CHEMISTRY

BOOKS - V PUBLICATION

ELECTROCHEMISTRY

Question Bank

1. How would you determine the standard electrode potential of the system (Mg^(2+))/ Mg ?

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2. Can you store copper sulphate solution in a zinc pot?

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3. Consult the table of standard electrode potentials given in the test and suggest three substances that can oxidise ferrous ions under suitable conditions?

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4. Calculate, the potential of hydrogen electrode in contact with a solution whose PH is 10 .

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5. Calculate 'the emf of the ceil in which the following reaction takesplace: $Ni(s) + 2Ag + (0.002M) - - Ni^2 + (0.160M) + 2Ag(s)$ Given that $E^0Cell = 1.05V$

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6. The cell in which the following reaction occurs

$2Fe^{3+}(aq) + 2I-(aq) \rightarrow 2Fe^{2+}(aq) + I_2(s)$

has E^0_{cell} = 0.236V at 298 K. Calculate the standard Gibbs energy and equilibrium constant of the cell reaction

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7. Why does the conductivity of a solution decreases with dilution?

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8. Suggest a way to determine Λ°_m value of water.

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9. The molar conductivity of $0.025 molL^{-1}$ methanoic acid (HCOOH) is $46.1 Scm^2 mol^{-1}$. Calculate its degree of dissociation and dissociation

constant. Given $\lambda^{\circ}\left(H^{+}\right)=349.6 Scm^{2}mol^{-1}$ and $\lambda\left(HCOO^{-}\right)=54.6 Scm^{2}mol^{-1}$

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10. If a current of 0.5 ampere flows through a metallic wire for two hours, then how many electrons flow through the wire?

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11. Suggest a list of metals that are extracted electrolytically.

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12. Consider the reaction: Cr2O7^2- +14 H^+ +6 e - ---> 2 Cr^3+ +7 H_2 O What is the quantity of electricity in coulombs needed to reduced 1mol of Cr_2 O_7^2- ?

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13. Write the chemistry of recharging the lead storage battery highlighting all the materials that are involved during recharging.

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14. Suggest two material other than hydrogen that can be used as fuels in fuels cells.

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15. Explain how rusting of iron is envaisaged as setting up of an electrochemical cell

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16. Arrange the following in the order in which they displace each other from the solution of their salts. Al, Cu, Fe,Mg and Zn

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17. Given the standard electrode potentials

$K^+/K = -2.93V, Ag^+/Ag = +0.8V, Hg^{2+}/Hg = 0.79V, Mg^{2+}/M$

Arrange them in increasing order of reducing power.

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18. Depict the galvanic çell in which the reaction $Zn(s) + 2Ag^{\cdot}(aq)Zn^2 + (aq) + 2Ag(s)$ takes place. Further'show: i. Which of the electrode is negatively charged? ii. The carriers of the current in the cell. iii. Individual reaction at each electrode.

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19. Calculate the standard cell.potentials of galvanic cell in which the following reactions take place: $Fe^{2+}(aq) + Ag^{+}(aq) \rightarrow Fe^{3+}(aq) + Ag(s)$ Calculate the ΔrG° and equilibrium constant of the reactions.

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20. Write the Nernst equation and emf of the following'cells at $-298\text{~}K$:

i. $Mg(s)IM_g^2 \cdot (0.001M)IICu^2 + (0.0001M)ICu(s)$ ii, $Fe(s)IFe^2 + (0.001M)IIH^+(1M)IH_2(\text{~}g)(l^-)I^2\ Pt(s)$ ii. $Sn(s)$ I $Sn^2 + (0.050M)IHH^+(0.020M)IH(g)(1$ 'bar)IPt(s) iv. $Pt(s)IBr_3(I)IBr(0.010M)IIH^+(0.030M)L + H_2(\text{~}g)$ (1 bar)IPt(s).

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21. In the button cells widely used in watches and other'devices the folfowing reaction takes place: (

$Zn(s) + Ag_2O(s) + H_2O\dot{D}Zn^2 + (aq) + 2Ag(s) + 2$ OH

$-(aq).)Deter\ \min\ e$Delta_r G^circ and cdot E^circ` for the reaction.

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22. Conductance(G)conductivity(K)and molar conductivity$\Lambda_m$are terms used in electrolytic conduction.

How do conductivity and molar conductivity vary with concentration of electrolytic solution?

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23. The conductivity of $0:20'M$ solution of KCl at $298\text{-}K$ is $0.0248Scm^{-1}$. Calculate its molar conductivity.

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24. The resistance of a conductivity cell containing $0.001M^{\circ} KCl$ solution at $298\text{~}K$ is 1500Ω. What is the cell constant if conductivity.of $0.001M$ KCl solution at $298K$ is $0.146 \times 10^{-3}\ Scm^{-1}$

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25. How much charge is required for the following reductions: i. 1 mol of $Al^{3}+$ to Al ? ii. $1\text{~}mol$ of $Cu^{2}\cdot$ to Cu ? 1 ~mol ot MnO_4^- to Mn^2+

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26. How much electricity in terms of Faraday is required to produce i. $20.0\text{~}g$ of Ca from $mo < enCaCl_2$? ii. $40.0\text{~}g$ of Al from molten Al_2O_2 ?

