Exercise # 1

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

[1] Y will oxidize X and not Z [2] Y will oxidize Z and not X

[3] Y will oxidize both X and Z [4] Y will reduce both X and Z

Q.2 Zinc displaces copper from the solution of its salt because–

[1] Atomic number of zinc Is more than that of copper

[2] Zinc salt is more soluble in water than the copper salt

[3] Gibbs free energy of zinc is less than that of copper

[4] Zinc is placed higher than copper in electrochemical series

Q.3 In the electrochemical cell H_2(g) 1 atom I H^+(1 M) I I Cu^{2+} (1 M) I Cu(s) Which one of the following statements is true

[1] H_2 is cathode; Cu is anode [2] Oxidation occurs at Cu electrode

[3] Reduction occurs at H_2 electrode [4] H_2 is anode; Cu is cathode

Q.4 Which of the following statements about galvanic cell is incorrect

[1] Anode is positive

[2] Oxidation occurs at the electrode with lower reduction potential

[3] Cathode is positive

[4] Reduction occurs at cathode

Q.5 One of the following is false for Hg

[1] It can evolve hydrogen from H_2S [2] It is a metal

[3] It has high specific heat [4] It is less reactive than hydrogen

Q.6 When a lead storage battery is discharged

[1] SO_2 is evolved [2] Lead sulphate is consumed

[3] Lead is formed [4] Sulphuric acid is consumed

Q.7 The values of the standard oxidation potentials for some reactions are given below :

$Zn \rightarrow Zn^{2+} + 2e^-$, $E^o = + 0.762$ V $Fe \rightarrow Fe^{2+} + 2\ e^-$, $E^o = + 0.440$ V

$Cu \rightarrow Cu^{2+} + 2e^-$, $E^o = - 0.345$ V $Ag \rightarrow Ag^+ + e^-$, $E^o = - 0.800$ V

Which one of the following is most easily reduced

[1] Fe^{2+} [2] Zn^{2+} [3] Cu^{2+} [4] Ag^{+1}

Q.8 The reaction $Zn^{2+} + 2e^- \rightarrow Zn$ has a standard potential of - 0.76 V. This means

[1] Zn can't replace hydrogen from acids [2] Zn is reducing agent

[3] Zn is an oxidising agent [4] Zn^{2+} is a reducing agent

Q.9 KCI cannot be used as a salt bridge for the cell Cu(s) I $CuSO_4$(aq) II $AgNO_3$I Ag(s) because

[1] $CuCI_2$ gets precipitated [2] CI_2 gas is evolved

[3] AgCI gets precipitated [4] None of the above

Q.10 Of the following metals that cannot be obtained by electrolysis of the aqueous solution of their salts are

[1] Ag and Mg [2] Ag and AI [3] Mg and AI [4] Cu and Cr

Q.11 A solution of sodium sulphate in water is electrolyzed using inert electrodes. The products at the cathode and anode are respectively

[1] H_2, O_2 [2] O_2, H_2 [3] O_2, Na [4] O_2, SO_2

Q.12 $2H^+$ (aq) + $2e^- \rightarrow H_2$ (g). Standard electrode potential for the above reaction (in volts) is

[1] 0 [2] +1 [3] –1 [4] None of these

Q.13 In the electrolysis of NaCl

[1] Cl^- is oxidized at anode [2] Cl^- is reduced at anode

[3] Cl^- is reduced at cathode [4] Cl^- is neither reduced nor oxidized

Q.14 The conductivity of strong electrolyte

[1] increases on dilution slightly [2] does not change on dilution

[3] decreases on dilution [4] depends on density of electrolyte

Q.15 Which of the following is a poor conductor of electricity

[1] CH_3COONa [2] C_2H_5OH [3] NaCl [4] KOH

Q.16 The most durable metal plating on iron to protect against corrosion is

[1] nickel plating [2] copper plating [3] tin plating [4] zinc plating

Q.17 Which one of the following reaction occurs at the cathode

[1] $2OH^- \rightarrow H_2O + O + 2e^-$ [2] $Ag \rightarrow Ag^+ + e^-$

[3] $Fe^{2+} \rightarrow Fe^{3+} + e^-$ [4] $Cu^{2+} + 2e^- \rightarrow Cu$

Q.18 The art of electroplating was given by

[1] Faraday [2] Edison [3] Thomas Graham [4] Daniell

Q.19 The standard reduction potentials of 4 elements are given below. Which of the following will be the most suitable reducing agent

I = - 3.04 V II = - 1.90 V III=0.V IV = 1.90 V

[1] III [2] II [3] I [4] IV

Q.20 E^o value of Mg^{2+} I Mg, Fe^{2+} I Fe and Zn^{2+} I Zn are - 2.37 V, - 0.44 V and - 0.76 V respectively. The correct statement is

[1] Mg oxidizes Fe [2] Zn oxidizes. Fe [3] Zn reduces Mg [4] Zn reduces Fe^{2+}

Q.21 Silver from silver nitrate is deposited by copper because

[1] E^o (Cu^{2+}, Cu) < E^o(Ag^+, Ag) [2] E^o(Ag^+, Ag) < E^o (Cu^{2+}, Cu)

[3] E^o (Cu^{2+}, Cu) = E^o (Ag^+ , Ag) [4] None of these

Q.22 The standard reduction potential values of three metallic cations, X, Y. Z are 0.52, - 3.03 and - 1.18V respectively. The order of reducing power of the corresponding metals is

[1] Y > Z > X [2] X > Y > Z [3] Z > Y > X [4] Z > X > Y

Q.23 Out of Cu, Ag, Fe and Zn, the metal which can displace all others from their salt solution is

[1] Ag [2] Cu [3] Zn [4] Fe

Q.24 The cell reaction $Zn + Cu^{+2} \rightarrow Zn^{+2} + Cu$ is best represented by

[1] Cu/Cu^{+2} I I Zn^{+2}/Zn [2] Zn/Zn^{+2} I I Cu^{+2}/Cu

[3] Cu^{+2}/Cu I I Zn/Zn^{+2} [4] $PtlZn^{+2}$ I I Pt/Cu^{+2}

Q.25 Stronger is oxidizing agent, greater is the

[1] Standard reduction potential [2] Standard oxidation potential

[3] Ionic nature [4] None

Q.26 When a copper wire is placed in a solution of $AgNO_3$, the solution acquires blue colour. This is due to the formation of

[1] Cu^{+2} ions [2] Cu + ions

[3] Soluble complex of Cu with $AgNO_3$ [4] None

Q.27 How many faraday are needed to reduce a mole of MnO_4^- to Mn^{2+}

[1] 4 [2] 5 [3] 3 [4] 2

Q.28 Which one of the following will not conduct electricity

[1] Crystalline NaCl [2] $CuSO_4$ solution

[3] Graphite [4] NaCl crystal having defects

Q.29 The relationship between equivalent conductivity (Λ), specific conductivity (K) and normality (xN) of a solution is

