} mol L^{-1}
d) 1.14%,3. 67 x 10^{-6} mol L^{-1}

189. E^0 Value of Ni^{2+}/Ni is - 0.25 V and Ag^+/Ag is +0.80 V. If a cell is made by taking the two electrodes what is the feasibility of the reaction?
a) Since E^0 value for the cell will be positive, redox reaction is feasible.
b) Since E^0 value for the cell will be negative, redox reaction is not feasible.
c) Ni cannot reduce Ag^+ to Ag hence reaction is not feasible.
d) Ag can reduce Ni^{2+} to Ni hence reaction is feasible.

190. What will be the emf of the following concentration cell at 25°C?
Ag(s) I $AgNO_3$(0.01 M) II $AgNO_3$ (0.05 M) I $Ag_{(s)}$
a) 0.828 V b) 0.0413 V c) -0.0413 V d) -0.828 V

191. If 54 g of silver is deposited during an electrolysis reaction, how much aluminium will be deposited by the same amount of electric current?
a) 2.7 g b) 4.5 g c) 27 g d) 5.4 g

192. Standard reduction potentials at 25^0C of Li^+/Li, Ba^{2+}/Ba, Na^+/Na and Mg^{2+}/Mg are -3.05, -2.90, -2.71 and -2.37 V respectively. Which one of the following is the strongest oxidizing agent?
a) Mg^{2+} b) Ba^{2+} c) Na^+ d) Li^+

193. The specific conductivity of N/10 KCl solution at 20°C is 0.0212 ohm^{-1} cm^{-1} and the resistance of the cell containing this solution at 20°C is 55 ohm. The cell constant is
a) 3.324 cm^{-1} b) 1.166 cm^{-1} c) 2.372 cm^{-1} d) 3.682 cm^{-1}

194. Mark the correct relationship from the following:

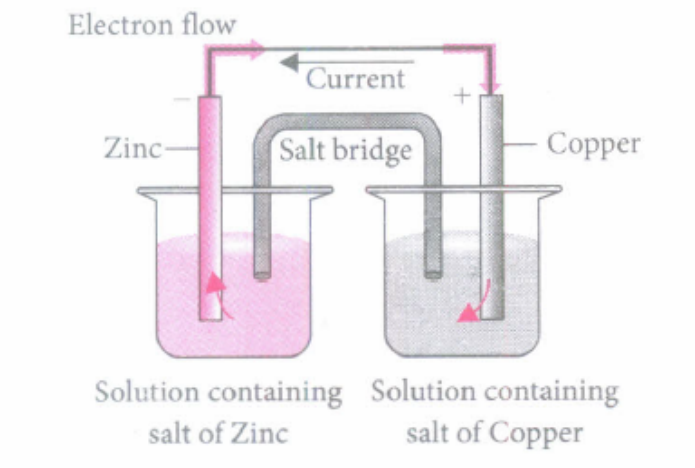
a) Equilibrium constant is related to emf as $logk = \frac{nFE}{2.303RT}$

b) EMF of a cell Zn I $Zn^{2+}_{(a1)}$ II $Cu^{2+}_{(a2)}$I Cu is $E = E^0 - \frac{0.591}{n} log \frac{[a_2]}{[a_1]}$

c) Nernst equation is $E_{cell} = E^0_{cell} - \frac{0.0591}{n} log \frac{[Products]}{[Reactants]}$

d) For the electrode M^{n+}/M at 273 K $E = E^0 - \frac{0.591}{n} log[M^{n+}]$

195. Which of the following statements is correct about the given Daniell cell?



a)
This cell converts the electrical energy liberated during the redox reaction to chemical energy.
b)
This cell has an electrical potential greater that 1.1 V when concentration of Zn^{2+} and Cu^{2+} ions is unity (1 mol dm^{-3})
c) In this cell, copper is acting as cathode and zinc is acting as anode.
Redox reaction occurring in this cell is
d) $Cu_{(s)} + Zn^{2+}_{(aq)} \longrightarrow Cu^{2+}_{(aq)} + Zn_{(s)}$

196. Electrical conductance through metals is called metallic or electronic conductance and is due to the movement of electrons. The electronic conductance depends on
a) the nature and structure of the metal b) the number of valence electrons per atom
c) change in temperature d) all of these.