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27. How much electricity is required in coulomb for the oxidation of i. 1 mol of H_2O to O_2 ii. $1\text{-}mol$ of FeO to Fe_2O_3

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28. A solution of $Ni(NO_3)_2$ is electrolysed between platinam electrodes using a current of $5am^-$ peres for 20 minutes. What mass of Ni is de posited at the cathode?

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29. Three electrolytic cells A, B, C containing solutions of $ZnSO_4$, $AgNO_3$ and $CuSO_4$, respectively are connected in series. A steady current of 1.5 amperes was passed through them until $1.45g$ of silver deposited at the cathode of cell B. How long did the current flow? What mass of copper and zinc were deposited?

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30. Using the standard electrode potentials given : in Table 3.1(book), predict if the reaction between the following is feasible: i. Fe^2+(aq) and I-(aq)ii. Ag+(aq) and $Cu(s)$ iii $Br_2(aq)$ and $Fe^2 + (aq)$.

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31. Predict the products of electrolysis in each of the following: ¡. An aqueous solution of $AgNO_3$ with şilver electrodes. ii. An aqueous solution of $AgNO_3$ with platinum electrodes. iii. A dilute solution of H_2SO_4 with platinum electrodes. iv: An aqueous solution of $CuCl_2$ with platinum electrodes.

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32. "Even combustion of fuels can be used to generate electricity". Comment on this statement by taking the reactions involved in $H_2 - O_2$ fuel cell.

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33. How will you show that Faraday's second law of electrolysis is simply corollary of the first law.

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34. Name, the products of electrolysis of the following a) if Copper sulphate solution using Pt electrodes. b) if Copper sulphate solution using Cu electrode.

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35. A part of electrodes series is given. Observe the values and fill up the following based on datas given:

'(##VPS_HSS_CHE_ XII_C03_E03_004_Q01##)'

i Ai: Oxidation , Pb.... ii. From the given,electrodes, which are to be chosen inorder to construct'a galvanic cell which can provide the maximumi value

of emf? iii. What will be the emf value of that cell? Find out the anode, cathode and chemical reaction in the cell?

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36. A. $0.05MNaOH$ solution offered, a.resistance of 31.6 ohm in a conductivity cell at 298 K. if the cell constant is 0.367 cm^-1.calculate molar conductivity of the sodium hydroxide solution.

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37. Calculate the single electrode potential at 298 K of the $Cu^{2}+$ / Cu electrode in which the concentration of ions is 2.0M

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38. The molar conductances of HCl, NaCl and CH 3 COONa are $426ohm^{-1}cm^{2}\text{-}mol^{-1}$, $126ohm^{-1}cm^{2}\text{-}mol^{-1}$, $91ohm^{-1}cm^{2}\text{-}mol^{-1}$

respectively. The molar conductances of CH 3 COOH

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39. The measured emf at $25^{\circ}C$ for the cell reaction. $Zn(s) + Cu^2 \cdot (1.0M) - - - Cu(s) + Zn^2 \cdot (0.1M)$ is $1.3v$ calculate $E0cell$ for the cell reaction.

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40. NH_4OH is a weak electrölyte whose equivalent conductance can be found using the conductance of infinite dilution of NH_4Cl, $NaCl$ and $NaOH$. weak electrolyte CH_3 COOH can-be found using strong electrolytes: 1. Give two sets of electrolytès which can be used to find the conductance of CH_3COOH. 2. Which law is applied in the above measurement? Also explain the law. 3. Apply the law in the determination of equivalent conductance of CH_3COOH using any of, the sets you suggested.

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41. 10. A student 'tried to find out the standard reduction'potentials of copper electrode and Zinc eleetrode separately using Normal Hydrogen Electrode as reference electrode. He obtained the reduction potentials of $E^0\frac{Cu^2}{Cu}$ as 0.34 and $E^0\frac{zn^{2+}}{zn}$ as- 0.76. The, reference electrode acted here as cathode in one case and anode in theother.',

1. In which cases NHE acts as cathode and anode respectively.

2. Represent the electrode reactions of the NHE in both cases.

3. Represent the cell reaction when he used the Cu electrode and NHE.

4. Calculate the standard' potential of the cell constructed using Zn and Cu electrodes.

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42. Iron metal is largely used for making ships. In the sea, ship is in contact with saline water. Destruction of iron becomes quicker in saline medium. a)What is such processes generalty called? b). Destruction of

iron can be prevented by coating with zinc, Explain the chemical reaction by-which iron gets protected. Give equations.