[1] $K = \frac{1000 \times x}{\Lambda}$ [2] $\Lambda = \frac{1000 \times K}{x}$ [3] $\Lambda = \frac{K}{1000 \times x}$ [4] $\frac{\Lambda}{1000 \times x}$

Q.30 The cell constant is the product of resistance and

[1] conductance [2] molar conductance

[3] specific conductance [4] specific resistance

Q.31 The cell reaction for the cell $Zn + Zn^{2+}$ (1.0M) | Cd^{2+} (1.0 M) | Cd is given by –

[1] $Cd \rightarrow Cd^{2+} + 2e^-$ [2] $Zn^{2+} \rightarrow Zn - 2e^-$

[3] $Cd + Zn^{2+} \rightarrow Zn + Cd^{2+}$ [4] $Zn + Cd^{2+} \rightarrow Zn^{2+} + Cd$

Q.32 The cell reaction $Zn + 2Ag^+ \rightarrow Zn^{2+} + Ag$ is best represented by

[1] Ag I Ag^+ I Zn I Zn^{2+} [2] Zn I Zn^{2+} I I Ag^+ I Ag

[3] 2Ag I Ag^+ I I Zn I Zn^{2+} [4] Zn I Zn^{2+} I I 2Ag I Ag^+

Q.33 Normal hydrogen electrode (N.H. E.) has been assigned as potential of

[1] 0 volt [2] 1 volt [3] 10 volt [4] 100 volt.

Q.34 $E_0 = \frac{RT}{nF} \ln K_{eq}$. This is called –

[1] Gibb's equation [2] Gibb's - Helmholtz equation

[3] Nernst's equation [4] van der Waals equation

Q.35 When electric current is passed through a cell having an electrolyte, the positive ions move towards the cathode and the negative ions towards the anode. If the cathode is pulled out of the solution

[1] The positive and negative ions will move towards the anode

[2] The positive ions will start moving towards the anode, the negative ions will stop moving

[3] The negative ions will continue to move towards the anode and the positive ions will stop moving

[4] The positive and negative ions will start moving randomly

Q.36 The number of electrons required. to deposit 1 gm atom of aluminium (at. wt. = 27) from a solution of aluminium chloride will be (where N is Avogadro's number)

[1] 1N [2] 2N . [3] 3N [4] 4N

Q.37 Which of the following is displaced by Fe -

(a) Ag (b) Hg (c) Zn (d) Na

[1] a, c [2] a, b [3] b. c [4] b, d

Q.38 Nernst equation is related with

[1] The electrode potential and concentration of ions in the solution

[2] Equilibrium constant and concentration of ions

[3] Free energy change and E.M.F. of the cell

[4] None

Q.39 Which is responsible for electrical conduction of molten sodium chloride

[1] Free electrons [2] Free ions

[3] Free molecules [4] Atoms of sodium and chlorine

Q.40 A standard hydrogen electrode has zero electrode potential because

[1] Hydrogen is easiest to oxidise [2] The electrode potential is assumed to be zero

[3] Hydrogen atom has only one electron [4] Hydrogen is the lightest element

Q.41 Standard reduction potentials at 25° C of Li^+ I Li, Ba^{2+} I Ba, Na^+ I Na and Mg^{2+} I Mg are –3.05, –2.90, –2.71 and - 2.37 volt respectively. Which one of the following is the strongest oxidising agent

[1] Na^+ [2] Li^+ [3] Ba^{2+} [4] Mg^{2+}

Q.42 When a solution of an electrolyte is heated the conductance of the solution –

[1] Increases because of the electrolyte conducts better

[2] Decreases because of the increased heat

[3] Decreases because of the dissociation of the electrolyte is suppressed

[4] Increases because the electrolyte is dissociated more

Q.43 Which of the following aqueous solutions will conduct an electric current quite well

[1] Sugar [2] Glycerol [3] Pure water [4] HCI

Q.44 The unit of electric charge is equal to

[1] Faraday / Avogadro number [2] Faraday x Avogadro number

[3] Avogadro number/Faraday [4] None of these

Q.45 Solid NaCI is a bad conductor of electricity because

[1] Solid NaCI is covalent [2] In solid state there are no ions

[3] In solid NaCI, there is no migration of ions

[4] ln solid NaCl, there are no electrons

Q.46 Water is nonelectrolyte but conducts electricity on dissolving a small amount of

[1] NaCI [2] Sugar [3] Acetone [4] Oxygen

Q.47 A conductance cell was filled with a 0.02 M KCl solution which has a specific conductance of 2.768×10^{-3} ohm^{-1} cm^{-1}. If its resistance is 82.4 ohm at 25°C, the cell constant is

[1] 0.2182 cm^{-1} [2] 0.2281 cm^{-1} . [3] 0.2821 cm^{-1} [4] 0.2381 cm^{-1}

Q.48 The resistance of 1 N solution of acetic acid is 250 ohm when measured in a cell of cell constant 1.15 cm^{-1}. The equivalent conductance (in Ohm^{-1} cm^2 $equiv^{-1}$) of 1 N acetic acid is

[1] 4.6 [2] 9.2 [3] 18.4 [4] 0.023

Q.49 The degree of dissociation of an electrolyte does not depends on

[1] Nature of electrolyte [2] Catalytic action

[3] Dilution [4] Temperature

Q.50 The cathodic reaction in electrolysis of dilute sulphuric acid with platinum electrode is

[1] Oxidation [2] Reduction

[3] Both oxidation and reduction [4] Neutralization

Answer Key

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

Exercise # 2

Q.1 The passage of current through a solution of certain electrolyte results in the evolution of H_2 at cathode and Cl_2 at anode. The electrolytic solution is

[1] Water [2] H_2SO_4 [3] Aqueous NaCl [4] Aqueous $CuCl_2$

Q.2 During electrolysis all ions move

[1] In the same direction [2] Toward oppositely charged electrodes

[3] Do not move [4] None of the above

Q.3 Which is an electrolyte

[1] $AgNO_3$ solution [2] Ethanol [3] Mercury [4] Sugar solution

Q.4 In an electrolytic cell current flows from

[1] Cathode to anode in outer circuit [2] Anode to cathode outside the cell

[3] Cathode to anode inside the cell [4] None

Q.5 During electrolysis of fused NaOH, which of the following ions move towards anode

[1] H^+ [2] OH^- [3] Na^+ [4] None

Q.6 The element easiest to reduce is

[1] Fe [2] Cu [3] Ag [4] Sn

Q.7 A cell in which electric current is produced by an oxidation reduction process is called