197. Which of the following reactions does not take place during rusting?
a) $H2CO_3$ $2H^+ \leftrightharpoons CO_3^{2-}$ b) $4Fe^{2+} + O_{2(dry)} \rightarrow Fe_2O_3$
c) $4Fe^{2+} + O_2 + 4H_2O \rightarrow 2Fe_2O_3 + 8H^+$ d) $Fe_2O_3 + xH_2O \rightarrow Fe_2O_3 + xH_2O$

198. Given below are the standard electrode potentials of few half-cells. The correct order of these metals in increasing reducing power will be K^+ I K = -2.93 V, Ag^+ I Ag = 0.80 V, Mg^{2+}| Mg = -2.93 V,Ag^+| Ag = 0.80 V, Mg^{2+} | Mg = -2.37V, Cr^{3+}| Cr = -0.74 V.
a) K < Mg < Cr < Ag b) Ag < Cr < Mg < K c) Mg < K < Cr < Ag d) Cr < Ag < Mg < K

199. The Gibbs energy for the decomposition of Al_2O_3 at 500°C is as follows:
$2/3Al_2O_3 \rightarrow 4/3Al + O_2$; Δ_rG= + 966 kJ/mol.
The potential difference needed for electrolytic reduction of Al_2O_3 at 500°C is at least
a) 5.0 V b) 4.5 V c) 3.0 V d) 2.5 V

200. Which of the following reactions cannot be a basis for electrochemical cell?

a) $H_2 + O_2 \rightarrow H_2O$ b) $AgNO_3 + Zn \rightarrow Zn(NO_3)_2 + Ag$

c) $AgNO_3 + NaCl \rightarrow AgCl \downarrow + NaNO_3$

d) $KMnO4+FeSO_4+H2SO_4 \rightarrow K_2SO_4+Fe2(SO_4)_3 + MnSO_4 + H_2O$

201. On the basis of the information available from the reaction

$\frac{4}{3}Al + O_2 \rightarrow \frac{2}{3}Al_2O_3, \Delta G = -827\ kJ\ mol^{-1}$ O_2 the minimum e.m.f. required to carry out an electrolysis of Al_2O_3 is $\left(F = 96500 C mol^{-1}\right)$

a) 8.56 V b) 2.14 V c) 4.28 V d) 6.42 V

202. Which of the following reaction is possible at anode?

a) $2Cr^{3+} + 7H_2O \rightarrow Cr_2O_7^{2-} + 14H^+$ b) $F_2 \rightarrow 2F^-$ c) $(1/2)O_2 + 2H^+ \rightarrow H_2O$

d) None of these.

203. A hypothetical electrochemical cell is shown below

A $\mid$ A^+ (xM) $\mid\mid$ B^+ (yM) $\mid$ B The EMF measured is + 0.20 V. The cell reaction is :

a) $A + B^+ \longrightarrow A^+ + B$ b) $A^+ - B \longrightarrow A + B^+$ c) $A^+ + B^- \longrightarrow A$, $B^+ + e^- \longrightarrow B$

d) The cell reaction cannot be predicted

204. The reaction which is taking place in nickel - cadmium battery can be represented by which of the following equation?

a) $Cd + NiO_2 + 2H_2O \rightarrow Cd(OH)_2 + Ni(OH)_2$ b) $Cd + NiO_2 + 20H^- \rightarrow Ni + Cd(OH)_2$

c) $Ni + Cd(OH)_2 \rightarrow Cd + Ni(OH)_2$ d) $Ni(OH)_2 + Cd(OH) \rightarrow Ni + Cd + 2H_2O$

205. Match the column I with column II and mark the appropriate choice.

	Column -I		**Column - II**
(A)	Kohlrausch's law	(i)	$\Lambda_{eq}^0 = \Lambda_c^0 + \Lambda_a$
(B)	Molar conductivity	(ii)	$\Lambda_m = \frac{K}{C}$
(C)	Degree of dissociation	(iii)	$a = \frac{\Lambda_m}{A_m^0}$
(D)	IDissociation constant	(iv)	$K_a = \frac{ca^2}{1-a}$

a) (A) $\rightarrow$ (iii), (B) $\rightarrow$ (iv), (C) $\rightarrow$ (i), (D) $\rightarrow$ (ii)

b) (A) $\rightarrow$ (i), (B) $\rightarrow$ (ii), (C) $\rightarrow$ (iii), (D) $\rightarrow$ (iv)

c) (A) $\rightarrow$ (iv), (B) $\rightarrow$ (i), (C) $\rightarrow$ (ii), (D) $\rightarrow$ (iii)

d) (A) $\rightarrow$ (ii), (B) $\rightarrow$ (iii), (C) $\rightarrow$ (iv), (D) $\rightarrow$ (i)

206. Consider for following relations for emf of a electrochemical cell:

emf of cell = (Oxidation potential of anode) - (Reduction potential of cathod

emf of cell = (Oxidation potential of anode) + (Reduction potential of cathode)

emf of cell = (Reduction potential of anode) + (Reduction potential of cathode)

emf of cell = (Oxidation potential of anode) - (Oxidation potential of cathode)

Which of the above relations are correct?

a) (ii) and (iv) b) (iii) and (i) c) (i) and (ii) d) (iii) and (iv)

207. The equivalent conductivity of N/10 solution of .acetic acid at 25°C is 14.3 $ohm^{-1}\ cm^2\ equiv^{-1}$. What will be the degree of dissociation of acetic acid?