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43. In Appollo space programme the fuel cells are used not only for electric power but also for prepare H_2O for drinking. What do-you understand by a fuel cell? What are the advantages of fuel cells over ordinary cells?

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44. The cell reaction for a galvanic cellIs $Ni_s + 2Ag_{aq}^{+} \rightarrow Ni_{aq}^{2+} + 2Ag_s$ .Represent that galvanic cell.

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45. How much substance is deposited by passing 1 coulomb of electricity?

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46. Which o of the following will have greater molar conductivity and why? Solution A- $1molKCl$ dissolved in 200 of the solution. Sólution . B- $1molKCl$ dissolved. in 500 of the solution.

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47. How many moles of Na and Al are deposited by passing 1 Faraday of electricity?

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48. A $0.1M$ aqueous solution of Na_2SO_4 is diluted by'adding H_2. What is the éffect of dilution on 1. conductance (G) 2. conductivity (K) 3. molar conductivity (Λ_m) and 4. equivalent conductince $(\Lambda_r g)$?

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49. It is not possible to determine the molar conductivity of weak electrolyte at infinite dilution (Λ_m°) graphically by extrapolation.

Justify the statement giving reason.

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50. Pt foil is used hydrogen electrode. Why?

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51. Name the products of electrolysis of molten and aqueous sodium chloride?

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52. Is it safe to stir AgNO3 solution with a copper spoon (E- Ag+/Ag=0.80 V, E- Cu+/Cu=0.34 V).

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53. An electrochemical cell is set up as usual but there is no flow.of current. What do you conclude?

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54. The standard reduction potential values of there metallic cations X, Y, Z are $0.52, \ -3, 03 - 1.18V$ respectively. What will be the order of reducing power of the corresponding metals?

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55. Why fluorine can not be obtained by the, electrolysis of aqueous HF solution, though it is a good conductor of electricity?

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56. Iron can be protected by coating with copper or tin. But if the coating is brokèn, iron corrodes faster than it dòes in the absence of Cu or tin. Why?

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57. Copper is conducting as such while copper sulphate is conducting only in molten state or in aqueous solution. Explain

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58. Name the equation showing the relation between equivalent or molar conductance and concentration of a strong electrolyte?

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59. Out of zinc and tin, which protects iron better even after cracks and why?

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60. Name the cells used in the Apollo space programme? What was the product used for?

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61. Write the Nernst equation for the reaction? i) $2Cr(s) + 3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd(s)$ ii) $2Cr + 3Fe^{2+} \rightarrow 2Cr^{3+} + 3Fe$

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62. Define corrosion? What is the chemical formula of rust?

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63. Rusting of iron is quicker in saline water than in ordinary water . Give reasons

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64. How will you increase the reduction potential of an electrode?

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65. In Appollo space programme the fuel cells are used not only for electric power but also for prepare H_2O for drinking. What do-you understand by a fuel cell? What are the advantages of fuel cells over ordinary cells?

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66. If fE_1°, fE_3° and fE_3° are the standard electrode. poteritials for $F\frac{e}{F}e^2 +$, $Fe^2\ \frac{\cdot}{F}\ e^3 +$ and $F\frac{e}{F}e^3 +$ electrodes_respectively, derive a relation hetween fE_1°, fE_2° and $bE^\circ boldsymbolx$.

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67. Tarnished silver contains Ag_2~S. Can this tarnish. be removed by placing tarnished silver ware in an aluminium pan containing an inert electrolytic solution such as $NaCl$. The standard electrode potential for the half reactions are $Ag_2S(s) + 2e^{-2}Ag(s)^2 + S^1 - -0.71v$ and $Al^4 + 3e^{-A}l(s),\ -1.66$~$V$

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68. Iron may be protected from rusting by coating with zinc or tin. Explain why zinc protects iron more effectively than tin once the protection coating has been seratched, using the data given,

$Zn^2 + + 2e^{-Z}n, -0.76\text{~}V$ $Fe^2 + + 2e^4Fe, -0.44\text{~}V$

$Sn^2 \cdot + 2e^{-S}n, -0.14\text{~}V$

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69. The standard reduction potential for the half cell $NO_j^{-(aq)} + 2H^+(aq) + e^{-N}O_2(\text{~}g) + H_2O$is $0.78\text{~}V$ 1). Calculate the reduction potential in ' $8MH^{\cdot}$ ii) What will be the' reduction potential of the half cell in a neutral solution. "Assume all the other species to be at unit concentration.

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70. Write the cell reaction and calculate fE° for the cell? beginarray/l Zn|Zn^2+ | Cu^2| Cu , Given that E_cu^circ=0.34 ~V and E_z_n^o=-0.76 ~V_i endarray

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71. The standard e.m.f. of the cell Cd|Cd^2+ || Cu^2+ | Cu is $0.74V$. The standard electrode potential of copper electrode is $0.34V$. Calculate the standard electrode potential of cadmium electrode?