[1] Voltaic cell [2] Standard cell [3] Reversible cell [4] Concentration cell

Q.8 The reference electrode is made from

[1] $CuSO_4$ [2] $ZnCl_2$ [3] $HgCl_2$ [4] Hg_2Cl_2

Q.9 Arrange the following in the order of their decreasing electrode potentials: Mg, K, Ba, Ca

[1] K, Ba, Ca, Mg [2] Ba, Ca, K, Mg [3] Ca, Mg, K, Ba [4] Mg, Ca, Ba, K

Q.10 Cathodic standard reduction potential minus anodic standard reduction potential is equal to

[1] Faraday [2] Coulomb [3] Cell potential [4] Ampere

Q.11 If the electrode potential of four elements P, Q, X, Y are 1.46 V, –0.36 V, 0.00 V and –1.24 V respectively, the maximum reactivity is shown by -

[1] P [2] Q [3] X [4] Y

Q.12 The standard electrode potential of four elements A, B, C, D are - 3.05, - 1.66, - 0.40, + 0.80 V. The high reactivity will be shown by

[1] A [2] B [3] C [4] D

Q.13 The oxidation potential of Mg and Al are + 2.37 and + 1.66 V. The Mg in chemical reactions

[1] Will be replaced by Al [2] Will replace Al

[3] Will not be able to replace Al [4] None of these

Q.14 Electrolysis of salt solution is due to the formation of

[1] Ions [2] Electrons [3] Acids [4] Oxides

Q.15 In aqueous solution, strong electrolytes ionize

[1] Almost completely [2] About 5% [3] About 20% [4] Incompletely

Q.16 During electrolysis of fused NaCl the reaction that occurs at anode is

[1] Cl^- ions are oxidized [2] Na^+ ions are oxidized

[3] Cl^- ions are reduced [4] Na^+ ions are reduced

Q.17 Electrolysis of an aqueous solution of NaOH between platinum electrodes yields

[1] H_2 at cathode only [2] O_2 at anode only

[3] H_2 at cathode, O_2 at anode [4] H_2 at anode, O_2 at cathode

Q.18 Faraday's laws of electrolysis are related to the

[1] Molecular mass of the electrolyte [2] Equivalent weight of the electrolyte

[3] Atomic weight of the cation/anion [4] Atomic number of the cation/anion

Q.19 If m represents mass of a substance (equivalent weight E) consumed or produced when quantity Q of electricity is passed then,

[1] $m \propto Q$ [2] $m \propto (1/Q)$ [3] $m \propto (1/E)$ [4] $m \propto Q.E.$

Q.20 The unit of electrochemical equivalent is

[1] Gram [2] Gram/Ampere [3] Gram/Coulomb [4] Coulomb/Gram

Q.21 The electric charge for electrode deposition of 1 g equivalent of a substance is

[1] 96500 coulombs per second [2] One ampere per second

[3] One ampere for one hour [4] Charge in Faradays on one mole of electrons

Q.22 The number of moles of Faradays needed to reduce a mole of Fe^{3+} to Fe^{2+} are

[1] 1 [2] 2 [3] 3 [4] 5

Q.23 Which of the following energy changes occur in galvanic cell -'

[1] Electrical energy $\rightarrow$ Chemical energy [2] Chemical energy $\rightarrow$ Electrical Energy

[3] Chemical energy $\rightarrow$ Internal energy [4] Internal energy $\rightarrow$ Electrical energy

Q.24 The single electrode potential E of 0.1 M solution of M^+ ions [E^o = -2.36 V] is

[1] + 2.41 [2] - 2.41 [3] - 4.82 [4] + 4.82

Q.25 The emf for the cell Ni I Ni^{2+} (1.0M) I I Au^{3+} (1.0M) I Au (E^o for Ni^{2+} I Ni = –0.25 V. E^o for Au^{3+} I Au = 1.50V) is

[1] 1.25 V [2] - 4.0 V [3] 1.75 V [4] - 1.75 V

Q.26 What is the emf of the cell Cr I Cr^{3+} (1.0M) I I Co^{2+} (1.0M) I Co [E^o For Cr^{3+} , Cr = –0.74 V & Co^{2+}, Co = –0.28V)–

[1] –0.74 –(–0.28) = –0.46 V [2] –0.74 + (–0.28) = –1.02 V

[3] –0.28 –(–0.74) = + 0.46 V [4] –0.28 (x_2) –(–0.74) x [3] = + 1.66 V

Q.27 The reaction ½ $H_2(g)$ + AgCI (s) = H^+ (aq.) + Cl^- (aq) + Ag (s) can be represented in the galvanic cell as

[1] Ag I AgCI(s) I KCI (soln.) I $AgNO_3$(soln.) I Ag

[2] Pt I H_2(g) I HCI(soln.) I $AgNO_3$ (soln.) I Ag

[3] Pt I H_2(g) I HCI(soln.) I AgCI(s) I Ag

[4] Pt I H_2(g) I KCI (soln.) I AgCI(s) I Ag

Q.28 The electrolytic cell, one containing acidified ferrous chloride and another acidified ferric chloride are connected in series. The ratio of iron deposited at cathodes in the two cells when electricity is passed through the cells will be

[1] 3 : 1 [2] 2 : 1 [3] 1 : 1 [4] 3 : 2

Q.29 A certain current deposits 0.50 g of hydrogen in 2 hrs. The amount of copper liberated from a solution of copper sulphate by the same current flowing for the same time would be

[1] 31.8 g [2] 63.6 g [3] 15.9 g [4] 6.36 g

Q.30 How long will it take for a current of 3 amperes to decompose 36 g of water. (Eq. wt. of hydrogen is 1 and that of oxygen 8)

[1] 36 hrs [2] 18 hrs [3] 9 hrs [4] 4.5 hrs

Q.31 For a reaction A (s) + $2B^+ \rightarrow A^{2+} + 2B$ K_c has been found to be 10^{12} . The E^o_{cell} is .

[1] 36 hours [2] 18 hours [3] 9 hours [4] 4.5 hours

Q.32 Standard electrode potential NHE electrode at 298 K is

[1] 0.05 V [2] 0.1 V [3] 0.00 V [4] 0.11 V

Q.33 The quantity of electricity needed to liberate 0.5 gram equivalent of an element is

[1] 48250 Faradays [2] 48250 Coulombs [3] 193000 Faradays [4] 193000 Coulombs

Q.34 From the following E^o value of half cells

(i) $A + e \rightarrow A^-$; $E^o = -8.24$ V (ii) $B^- + e \rightarrow B^{2-}$; $E^o = + 1.25$ V

(iii) $C^- + 2e \rightarrow C^{3-}$; $E^o = -1.25$ V (iv) $D + 2e \rightarrow D^{2-}$; $E^o = + .68$ V

What combination of two half cells would result in a cell with the largest potential

[1] (ii) & (iii) [2] (ii) & (iv) [3] (i) & (iii) [4] (i) & (Iv)

Q.35 E^o for $F_2 + 2e = 2F^-$ is 2.8 V, E^o for $\frac{1}{2}F_2 + e^- = F^-$ is

[1] 2.8 V [2] 1.4 V [3] –2.8 V [4] –1:4 V

Q.36 The half cell reduction potential of a hydrogen electrode at pH = 10 will be

[1] 0.59 V [2] – 0.59 V [3] 0.059 V [4] – 0.059 V

Q.37 10800 C of electricity through the elecrolyte deposited 2.977 g of metal with atomic mass 106.4 g mol^{-1} The charge on the metal cation is - .