($\Lambda_{\infty CH_3CooH}$ = 390.71 $ohm^{-1}\ cm^2\ equiv^{-1}$)

a) 3.66 % b) 3.9 % c) 2.12 % d) 0.008 %

208. Limiting molar conductivity of NH_4OH:

$\left(\text{is } \overset{\circ}{\Lambda}_m\left(NH_4OH\right) \right)$ is equal to:

a) $\overset{o}{\Lambda}m\left(NH_4Cl\right) + \Lambda_{m(NaCl)} - \overset{\circ}{\Lambda}_{m(NaOH)}$ b) $\overset{o}{\Lambda}_{m(NaOH)} + \Lambda^{o}_{m(NaCl)} - \overset{o}{\Lambda}\Lambda_m\left(NH_4Cl\right)$

c) $\overset{o}{\Lambda}_m\left(NH_4OH\right) + \Lambda^{o}_m\left(NH_4Cl\right) - \Lambda^{o}_{m(HCl)}$ d) $\Lambda_m\left(NH_4Cl\right) + \overset{o}{\Lambda}_m(NaOH) - \Lambda_{m(NaCl)}$

209. Using the data given in find out in which option the order of reducing power is correct

$E^0_{Cr_2{}^{2-}_7/Cr^{3+}} = 1.33V; E^0_{Cl2/Cl^-} = 1.36V$

$E^0_{MnO_4^-/Mn^{2+}} = 1.51V; E^0_{Cr^{3+}/cr} = -0.74V$

a) $Cr^{3+} < Cl^- < Mn^{2+} < Cr$ b) $Mn^{2+} < Cl^- < Cr^{3+} < Cr$ c) $Cr^{3+} < Cl^- < Cr_2O_7^{2-} < MnO_4^-$

d) $Mn^{2+} < Cr^{3+} < Cl^- < Cr$

210. E^0 for the cell, $Zn \mid Zn^{2+}(aq) \mid\mid Cu^{2+}(aq) \mid Cu$ is 1.10 V at 25^0C. The equilibrium constant for the reaction,

$Zn(s) + Cu^{2+}(aq) \longrightarrow Cu(s) + Zn^{2+}(aq)$ is of the order :

a) 10^{-37} b) 10^{-28} c) 10^{18} d) 10^{17}

211. In an electrolytic cell, the flow of electrons is

a) from cathode to anode in the solution b) from cathode to anode through external supply

c) from cathode to anode through internal supply

d) from anode to cathode through internal supply.

212. A device that converts energy of combustion of fuels like hydrogen and methane, directly into electrical energy is known as

a) Electrolytic cell b) Dynamo c) Ni-Cd Cell d) Fuel cell

213. During the electrolysis of dilute sulphuric acid, the following process is possible at anode.

a) $2H_2O_{(l)} \rightarrow O_{2(g)} + 4H^+_{(aq)} + 4e^-$ b) $2So^{2-}_{4(aq)} \rightarrow S_2O^{2-}_{8(aq)} + 2e^-$

c) $H_2O_{(l)} \rightarrow H^+_{(aq)} + OH^-_{(aq)}$ d) $H_2O_{(l)} + e^- \rightarrow \frac{1}{2}H_{2(g)} + OH^-_{(aq)}$

214. In a galvanic cell, the salt bridge

(i) does not participate chemically in the cell reaction

(ii) stops the diffusion of ions from one electrode to another

(iii) is necessary for the occurrence of the cell reaction

(iv) ensures mixing of the two electrolytic solutions.

a) (i) and (iii) only b) (i) and (ii) only c) (iii) and (iv) only d) all of these.

215. Use the data given in and find out the most stable ion in its reduced form.

$E^0_{Cr_2{}^{2-}_7/Cr^{3+}} = 1.33V; E^0_{Cl2/Cl^-} = 1.36V$

$E^0_{MnO_4^-/Mn^{2+}} = 1.51V; E^0_{Cr^{3+}/cr} = -0.74V$

a) Cl^- b) Cr^{3+} c) Cr d) Mn^{2+}

216. On electrolysis of dil. sulphuric acid using platinum (pt) electrode, the product obtained at anode will be:
a) SO_2 gas b) Hydrogen gas c) Oxygen gas d) H_2S gas

217. Which of the following is the correct order in which metals displace each other from the salt solution of their salts?
a) Zn, Al, Mg, Fe, Cu b) Cu, Fe, Mg, Al, Zn c) Mg, Al, Zn, Fe, Cu d) Al, Mg, Fe, Cu, Zn