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72. fE^circ of some elements are, given: fI,+2 e^- 2 fI-, fE^circ=+0.54 fV endaligned$MnO_4^{-+}8H^+ + 5e^rMn^2 + + 4H_2O, E_1^\circ = +1,52\text{~}V$ Fe^3++e^- Fe^2+, E^circ=+0.77 ~V $Sn^4 + + 2e^{-S}n^2 \cdot , E^\circ = +0.1\text{~}V$ 'a) Select the strongest reductant and oxidant. in these. b) Select the weakest reductant and oxidant in these. c) Select the spontaneous reaction from the changes given below: i. $Sn^4 + 2Fe^2 \cdot Sn^2 \cdot + 2Fe^h$ ii. $2Fe^2 \cdot + I_2.2Fe^2 + + 2I^-$ iii. $Sn^4 + + 2I_{-S}n^2 + + I_2$

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73. The standard electrode potential of Au^3+(aq)+3 e- → Au(s) is 1.42 V. Predict if gold can be dissolved in 1M HCl solution and on passing

hydrogen gas through gold salt solution,metallic gold will be precipitated or not.

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74. Calculate the quantity of electricity that will be required to liberate $710g$ of Cl, gas by electrolysing a conc. solution of $NaCl$. What is the amount of $NaOH$and volume.of H_2 at $27^\circ C$ and 1 atm pressure is obtained during this process?

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75. How many grams of silver could be plated out on a shield by electrolysis of a solution containing Ag ions for a period of 4 hours at a current strength of 8.5 amperes? [I $F = 96,500C\ mol^{-1}$, molar mass of $Ag = 107.8g$]

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76. How much time would it take in minutes to deposit 1.18 g of metallic copper on a metal object when a current of 2.0 A is passed through the electrolytic cell containing Cu ^2 +ions? [Molar mass of Cu =63.5 g /mol;IF=96,500 Cmol^-1]

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77. Calćulate the pH of the following half cell Pt, H_2 / H_2SO_4 The oxidation potential is +0.3 V .

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78. The standard reduction potential of $Cu^{2+} \mid Cu$ and $Ag^{+} \mid Ag$ electrodes are 0.337 and 0.799 volt respectively. Construct a galvanic cell using these electrodes so that its standard emf is positive. For what concentration of Ag^{+} will the emf of the cell at $25^{\circ}C$ be zero if the concentration of Cu^{2+} is 0.01M?

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79. Chromium metal can be plated out from an acidic solution containing CrO_3 , according to the following equation $CrO_3(aq) + 6H^+(aq) + 6e^- \rightarrow Cr(s) + 3H_2O$, Cal culate (i) how many grams of chromium will be plated out by $24000C$ and (ii) how long will it take to plate out $1.5g$ of chromium by using $12.5A$ current? (atomic mass of $Cr = 52$)

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80. A cell Cu / Cu^2+ / / Ag^+ / Ag initially contains 1 M Ag^+ and 1 M Cu^2 + ions. Calculate the change in cell potential after the passage of 9.65 A of current for I hour.

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81. Iodine (I_2) and Bromine (Br_2) are added to a solution containing iodine I^- and bromide Br^- ions. What reaction would occur if the

concentration of each species is 1M. The electrode potentials for the reactions are $E^{\circ}\left(I_2 / I^{-}\right)=0.54V, E^{\circ}\left(Br_2 / Br^{-}\right)=1.08V$

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82. In a fuel cell, hydrogen and oxygen react to produce electricity. In the process hydrogen is oxidised at the anode and oxygen at the cathode. If $67.2L$ of H_2, at STP react in 15 minutes, what is the average current produced. If the entire current is used for electro deposition of copper from copper (II) solution, how many grams of copper will be deposited?

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83. EMF of Daniel cell was found using different concentrations of Zn^2+ ion and Cu^2+ion. A graph was then plotted between E cell and log[Zn2+]/[Cu2+]. The plot was found to be linear with intercept in E cell axis equal to 1.1 V. Calculate E cell for Z n / Zn^2 +(0.1 M) / / Cu^2+(0.0 1M) / Cu

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84. The molar conductivity of acetic acid solution at infinite dilution is $390.7\Omega^{-1}cm^2mol^{-1}$. Calculate the molar conductivity of $0.01M$ acetic acid solution, given that the dissociation constant of acetic acid is 1.8×10^{-5}

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85. Copper sulphate solution $(250mL)$ was electrolysed using a platinum anode and a copper cathode. A constant current of $2mA$ was passed for 16 minutes. It was found that after electrolysis, the absorbance of the solution was reduced to $50\,\%$ of its original value. Calculate the concentration of copper sulphate in the solution to begin with.