[1] + 4 [2] + 3 [3] + 2 [4] + 1

Q.38 In passing 3 faraday of electricity through the three electrolytic cells connected in series containing Ag^+, Ca^{2+} and AI^{+3} ions respectively. The molar ratio in which the three metal ions are liberated at the electrodes is –

[1] 1 : 2 : 3 [2] 3 : 2 : 1 [3] 6 : 3 : 2 [4] 3 : 4 : 2

Q.39 How many Coulomb of electricity are consumed when 100 mA current is passed through a solution of $AgNO_3$ for half an hour during electrolysis

[1] 108 [2] 180 [3] 1800 [4] 18000

Q.40 On passing 3 ampere current for 50 minute, 1.8 g of metal deposits. The equivalent weight of metal

[1] 20.5 [2] 25.8 [3] 19.3 [4] 30.7

Q.41 E^o_{RP} for Fe^{+2}/Fe and Sn^{+2}/Sn are –0.44 and –0.14 volt respectively. The standard emf for cell $Fe^{+2} + Sn \rightarrow Sn^{+2} + Fe$ is

[1] + 0.30 V [2] –0.58 V [3] + 0.58 V [4] –0.30 V

Q.42 The hydrogen electrode is dipped in a solution of pH 3 at 25°C. The reduction potential of half cell would ::Je

[1] 0.177 V [2] - 0.177 V [3] 0.087 V [4] 0.059 V

Q.43 The standard reduction potentials of Cu^{2+}/Cu and Cu^{2+}/Cu + are 0.337 and 0.153 V respectively. The standard electrode potential of Cu^+ / Cu half cell is

[1] 0.184 V [2] 0.827 V [3] 0.521 V [4] 0.490 V

Q.44 The solution of nickel sulphate in which nickel rod is dipped is diluted to 10 times. The potential of nickel

[1] Decreases by 60 mV [2] Increases by 30 m V

[3] Decreases by 30 m V [4] Decreases by 60 V

Q.45 The standard reduction potentials, E^o, for the half reactions are

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

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

The EMF for the cell reaction

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

[1] - 0.35 V [2] + 0.35 V [3] + 1.17 V [4] - 1.17 V

Q.46 The standard reduction potential for Fe^{2+} / Fe and Sn^{2+} / Sn electrodes are – 0.44 and – 0.14 volt respectively.

For the cell reaction:

$Fe^{2+} + Sn \rightarrow Fe + Sn^{2+}$ the standard emf is

[1] + 0.30 V [2] –0.58 V [3] + 0.58 V [4] –0.30V

Q.47 For the electrochemical cell, M I M^+ I X^- I X, E^o (M^+/M) = 0.44 V and E^o (X / X^-) = 0.33 V. From this data, one can deduce that

[1] $M + X \rightarrow M^+ + X^-$ is the spontaneous reaction [2] $M^+ + X^- \rightarrow M + X$ is the spontaneous reaction

[3] E_{cell} = 0.77 V [4] None

Q.48 The values of Λ^{∞}_{eq} for NH_4Cl, NaOH and NaCl are respectively 149.74, 248.1 and 126.4 $ohm^{-1}cm^2$ $equi^{-1}$

The value of Λ^{∞}_{eq} in NH_4OH is

[1] 371.44 [2] 271.44

[3] 71.44 [4] It cannot be calculated from the data given

Q.49 The equivalent conductance of 0.001 M acetic acid is 50 ohm^{-1} cm^2 etc. The maximum value of equivalent conductance is 250 ohm^{-1} cm^2 eq^{-1}. What is its degree of ionization

[1] 0.2% [2] 2% [3] 20 % [4] Some other value

Q.50 What weight of copper will be deposited by passing 2 faradays of electricity through a cupric salt

[1] 2.0 g [2] 3.175 g [3] 63.5 g [4] 127.0 g

Q.51 The electrochemical equivalent of silver is 0.00111 8 g. When an electric current of 0.5 ampere is passed through an aqueous silver nitrate solution for 200 seconds, the amount of silver deposited is

[1] 1.118 g [2] 0.1118 g [3] 5.590 g [4] 0.5590 g

Q.52 A current of 9.65 ampere flowing for 10 minutes deposits 3.0 g of the metal which is monovalent the atomic mass of the metal is

[1] 10 [2] 50 [3] 30 [4] 96.5

Q.53 When 96500 coulomb of electricity is passed through a copper sulphate solution, the amount of copper deposited will be

[1] 0.25 mol (2.) 0.50 mol [3] 1.00 mol [4] 2;00 mol

Q.54 The e.m.f. of the cell in which the following reaction $Zn(s) + Ni^{2+}(a = 1.0)$ □ Zn^{2+} (a = 10) + Ni(s) occurs, is found to be 0.5105 V at 298 K. The standard e.m.f. of the cell is

[1] 0.5400 [2] 0.4810 V [3] 0.5696 V [4] -0.5105 V

Q.55 The number of coulombs required for the deposition of 107.870 g of silver is

[1] 96,500 [2] 48,250 [3] 1,93,000 [4] 10,000

Q.56 When $E°_{Ag^+/Ag}$ = 0.8 volt and $E°_{Zn^{2+}/Zn}$ = –0.76 volt, which of the following is correct

[1] Ag^+ can be reduced by H_2 [2] Ag can oxidise H_2 into H^+

[3] Zn^{2+} can be reduced by H_2 [4] Ag can reduce Zn^{2+} ion

Q.57 At 298 K, the standard reduction potentials for the following half reactions are given as :

Zn^{2+} (aq) + $2e^- \rightarrow Zn^{2+}$(s); –0.762, Cr^{3+} (aq) + $3e^- \rightarrow$ Cr(s) ; –0.740

$2H^+$(aq) + $2e^- \rightarrow H_2$(g); 0.00, Fe^{3+} (aq) + $e^- \rightarrow Fe^{2+}$ (aq) ; + 0.770

The strongest reducing agent is

[1] Zn (s) [2] H_2 (g) [3] Cr (s) [4] Fe^{2+} (aq)

Q.58 The two electrodes of platinum fitted in a conductance cell are 1.5 cm apart while the area of cross section of each electrode is 0.75 cm^2. The cell constant is