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86. 4 ampere current was passed through an aqueous solution of an unknown salt of Pd for 1 hour, 3.977 g of P d^ n+ was deposited at cathode. Find n (mass of P d=106.4)

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87. Calculate the single electrode potential at 298 K of the $Cu^2 +$ / Cu electrode in which the concentration of ions is 2.0M

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88. The Standard electrode potentials of some electrodes are given below:

$E^\circ\_\left(Zn^{2+}Zn\right) = -0.76V, E^\circ\left(Cu^{2+}Cu\right) = +0.34, E^\circ\_(Ag, Ag) =$

Find the value of K_e (equilibrium constant) in the Daniell cell at 298 K

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89. The standarid potentiat of a cell. is measured as 1.1V: The,reaction of the cell.is represented-as $Zn(s) + Cu^2 + (aq) Zn^2 + (aq) + Cu(s)$ i. Calculate the standard free energy change of the reaction. ii Using the calculated value of $\Delta_r G^\circ$, find the equilibriam constant of the reaction. iii. If the concentrations of the electrólytes are $\left[Zn^2 + \right] = 0.1\text{~}mol$ Mitre and $\left[Cu^2 + \right] = 0.2\text{~}mo\frac{l}{}$ litre, calculate the cell 'potentiat.

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90. The resistivity of a $0.8M$, solution of electrolyte is. 5×10^{-3}, ohm cm. Calculate molar conductivity.

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91. The conductivity of $0:20'M$ solution of KCl at $298\text{~}K$ is $0.0248 Scm^{-1}$. Calculate its molar conductivity.

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92. Conductivity of 0.02 M, KCl solution is $0.002765 Scm^{-1}$. If the resistance of the cell containing the solution is 400 ohm, calculate the, cell constant.

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93. The conductivity of $0.001028 molL^{-1}$ acetic acid is $4.95 \times 10^{-5} Scm^{-1}$, Calculate its dissociation constint if Λ_m^0 for acetic acid is $390.5 Scm^2 mol$:

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94. Caleulate Λ_m^0 for acetic acid. Given that $\Lambda_m^0(HCl) = 426 ohm^{-1}\text{-}cm^3\text{-}mol^{-1}$, $\Lambda_m^0(NaCl) = 126 ohm^{-1}\text{-}cm^2\text{-}mol^{-}$ and $\Lambda_m^0(CH_3COONa) = 91 ohm^{-1}\text{-}cm^2\text{-}mol^{-1}$

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95. An electrolyte is one : Which conducts electric current, Which is capable of ionisation by passing electic current, Which dissociates into ions by dissolving in suitable solvent, None of the above

A. Which conducts electric current

B. Which is capable of ionisation by passing electic current

C. Which dissociates into ions by dissolving in suitable solvent

D. None of the above

Answer: C

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96. Strong electrolytes are those which : dissolve readily in water, conduct electricity, Dissociate into ions at high dillution, completely dissociate into ions at all dillutions

A. dissolve readily in water

B. conduct electricity

C. Dissociate into ions at high dillution

D. completely dessociate into ions at all dillutions

Answer: D

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97. Electrolytes when dissolved in water dissociate into ions because : they were unstable, the water dissolves, the force of repulsion increase, the forces of elecrtostatic attraction are broken down by water

A. they were unstable

B. the water dissolves

C. the force of repulsion increase

D. the forces of elecrtostatic attraction are broken down by water

Answer: D

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98. Which of the following aqueous solution will conduct an electric current quite well? Glycerol, HCI, Sugar, Pure water

A. Glycerol

B. BHCI

C. Sugar

D. Pure water

Answer: B

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99. Condutivity of a solution is directly proportional to : Dilution, Number of ions, Current density, Volume of the solution

A. Dilution

B. Number of ions

C. Current density

D. Volume of the solution

Answer: B

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100. Electrolytic conduction differs from metallic conduction in the case of electrolytic conduction : The resistance increases with increasing temperature, The resistance decreases with increasing temperature, The flow of current does not generate heat, The resistance is independent of the length of the conductance

A. The resistance increases with increasing temperature

B. The resistance decreases with increasing temperature

C. The flow of current does not generate heat

D. The resistance is independent of the length of the conductance

Answer: B

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101. When a solution of an electrolyte is heated the conductance of the solution : Increases because electrolyte conduct better, Decreases because of the increased heat, Decreases because of the dissociation of the electrolyte is suppressed, Increases because the electrolyte is dissociated more

A. Increases because electrolyte conduct better

B. Decreases because of the increased heat

C. Decreases because of the dissociation of the electrolyte is suppressed

D. Increases because the electrolyte is dissociated more

Answer: D

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102. The conductivity of strong electrolyte : Increases on dilution, Does not change considerably on dillution, Decreases on dillution, Depends on density

A. Increases on dilution

B. Does not change considerably on dillution

C. Decreases on dillution

D. Depends on density

Answer: C

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103. Electrolysis of molten NaCl leads to the formation of

A. sodium and hydrogen

B. sodium and oxygen

C. hydrogen and oxygen

D. sodium and chlorine

Answer: D

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104. In the electrolysis of NaCl : Cl ion is oxidized at anode, Cl ion is reduced at anode, Cl ion is oxidized at cathode, Cl ion is neither produced nor oxidized

A. Cl ion is oxidized at anode

B. Cl ion is reduced at anode

C. Cl ion is oxidized at cathode

D. Cl ion is neither produced nor oxidized

Answer: A

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105. The product of elctrolysis of aqueous NaCl solution are : Na at cathode and Cl_2 at anode, H_2 at cathode and Cl_2 at anode, H_2 at cathode and O_2 at anode, Na at cathode and O_2 at anode

A. Na at cathode and Cl_2 at anode

B. at cathode and Cl_2 at anode

C. H_2 at cathode and O_2 at anode

D. Na at cathode and O_2 at anode

Answer: B

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106. NaOH is manufactured by the electrolysis of brine solution. The próducts of the reaction are : Cl_2 and H_2, Cl_2 and $Na - Hg$, Cl_2 and Na, Cl_2 and O_2

A. Cl_2 and H_2

B. Cl_2 and N_0^-2 cdot Hg

C. Cl_2 and Na

D. Cl_2 and O_.2

Answer: A

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107. The passage of current liberates H_2, at cathode and Cl_2 at anode. The solution is : Copper chloride in H_2O, NaCl in H_2O, H_2SO_4, water

A. Copper chloride in H_2 O

B. NaCl in H_2 O

C. H_2 SO_4

D. water

Answer: B

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108. The effect of temperature increases, : electrolytic conduction decreases , Metallic conduction increases, metallic conduction decreases, Electrolytic conduction increases, metallic conduction decreases, Both electrolytic and metallic conduction decreases, Both electrolytic and metalllic conduction increases

A. Metallic conduction increases, metallic conduction decreases

B. Electrolytic conduction increases, metallic conduction decreases

C. Both electrolytic and metallic conduction decreases

D. Both electrolytic and metalllic conduction increases

Answer: B

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109. Effect of dilution on conduction is : Specific conductance increases molar conductance decreases, Specific conductance decreases molar

conductance increases, Both increase with dilution, Both decrease with dilution

A. Specific conductance increases molar conductance decreases

B. Specific conductance decreases molar conducctance increases

C. Both increase with dilution

D. Both decrease with dilution

Answer: B

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110. A solution of sodium sulphate in water is electrolyzed using inert electrodes. The products at thee catahode and anode are respectively

A. H_2, O_2

B. O_2, H_2

C. O_2, Na

D. O2, SO2

Answer: A

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111. During the electrolysis of aqueous solution of sodium sulphate, on cathode we get

A. Na

B. SO_2

C. SO_3

D. H_2

Answer: D

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112. 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 : The positive ions will start moving towards the anode the negtive ions will stop moving, The positive and negative ions will move towards the anode, The positive and negative ions will start moving randomly, The negative ions will continue to move towards the anode and the positive ionns will stop moving

A. The positive ions will start moving towards the anode the negtive ions will stop moving

B. The positive and negative ions will move towards the anode

C. The positive and negative ions will start moving randomly

D. The negative ions will continue to move towards the anode and the positive ionns will stop moving

Answer: C

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113. The molar conductivity of an electrolyte increases as Dilution increases Temperature decreases Dilution decreases None of these

A. Dilution increases

B. Temperature decreases

C. Dilution decreases

D. None of these

Answer: A

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114. The solution in the electrolytic cell after the electrolysis of aqueous solution of NaCl is rich in

A. HCl

B. NaCl

C. Only water

D. NaOH

Answer: C

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115. Which one of the following dissolved in water forms a solution that is non conducting? Indian saltpetre Potash alum Green vitriol Ethyl alcohol

A. Indian saltpetre

B. Potash alum

C. Green vitriol

D. Ethyl alcohol

Answer: D

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116. For the electrolysis of dil fH_i fS O_4 using platinum electrodes which of the following statementt is correct?

A. Hydroxide ions are discharged at cathode

B. Hydrogen is evolved at anode

C. Oxygen is the only gas evolved

D. A chemical change occurs

Answer: D

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117. Which of the substances Na, Hg, S, Pt and graphite can be used as electrodes in electrolytic cells having aqueous solution? Na, Pt and graphite Hg, pt and graphite Pt and graphite only Na and S only

A. Na, Pt and graphite

B. Hg,pt and graphite

C. Pt and graphite only

D. Na and S only

Answer: C

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118. Which of the following moves towards the anode during electrolysis of fused NaOH? Na^+, H^+, OH^-, O^2-

A. Na^+

B. H^+

C. OH

D. O^2-

Answer: C

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119. On electrolysing a solution of dilute H_2SO_4 between platinum electrodes the gas evolvedat the anode is

A. SO_2

B. so_3

C. O_2

D. H_2

Answer: C

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120. When an aqueous solution of sulphuric acid is electrolysed, the ion discharged at the anode is : Hydrogen, Sulphate, Hydroxyl, Oxygen