[1] 0.2 cm^{-1} [2] 0.5 cm^{-1} [3] 0.125 cm^{-1} [4] 2.0 cm^{-1}

Q.59 Which of the following will increase the voltage of the cell Sn (s) + $2Ag^+$ (aq) $\rightarrow$ Sn^{2+} (aq) + 2 Ag (s)

[1] Increase in the concentration of Sn^{2+} ions [2] Increase in the concentration of Ag^+ ions

[3] Increase in the size of silver rod [4] None

Q.60 The standard reduction potentials, E^o for the half reactions are as $Zn = Zn^{2+} + 2e$, $E^o = 0.76$ V, $Fe = Fe^{2+} + 2e$, $E^o = 0.41$ V. The emf for the cell reaction $Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$, is

[1] – 0.35 V [2] + 0.35 V [3] + 1.17 V [4] – 1.17 V

Q.61 At 20°C, the standard oxidation potential of Zn and Ag in water are

$Zn\ (s) \rightarrow Zn^{2+}\ (aq) + 2e^-$; $E^o = 0.76$ V, $Ag\ (s) \rightarrow Ag^+\ (aq) + e^-$; $E^o = -0.80$ V

Which of the following reaction actually takes place

[1] $Zn^{2+}\ (aq) + 2\ Ag\ (s) \rightarrow 2\ Ag + (aq) + Zn\ (s)$ [2] $Zn\ (s) + 2Ag^+\ (aq) \rightarrow Zn^{2+}\ (aq) + 2\ Ag\ (s)$

[3] $Zn^{2+}\ (aq) + 2\ Ag\ (aq) \rightarrow Zn\ (s) + Ag\ (s)$ [4] $Zn\ (s) + Ag\ (s) \rightarrow Zn^{2+}\ (aq) + Ag\ (aq)$

Q.62 The standard electrode potentials of Zn^{2+}/Zn and Ag^+/Ag are –0.763 V and + 0.799 V respectively. The standard potential of the cell is

[1] 1.56 V [2] 0.036 V [3] -1.562 V [4] 0.799 V

Q.63 The cell reaction of a cell is $Mg(s) + Cu^{2+}(aq) \rightarrow Cu(s) + Mg^{2+}\ (aq)$. If the standard reduction potentials of Mg and Cu are -2.37 and + 0.34 V respectively. The emf of the cell is

[1] 2.03 V [2] -2.03 V [3] + 2.71 V [4] -2.71 V

Q.64 What weight of copper will be deposited by passing 2 Faradays of electricity through a solution of cupric salt -

[1] 31.75 g [2] 63.5 g [3] 20.0 g (4) 40.0 g

Q.65 On passing electric current into a solution of a salt of metal, M, the reaction at the cathode takes place as: $M^{2+} + 2e^- \rightarrow M$. Atomic weight of M is 65. The equivalent weight of metal is

[1] 65 (2} 32.5 [3] 130 , [4] 200

Q.66 The amount of electricity that should be passed through $CuSO_4$ solution with Cu electrodes to deposit 0.1 g atom of Cu is

[1] 9650 coulombs [2] 96500 coulombs [3] 19300 coulombs [4] 193000 coulombs

Q.67 A current of 0.5 ampere when passed through $AgNO_3$ solution for 193 sec. deposited 0.108g of Ag. The equivalent weight of silver is

[1] 108 [2] 54 [3] 5.4 [4] 10.8

Q.68 A solution containing one mole per litre of each $Cu(NO_3)_2$, $AgNO_3$, $Hg_2(NO_3)_2$, $Mg\ (NO_3)_2$ is being electrolyzed by using inert electrodes. The value of reduction potentials are $Ag/Ag^+ = + 0.80$, $2Hg/Hg_2^{2+} = 0.79$, $Cu/Cu^{2+} = + 0.34$, $Mg/Mg^{2+} = - 2.7$.With increasing voltage, the sequence of deposition of metals on the cathode will be

[1] Ag, Mg Hg, Cu [2] Ag, Hg, Cu [3] Cu, Hg, Ag, Mg [4] Mg, Cu, Hg, Ag

Q.69 A current of 2.6 ampere is passed through $CuSO_4$ solution for 6 minutes 20 seconds. The amount of Cu deposited is (At. wt. of Cu = 63.5, Faraday = 96500 C)

[1] 6.35 g [2] 0.635 g [3] 0.325 g [4] 3.175 g

Q.70 A certain current liberates 0.504 g of H_2 in 2 hours. How many grams of copper can be liberated by the same current flowing for the same time in $CuSO_4$ solution - .

[1] 31.8 g [2] 15.9 g [3] 12.7 g [4] 63.5 g

Answer Key

Qus.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Ans.	3	2	1	2	2	3	1	4	4	3	4	1	2	1	1	1	3	2	1	3	4	1	2	**2**	**3**
Qus.	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
Ans.	3	3	4	3	1	1	3	2	1	1	2	1	3	2	3	4	2	3	3	2	4	2	2	3	3
Qus.	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**					
Ans.	2	2	2	2	1	1	1	4	2	2	2	1	3	2	2	3	1	2	3	2					

Exercise # 3

Q.1 Which of the following is not true about e.m.f. of a cell **[AIIMS 94]**

[1] It is maximum voltage obtainable from the cell

[2] It is responsible for the flow of steady current in the cell

[3] Work calculated from it is not the maximum work obtainable from the cell

[4] It is the potential difference between two electrode when no current is flowing in circuit

Q.2 The standard reduction potentials for the following half - cell reactions are **[BHU 95]**

$Zn \rightarrow Zn^{2+} + 2e^-$; $E^o = 0.76$ V ; $Fe \rightarrow Fe^{2+} + 2e^-$; $E^o = -0.44$ V

The e.m.f. for the cell reaction $Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$ will be

[1] –0.32V [2] + 0.32 V [3] + 1.20 V [4] –1.20 V

Q.3 If $[Zn^{2+}] = 0.1$ M and $E^o = -0.76$ V then half cell potential at 298 K for the reaction

Zn^{2+} (aq) + $2e^- \rightarrow$ Zn (s) is – **[BHU 95]**

[1] 0.789V [2] - 0.789 V [3] - 0.698 V [4] 0.698 V

Q.4 A current of 5 ampere is passed through the solution of zinc sulphate for 40 minutes then the amount of deposited zinc on cathode will be - **[CPMT 96]**

[1] 40.65gm [2] 4.065 gm [3] 0.4056 gm [4] 65.04 gm

Q.5 When 0.04 faraday of electricity is passed through a solution of $CaSO_4$, then the weight of Ca^{+2} metal deposited at the cathode is - **[BHU 96]**