A. Hydrogen

B. Sulphate

C. Hydroxyl

D. Oxygen

Answer: C

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121. In electrolysis of dil. H_2SO_4 using platinum electrodes

A. H_2 is evolved at cathode

B. NH_3 is produced at anode

C. Cl_2 is obtained at cathode

D. O_2 is produced

Answer: A

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122. The reaction at the cathode during the electrolysis of dilute H_2SO_4 with platinum electrode is

A. Oxidation

B. Reduction

C. Both

D. Neutralization

Answer: B

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123. Two platinum electrodes are immersed in a Cuso /4 disappears leaving behind a colourless solution. The colourless solution is

A. Water

B. Platinum sulphate solution

C. Copper hydroxide

D. Sulphuric acid solution

Answer: D

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124. The molar conductivity of a strong electrolyte

A. increases linearly with concentration

B. Increases with square root of concentration in a linear fashion

C. Decreases linearly with concentration

D. Decreases with square root of concentration in a linear fashion

Answer: D

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125. Which one of the following ion ha highest limiting molar conductivity

A. Na^+

B. Mg^prime z+

C. K^+

D. Ca^2

Answer: D

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126. The sequence of the ionic mobility in the aqueous solution is

A. K^daggergtNa^+gtRb^2 gtCs^*

B. Cs^+ ge R b^+gt K^+gtNa^+

C. R b^+gtK^+gtCs ^+gtNa^+

D. hatN a^+gtK^+gtk^+ b^+gtC s^+

Answer: B

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127. Which of the following electrolytic solutions has the least specific conductance.

A. 2N

B. 0.002N

C. 0.02N

D. 0.2N

Answer: B

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128. The highest electrical conductivity of the following aqueous solutions is of

A. 0.1M acetic acid

B. 0.1M chloroacetic acid

C. 0.1M flouroacetic acid

D. 0.1M difloroacetic acid

Answer: D

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129. In electrolytic cell, the flow of electrons is from

(a)Cathode to anode in the solution

(b)Cathode to anode through external supply

(c)Cathode to anode through internal supply

(d)Anode to cathode through internal supply

A. Cathode to anode in the solution

B. Cathode to anode through external supply

C. Cathode to anode through internal supply

D. Anode to cathode through internal supply

Answer: C

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130. The ionic conductance of the following cations in a given concentration are in the order

A. "Li+ ltNa^+ltK^primeltRb^*

B. Li^*gtNa^*gtK^*gtRb^4

C. Li^*ltNa^*gtK^* ge Rb^*

D. Li^prime=Na^+ltK^*lt Rb^+

Answer: A

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131. The ionic conductivity of the catin and anion of the uni-uni valent salt is 140 and 80 respectively. The molar condutivity of the salt is

A. 160 Omega^-1 ~cm^2 ~mol^-1

B. 280 Omega^-1 ~cm^2 ~mol^-1

C. 60 moles

D. 220 stackrel10^-/2^-1 ~cm^2 ~mol^-1

Answer: D

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132. The molar conductivities of $\Lambda_s uoic^\circ$ and $\Lambda_I \mathbb{C}^\circ$ at infinite dilution in water at $25^\circ C$ are 91.0 and $426.2 Scm^2 \sim mol^{-1}$ respectively. To calculate Λ° HOAc the additional yalue required is

A. Lambda_NaOH^circ

B. Lambda^circ NCC

C. Lambda_H_2 O^D

D. Lambda_KCI^circ

Answer: B

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133. If equivalent conductance of $1M$ benzoic acid is $12.8\Omega^{-1}\text{-}cm^2$ and if the conductance of benzoate ion and $H^{\cdot}$ ion are 42 and $288.42\Omega^{-1}\text{-}cm^2$ respectively, its degree of dissociation is

A. 39%

B. 3.9%

C. 0.35%

D. 0.039 %

Answer: B

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134. Law of electrolysis was given by

A. Lamark

B. Ostwald

C. Faraday

D. Arhenius

Answer: C

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135. The amount of ion discharged during electrolysis is not directly proportional to

A. Resistance

B. Time

C. Current

D. Chemical equivalent of the ion

Answer: A

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136. Faraday's law of electrolysis are related to

A. Atomic number of the cation

B. Atomic number of the anion

C. Equivalent mass of the electrolyte

D. Speed of the cation

Answer: C

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137. The amount of electricity required to deposit 1 mole of aluminium from a solution of ACl_3 will be

A. 0.33 Faraday

B. 1 Faraday

C. 3 Faraday

D. 1.33 Faraday

Answer: C

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138. The conductivity of $\frac{N}{10}KCl$ solution at $20^\circ C$ is $0.0212 \cdot ohm^{-1}\text{-}cm^{-1}$ and the resistance of the cell containing this solution at $20^\circ C$ is 55 ohm. The cell constant is : $4.616\text{-}cm^{-1}$, $1.166\text{-}cm^{-1}$, $2.173\text{-}cm^{-1}$, $3.324\text{-}cm^{-1}$