[1] 0.2 g [2] 0.4 g [3] 0.6 g [4] 0.8 g

Q.6 Aluminium is obtained at cathode when the molten mixture of Na_3AlF_6 and Al_2O_3 is electrolyzed the compound obtained at anode will be- **[RPET 96]**

[1] O_2 [2] OF_2 [3] F_2 [4] NaF

Q.7 The standard potential of the following reactions are as

$Zn \rightarrow Zn^{+2} + 2e^-$: $E_0 + 0.76$ V

$Fe^{+2} + 2e^- \rightarrow Fe$: $E_0 = - 0.41$ V

The electromotive force (e.m.f) of the cell reaction **[RPET 96]**

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

[1] + 0.35 V [2] –0.35 V [3] +1.17 V [4] –1.17 V

Q.8 The amount of electricity required to deposit 0.9 g of aluminium, when the electrode reaction is

$Al^{3+} + 3e^- \rightarrow Al$ **[BHU 97]**

[1] 9.65×10^3C [2] 1.93×10^4C [3] 9.65×10^4C [4] 4.34×10^4C

Q.9 A certain current liberated 0.504 g of hydrogen in 2 hours. How many grams of copper can be liberated by the same current flowing for the same time in copper sulphate solution- **[AIIMS 98]**

[1]12.7g [2] 16.0 g [3] 31.8 9 [4] 63.5 9

Q.10 The specific conductance of a N/10 KCl at 25°C is 0.0112 ohm-1 cm^{-1}. The resistance of cell containing solution at the same temperature was found to be 55 ohms. The cell constant will be- **[AIIMS 98]**

[1] 0.0616 cm^{-1} [2] 0.616 cm^{-1} [3] 6.16 cm^{-1} [4] 616 cm^{-1}

Q.11 What is the amount of chlorine evolved, when 2A of current is passed for 30 minutes in an aqueous solution of NaCl - **[BHU 98]**

[1] 1.32g [2] 4.56 g [3] 9.81 g [4] 12.6 g

Q.12 If conductivity & relative conductivity are equal then all constants will be **[RPET 99]**

[1] 1 [2] 0 [3] 0.33 [4] 0.40

Q.13 0.5 Faraday current flows in 1 mole NaCl. How many gms CI will be produced **[RPET 99]**

[1] 71 gm [2] 35.5 [3] 77.5 gm [4] 17.75 gm

Q.14 In a cell oxidation & reduction are occurring simultaneously, when would be e.m.f. **[RPET 99]**

[1] + ion [2] - ion [3] zero [4] constant

Q.15 Process of Galvanization is present in which metal **[RPET 99]**

[1] Cu [2] Zn [3] Al [4] Mg

Q.16 Equivalent conductances of Ba^{+2} & CI^{-} ions are 127 & 76 ohm^{-1} cm^{-1} eq^{-1} respectively. Equivalent conductance of $BaCl_2$ at infinite dilution is - . **[CPMT 2000]**

[1] 139.5 [2] 101.5 [3] 203 [4] 279

Q.17 For the cell, the cell reaction is Mg (s) + Cu^{2+} (aq) $\rightarrow$ Cu(s) + Mg^{2+} (aq). If standard reduction potentials of Mg and Cu are - 2.37 and + 0.34 V respectively. emf of cell is - **[AFMC 2000]**

[1] 2.03V [2] – 2.03 V [3] 2.71 V [4] –2.71 V

Q.18 When a lead battery discharges, which of these occurs **[AFMC 2001]**

[1] Pb is formed [2] Sulphuric acid is consumed

[3] $PbSO_4 \rightarrow Pb^{2+} + SO_4^{2-}$ [4] $PbSO_4 + H_2 \rightarrow Pb + H_2SO_4$

Q.19 Saturated solution of KNO_3 is used to make 'Salt - bridge' because **[IIT Scr. 2001]**

[1] Velocity of K^+ is greater than that of NO_3

[2] Velocity of NO_3^- is greater than that of K^+

[3] Velocities of both K^+ and NO_3^- are nearly the same

[4] KNO_3 is highly soluble in water

Q.20 The standard cell potential of: Zn/Zn^{2+} (aq) II Cu^{2+} (aq) I Cu cell is 1.10 V

The maximum work obtained by this cell will be **[MPPET 2002]**

[1] -106.15 kilo joule [2] - 212.30 kilo joule

[3] - 318.45 kilo joule [4] - 424.60 kilo joule

Q.21 Which of the following reactions occur at the cathode during the charging of a lead storage battery **[MPPET 2002]**

[1] $Pb^{2+} + 2e^- \rightarrow Pb$ [2] $Pb^{2+} + SO_4^{2-} \rightarrow PbSO_4$

[3] $Pb \rightarrow Pb^{2+} + 2e^-$ [4] $PbSO_4 + 2H_2O \rightarrow PbO_2 + 4H^+ + SO_2^{2-} + 2e^-$

Q.22 At cathode, the electrolysis of aqueous Na_2SO_4 gives - **[MPPMT 2002]**

[1] Na [2] H_2 [3] SO_3 [4] SO_2

Q.23 In galvanic cell the salt bridge is used to **[MPPMT 2002]**

[1] Complete the circuit [2] Reduce the electrical resistance in the cell

[3] Separate cathode from anode [4] Carry salts for the chemical reaction

Q.24 The reference electrode is made by using **[MPPMT 2002]**

[1] $ZnCl_2$ [2] $CuSO_4$ [3] $HgCl_2$ [4] Hg_2Cl_2

Q.25 EMF of a cell in terms of reduction potential of its left and right electrodes is **[AIEEE 2002]**

[1] $E = E_{left} - E_{right}$ [2] $E = E_{left} + E_{right}$ [3] $E = E_{right} - E_{left}$ [4] $E = -(E_{right} + E_{left})$

Q.26 When $KMnO_4$ acts as an oxidising agent and ultimately forms $[MnO_4]^{-2}$, MnO_2, Mn_2O_3, Mn^{+2} then the number of electrons transferred in each case respectively is **[AIEEE 2002]**

[1] 4, 3, 1, 5 [2] 1, 5, 3, 7 [3] 1, 3, 4, 5 [4] 3, 5, 7, 1

Q.27 Conductivity (unit Siemen's) is directly proportional to area of the vessel and the concentration of the slution in it and is inversely proportional to the length of the vessel then the unit of the constant of proportionality is **[AIEEE 2002]**

[1] Sm mol^{-1} [2] Sm^2 mol^{-1} [3] $S^{-2}m^2mol$ [4] $S^2m^2mol^{-2}$

Q.28 What will be the emf for the given cell Pt $|H_2(P_1)|$ $H^+(aq)$ $||$ $H_2(P_2)|$ Pt **[AIEEE 2002]**

[1] $\frac{RT}{f}\log\frac{P_1}{P_2}$ [2] $\frac{RT}{2f}\log\frac{P_1}{P_2}$ [3] $\frac{RT}{f}\log\frac{P_2}{P_1}$ [4] None of these