A. 4.616 ~cm^-1

B. 1.166 ~cm^-1

C. 2.173 ~cm^-1

D. 3.324 ~cm^-1

Answer: B

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139. The ionic conductance of $Ba^{2}+$ and Cl - ions are respecfively 127 and $76 ohm^{-1}$~cm^{2} at infinite dilution. The equivalent conductance (in ohm ^ 1~cm^{2}) of $BaCl$, at infinite dilution is

A. 203

B. 279

C. 101.5

D. 139.5

Answer: D

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140. The limiting molar conductivities Λ_{m}^{-} for $NaCl$, KBr and KCl are 126,152 and 150~$cm^{2}\ mol^{-1}$ respectively. The Λ_{s},for $NaBr$ is

A. 128 Scm^2 ~mol^-1

B. 176 Scm^2 ~mol^-1

C. 278 Scm^2 ~mol^-1

D. 302 Scm^2 ~mol^-1

Answer: A

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141. When the same quantity of electricity is passed through the solution of different electrolytes ín series, the amounts of products. obtained are proportional to their : Atomic weighs, Chemical equivalent, Gram molecular volume, Gram atomic ions

A. Atomic weighs

B. Chemical equivalent

C. Gram molecular volume

D. Gram atomic ions

Answer: B

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142. The quantity of electricity needed to liberate one gram equivalent weight of an element is : 1 ampere, 96500 ampere, 96500 coulombs, 96500 Faradays

A. 1 ampere

B. 96500 ampere

C. 96500 coulombs

D. 96500 Faradays

Answer: D

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143. The quantity of electricity required to liberate one gram equivalent weight of an element is called

A. ampere

B. volt

C. Ohm

D. Faraday

Answer: C

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144. One faraday of electricity will liberate one gram atom of the metal from a solution of : $AuCl_3, BaCl_2, CuSO_4, NaCl$

A. AuCl_3

B. BaCl_2

C. CuSO_4

D. NaCl

Answer: D

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145. The conductivity of a saturated solution of $BaSO_4$ is $3.\theta 6 \times 10^{-6} ohm^{-1}$~$cm^{-1}$ and its equiva- lent conductance is $1.55 ohm^{-1}$~cm^2 equiv $\hat{}\ -1$. The fK. for $BaSO_4$ will be

A. 4 xx 10^-12

B. 2.5 xx 10^-9

C. 2.5 xx 10^-13

D. 4 xx 10^-6

Answer: D

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146. Equivalent conductance of NaCl, HCl and fC_2fH_5COONa at infinite dilution are 126.45 426.16 and' $91 \cdot$ ohm $\hat{}\ -1$~cm^2 respectively. The equivalent conductance of fC_2H_5COOH is

A. 201.28 ohm^-t ~cm^2

B. 390.71 ohm^-1 ~cm^2

C. 698.28 ohm^-1 ~cm^2

D. 540.48 ohm^-1 ~cm^2

Answer: B

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147. When one ampere current flows for 1 second through a conductor, thisquantity of electricity is called

A. Faraday

B. Columb

C. EMF

D. Ohm

Answer: B

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148. One elctronic charge is equal to : $9500 Faraday$, $1 Faraday$, 1.602×10^{-19} C, All of the above

A. 9500 Faraday

B. 1 Faraday

C. 1.602 xx[0^-10 C.

D. All of the above

Answer: C

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149. Total charge on one mole of a metal ion is equal to

A. 6.28 xx 10^18 C

B. 1.6 xx 10^-19 C

C. 9.65 xx 10^circ C

D. None of these

Answer: C

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150. The number of electrons involved in the reaction when a Faraday of electricity is passed through an electrolyte in solution is

A. 12 xx 10^15

B. 96540

C. 8 xx 10^16

D. 6 xx 10^93

Answer: D

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151. The amount of silver (atomic riass of $Ag = 108$) déposited by passing 9.65 coulomb of electricity through a silver nitrate solution is

A. 10.8mg

B. 5.4mg

C. 16.2mg

D. 21.2mg

Answer: A

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152. A current of strength 2.5 amp was passed through CuSO4 solution for 6 minutes 26 seconds.The amount of copper deposited is (at. wt. of $Cu = 63.5) \cdot (F = 96500C)$ (a)0.3175g (b)3.175g (c)0.635g (d)6.35g

A. 0.3175g

B. 3.175g

C. 0.635g

D. 6.35g

Answer: A

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153. The amount of substance deposited by the passing of 1 ampere current for 1 second is equal to

A. Equivalent mass

B. Molecular mass

C. Electrochemical equivalent

D. Specific equivalent

Answer: C

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154. During the electrolysis of $NaCl$, when platinum electrode is taken, H_2, is liberated at the cathode while-it form sodium amalgam with mercury cathode. 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 dissolve in Pt.

D. Con. of H^+ ions is larger when Pt electrode is taken'

Answer: B

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