Q.29 Which of the following reaction is possible at anode **[AIEEE 2002]**

[1] $2Cr^{3+} + 7H_2O \rightarrow Cr_2O_7^{2-} + 14H^+$ [2] $F_2 \rightarrow 2F^-$

[3] $½O_2 + 2H^+ \rightarrow H_2O$ [4] None of these

Q.30 When the sample of copper with zinc impurity is to be purified by electrolysis, the appropriate electrodes are **[AIEEE 2002]**

	Catode	**Anode**
[1]	Pure zinc	Pure copper
[2]	Impure sample	Pure copper
[3]	Impure zinc	Impure sample
[4]	Pure copper	Impure sample

Q.31 For a cell reaction involving a two–electrons change, the standrard emf of the cell is found to be 0.295V at 25ºC. The equilibrium constant of the reaction at 25ºC will be : **[AIEEE 2003]**

[1] 1×10^{-10} [2] 29.5×10^{-2} [3] 10 [4] 1×10^{10}

Q.32 Which one of the following nitrates will leaves behing a metal on strong heating : **[AIEEE 2003]**

[1] Ferric nitrate [2] Copper nitrate

[3] Manganese nitrate [4] Silver nitrate

Q.33 Sereval blocks of magnesium are fixed to the bottom of a ship to **[AIEEE 2003]**

[1] Keep away the sharks [2] Make the ship lighter

[3] Prevent action of water and salt [4] Prevent puncturing b under-sea rocks

Q.34 Standard reduction electrode potentials of three metals A, B and C are respectively + 0.5V, –3.0V and –1.2 V. The reducing powers of these metals are **[AIEEE 2003]**

[1] B > C > A [2] A > B > C [3] C > B > A [4] A > C > B

Q.35 On the basis of the information available from the reaction

$\frac{4}{3}Al + O_2 \rightarrow \frac{2}{3}Al_2O_3$, $\Delta G = -827$ kJmol^{-1} of O_2, the minimumemf required to carry out an electrolysis of Al_2O_3 is (F = 96500C mol^{-1}) **[AIEEE 2003]**

[1] 8.56 V [2] 2.14 V [3] 4.28 V [4] 6.42 V

Q.36 Then during electrolysis of a solution of $AgNO_3$, 9650 coulombs of charge pass through the electroplating bath, the mass of silver deposited in the cathode will be **[AIEEE 2003]**

[1] 1.08 g [2] 10.8 g [3] 21.6 g [4] 108g

Q.37 For the redox reaction

$Zn(s) + Cu^{2+}(0.1M) \rightarrow Zn^{2+}(1M) + Cu(s)$ taking place in a cell, E^o_{cell} is 1.10 volt. E_{cell} for the cell will be

$\left(2.303\frac{RT}{F} = 0.0591\right)$ – **[AIEEE 2003]**

[1] 2.14 volt [2] 1.80 volt [3] 1.07 volt (4 0.82 volt

Q.38 The emf of a Daniel cell at 298K is E_1 Zn | $ZnSO_4$ (0.01M) | | $CuSO_4$ (1.0M) | Cu when the concentration of $ZnSO_4$ is 1.0 M and that of $CuSO_4$ is 0.01M the emf changed to E_2. What is the relationship between E_1 and E_2 **[IIT 2003]**

[1] $E_2 = 0 \neq E_1$ [2] $E_1 > E_2$ [3] $E_1 < E_2$ [2] $E_1 = E_2$

Q.39 When MnO_2 is fused with KOH, a coloured compound is formed, the product and its colour is

[1] K_2MnO_4, Purple green [2] $KMnO_4$, Purple **[IIT 2003]**

[3] Mn_2O_3, brown [4] Mn_3O_4 black

Q.40 In the electrolytic cell, flow of electrons is from **[AIIMS 2003]**

[1] Cathode to anode in solution [2] Cathode to anode through external supply

[3] Cathode to anode through internal supply [4] Anode to cathode through internal supply

Q.41 When lead storage battery is charged **[MP PET 2003]**

[1] PbO_2 is dissolved [2] H_2SO_4 is regenerated

[3] $PbSO_4$ is deposited on lead electrode [4] Lead is deposited on lead electrode

Q.42 The standard electrode potential of the half cells are given below **[CPMT 2003]**

$Zn^{2+} + 2e^- \rightarrow Zn$; E = –7.62 V

$Fe^{2+} + 2e^- \rightarrow Fe$; E = –7.81 V

The emf of the cell $Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$ is

[1] 1.54 V [2] –1.54 V [3] –0.19 V [4] +0.19 V

Q.43 The conductivity of strong electrolyte is **[CPMT 2003]**

[1] Increase on dilution slighltly [2] Decrease on dilution

[3] Does not change with dilution [4] Depend upon density of electrolytes itself

Q.44 What is 'A' in the following reaction **[MP PET 2003]**

$2Fe^{3+}(aq) + Sn^{2+}(aq) \rightarrow 2Fe^{2+}(aq) + A$

[1] $Sn^{3+}(aq)$ [2] $Sn^{4+}(aq)$ [3] $Sn^{2+}(aq)$ [4] Sn

Q.45 The $E^o_{M^{3+}/M^{2+}}$ values for Cr, Mn, Fe and Co are –0.41, +1.57,+ 0.77 and + 1.97V respectively. For which one of these metals the change in oxidation state from +2 to +3 is easiest? **[AIEEE 2004]**

[1] Co [2] Mn [3] Fe [4] Cr

Q.46 The standard e.m.f. of a cell, involving one electron change is found to be 0.591V at 25ºC. The equilibrium constant of the reaction is (F = 96,500 C mol^{-1}; R = 8.31.4 JK^{-1} mol^{-1}) **[AIEEE 2004]**

[1] 1.0×10^{30} [2] 1.0×10^5 [3] 1.0×10^{10} [4] 1.0×10^1

Q.47 The limiting molar conductivities Λ^o for NaCl, KBr and KCl are 126, 152 and 150 Scm^2 mol^{-1} respectively. The Λ^o for NaBr is **[AIEEE 2004]**

[1] 302 S cm^2 mol^{-1} [2] 176 S cm^2 mol^{-1}

[3] 278 S cm^2 mol^{-1} [4] 128 S cm^2 mol^{-1}

Q.48 In a cell that utillses the reaction $Zn_{(s)} + 2H^+(aq) \rightarrow Zn^{2+}$ (aq) + $H_2(g)$ addition of H_2SO_4 to cathode compartment, will **[AIEEE 2004]**

[1] increase the E and shift equilibrium to the left

[2] lower the E and shift equilibrium to the right

[3] increase the E and shift equilibrium to the right

[4] lower the E and shift equilibrium to the left

Q.49 Consider the following E^o values **[AIEEE 2004]**

$E^o_{Fe^{3+}/Fe^{2+}} = +0.77V$

$E^o_{Sn^{2+}/Sn} = -0.14V$

Under standard conditions the potential for the reaction

$Sn_{(s)} + 2Fe^{3+}(aq) \rightarrow 2Fe^{2+}(aq) + Sn^{2+}$ (aq) is

[1] 0.63 V [2] 1.40 [3] 0.91 V [4] 1.68 V

Q.50 In a hydrogen-oxygen fuel cell, combustion of hydrogen occurs to **[AIEEE 2004]**

[1] remove adsorbed oxygen from electrode surfaces

[2] create potential difference between the two electrodes

[3] produce high purity water

[4] generate heat

Q.51 4.5 g of aluminium (at. mass 27 amu) is deposited at cathode from Al^{3+} solution 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 - **[CPMT 2005]**

[1] 44.8 L [2] 22.4 L [3] 11.2 L [4] 5.6 L

Q.52 The highest electrical conductivity of the following aqueous solutions is of **[AIEEE 2005]**

[1] 0.1 M acetic acid [2] 0.1 M chloroacetic acid

[3] 0.1 M fluoroacetic acid [4] 0.1 M difluoroacetic acid

Q.53 Aluminium oxide may be electrolysed at 1000°C to furnish aluminium metal (at. mass = 27 amu ; 1 Faraday = 96.500 Coulombs). The cathode reaction is

$$Al^{3+} + 3e^- \rightarrow Al^0$$

To prepare 5.12 kg of aluminimum metal by this method would require **[AIEEE 2005]**

[1] 5.49×10^7 C of electricity [2] 1.83×10^7 C of electricity

[3] 5.49×10^4 C of electricity [4] 5.49×10^{10} C of electricity

Q.54

Electrolyte	KCl	KNO_3	HCl	NaOAC	NaCl
($Scm^2\ mol^{-1}$)	149.9	145.0	426.2	91.0	126.5

Calculate using appropriate molar conductances of the electrolytes listed above at infinite dilution in H_2O at 25°C. **[AIEEE 2005]**

[1] 517.2 [2] 552.7 [3] 390.7 [4] 217.5

Q.55 A hypothetical electrochemicl cell is shown below

$$\overset{\ominus}{A}\,|A^+(xM)\,|\,{}_{B}{}^{+}\,(yM)\,|\,\overset{\oplus}{B}$$

The emf measured is +0.20 V. The cell reaction is **[CPMT 2006]**

[1] The cell reaction cannot be predicted [2] $A + B^+ \rightarrow A^+ + B$

[3] $A^+ + B \rightarrow A + B^+$ [4] $A^+ + e^- \rightarrow A$; $B^+ + e^- \rightarrow B$

Q.56 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

$$Fe + 2\,Fe^{3+} \rightarrow 3Fe^{2+}$$

Will be **[CPMT 2006]**

[1] 1.212 V [2] 0.111 V [3] 0.330 V [4] 1.653 V

Q.57 The molar conductivities $\wedge^{\circ}_{NaOAc}$ and $\wedge^{\circ}_{HCl}$ at infinite dilution in water at 25ºC are 91.0 and 426.2 S cm^2/mol respectively.To calculate $\wedge^{\circ}_{HOAc}$ the additional value requried is **[AIEEE 2006]**

[1] $\wedge^{\circ}_{KCl}$ [2] $\wedge^{\circ}_{NaOH}$ [3] $\wedge^{\circ}_{NaCl}$ [4] $\wedge^{\circ}_{H_2O}$

Write-up I [Question 58 to 60] **[IIT- 2006]**

$Ag^+ + e^- \longrightarrow Ag$ $E_0^{reduction} = 0.8$ V

$C_6H_{12}O_6 + H_2O \longrightarrow C_6H_{12}O_7 + 2H^+ + 2e^-$ $E^0_{oxidation} = -0.5$ V

$[Ag(NH_3)_2]^+ + e^- \longrightarrow Ag + 2NH_3$ $E^0_{reduction} = 0.3$ V

Use $\left(\frac{F}{RT}\right) = 38.9\ V^{-1}$

Q.58 Calculate (In K) for $C_6H_{12}O_6 + 2Ag^+ + H_2O \longrightarrow C_6H_{12}O_7 + 2H^+ + 2Ag$

[1] 16 [2] 20 [3] 19 [4] 18

Q.59 On adding NH_3 pH of solution increases to 11 then, identify the effect of pH on potential of half-cell

[1] E_{ox} increased from E^0_{ox} by 0.065 [2] E_{ox} decreased from E^0_{ox} by 0.065

[3] E_{red} increased from E^0_{red} by 0.065 [4] E_{red} decreased from E^0_{red} by 0.065

Q.60 NH_3 is used in this reaction rather than any other base.Select the wrong statement out of the following

[1] $[Ag(NH_3)_2]^+$ is a weaker oxidizing agent than Ag^+

[2] NH_3 prevents the decomposition of gluconic acids

[3] NH_3 has affected the standard reduction potential of glucose/gluconic acid electrode

[4] NH_3 combines with Ag^+ to form a complex

Q.61 The equivalent conductances of two strong electrolytes at infinite dilution in H_2O (where ions move freely through a solution) at 25°C are given below: **[AIEEE 2007]**

$\Lambda^{\circ}_{CH_3COONa} = 91.0\ S\ cm^2/equiv$

$\Lambda^{\circ}_{HCl} = 426.2\ S\ cm^2/equiv$

What additional information/quantity one needs to calculate Λ° of an aqueous solution of acetic acid ?

[1] The limiting equivalent conductance of $H^+ (\lambda^{\circ}_{H^+})$ [2] Λ° of chloroacetic acid ($ClCH_2COOH$)

[3] Λ° of NaCl [4] Λ° of CH_3COOK

Q.62 The cell Zn | Zn^{2+} (1M) || Cu^{2+} (1M)| Cu $\left(E^0_{cell} = 1.10\,V\right)$ was allowed to be completely discharged at 298 K. The relative concentration of Zn^{2+} to Cu^{2+} $\left(\frac{[Zn^{2+}]}{[Cu^{2+}]}\right)$ is **[AIEEE 2007]**

[1] $10^{37.3}$ [2] 9.65×10^4 [3] antilog (24.08) [4] 37.3

Answer Key

Qus.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Ans.	3	2	2	2	4	1	1	1	2	2	1	1	1	1	2	1	3	2	3	2	4	2	1	4	3
Qus.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Ans.	3	2	2	1	4	4	4	3	1	2	2	3	2	1	4	3	1	1	2	4	3	4	3	3	4
Qus.	51	52	53	54	55	56	57	58	59	60	61	62													
Ans.	4	4	1	3	3	1	3	1	1	3	3	1													