



CHEMISTRY

BOOKS - USHA CHEMISTRY (ODIA ENGLISH)

ELECTRO CHEMISTRY

Exercise

1. Out of Cu, Ag, and Mg the metal which can displace all others from their aqueous salt

solution is-

A. Cu

B. Zn

C. Ag

D. Mg

Answer:



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2. Which of the following solutions can be stored in copper vessel?

A. $AgNO_3$

B. $AuCl_3$

C. $ZnCl_2$

D. All of these

Answer:



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3. What is the charge on one mole of electrons

?

A. 1.6×10^{-19} coulomb

B. 6.28×10^{18} coulomb

C. 9.65×10^4 coulomb

D. 6.023×10^{23} coulomb

Answer:



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4. In electroplating the article to be electroplated is made as-

A. Cathode

B. Anode

C. Either cathode or anode

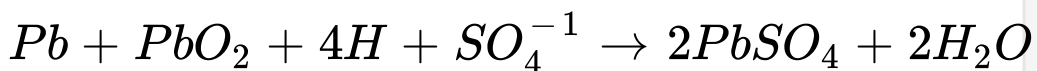
D. Simply suspended in the electrolytic solution

Answer:



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5. The following reaction takes place in a lead storage battery during discharging.



. It is a case of _____ reaction.

- A. Redox
- B. Disproportionation
- C. Comproportionation
- D. Metathetical

Answer:



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6. What amount of electricity is required to deposit 1mole copper from a solution of $CuSO_4$?

A. 2F

B. 1F

C. 3F

D. 0.5F

Answer:



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7. The limiting molar conductance of NaCl, KBr, KCl are 126, 152 and 150 $\text{ohm}^{-1}\text{cm}^2\text{mol}^{-1}$ respectively. The limiting molar conductance of NaBr is-

A. 128

B. 302

C. 428

D. 176

Answer:



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8. The correct order of equivalent conductance at infinite dilution of LiCl , NaCl , KCl is



Answer:



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9. When a rod of metal 'A' is dipped in aqueous solution of metal 'B' at 25°C , what will happen? (Given standard electrode potentials are $A^{2+} / A = -0.76\text{V}$ and $B^{2+} / B = +0.34\text{V}$)

A. (a) 'A' will gradually dissolve

B. (b) 'B' will deposition 'A'

C. (c) Water will decompose

D. (d) No reaction will occur

Answer:



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10. The best conductor of electricity is a 1M solution of

A. Boric acid

B. Acetic acid

C. Oxalic acid

D. Sulphuric acid

Answer:



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11. If 'V', in the equation, $\lambda = K \times V$ is the volume in cc containing 1gm equivalent of the electrolyte, 'V' for an $N/10$ solution will be-

A. 10cc

B. 100cc

C. 1000cc

D. 10000cc

Answer:



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12. Electrolytes conduct electricity due to movement of-

A. Atoms

B. ions

C. Electrons

D. Molecules

Answer:



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13. The mass of a substance liberated at the electrode is directly proportional to its-

A. Atomic mass

B. Equivalent mass

C. Molecular mass

D. None of these

Answer:



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14. The unit of electrochemical equivalent is

A. gm / coomb

B. gm / ampere

C. Coomb / gm

D. gm.coulomb

Answer:



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15. The correct relationship between free energy change and cell potential is-

A. $\Delta G^\circ = -nFE^\circ$

B. $\Delta G^\circ = nFE^\circ$

C. $\Delta G^\circ = \frac{nF}{E^\circ}$

$$D. \Delta G^\circ = -\frac{nE^\circ}{F}$$

Answer:



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16. A current of 0.75A is passed through an acidic $CuSO_4$ for 10 min. the volume of oxygen liberated at anode at STP will be

A. 0.261cc

B. 26.1cc

C. 52.2 cc

D. 0.522cc

Answer:



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17. The electrolysis of hydrochloric acid results in the formation of 1 gm equivalent of H_2 gas at the cathode. The weight of Cl_2 liberated at anode is

A. 1gm

B. 17.75gm

C. 35.5gm

D. 71gm

Answer:



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18. The exact value of emf of cell can be measured by means of

A. Potentiometer

B. Galvanometer

C. Polarimeter

D. Ammeter

Answer:



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19. When one coulomb of electricity is passed through an electrolytic solution, the mass deposited is equal to

- A. The chemical equivalent
- B. The atomic weight
- C. the electrochemical equivalent
- D. The molecular weight

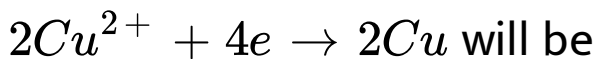
Answer:



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20. The standard reduction potential for the reaction, $2Cu^{2+} + 2e^{-} \rightarrow Cu$ is $+0.34V$. the

standard electrode potential for the reaction,



A. 0.34V

B. 0.51V

C. 0.68V

D. Unpredictable

Answer:



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21. At infinite dilution the equivalent conductance of CH_3COONa , HCl and $NaCl$ are 91,426 and $126.7 \text{ ohm}^{-1} \text{ cm}^2 \text{ geq}^{-1}$ respectively. The equivalent conductance of CH_3COOH at infinite dilution is nearly equal to

- A. 126
- B. 209
- C. 390.3
- D. 908

Answer:



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22. The electrolytic products of aqueous solution of NaOH are

A. Na, F_2

B. Na, O_2

C. H_2, O_2

D. H_2, F_2

Answer:



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23. For a redox reaction to be spontaneous, the e.m.f. should be

A. -ve

B. +ve

C. zero

D. Any of these

Answer:



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24. When same quantity of current is passed through two different electrolytes connected in series, the amount of products liberated at the electrodes are in the ratio of their.

- A. Atomic mass
- B. Equivalent mass
- C. Molecular mass

D. Atomic number

Answer:



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25. During electrolysis the reaction occurs at anode is

A. Reduction

B. Oxidation

C. Redox

D. Hydrolysis

Answer:



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26. The number of faradays required to deposit 27gm 'Al' from a solution of $AlCl_3$ will be

A. 1

B. 2

C. 3

D. 4

Answer:



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27. Which of the following equations is correct?

A. Conductance = specific conductance \times
cell constant

B. Equivalent conductance = specific

conductance \times cell constant

C. Conductance = equivalent conductance

\times cell constant

D. Cell constant = specific conductance /

conductance

Answer:



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28. Which of the following solution of NaCl has the lowest value of Specific conductance?

A. 1M

B. 0.1M

C. 0.01M

D. 0.001M

Answer:



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29. 3.17 gm of a substance was deposited by the flow of 0.1mole of electrons. The equivalent weight of the substance is

A. 0.317

B. 3.17

C. 31.7

D. 63.4

Answer:



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30. When electricity is passed through a solution of $AlCl_3$, 13.5gm of 'Al' metal is deposited. The number of faraday must be

A. 1

B. 1.5

C. 2

D. 3

Answer:



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31. The passage of current through the solution of a certain electrolyte results in the liberation of H_2 at the cathode and Cl_2 gas at anode. The solution in the container could not be



Answer:



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32. The increase in molar conductance of HCl with dilution is due to

A. Increase in degree of dissociation of HCl

B. Increase in degree of dissociation of water

C. Increase in ionic mobility

D. Increase in interionic force of attraction

Answer:



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33. Which of the following statements is wrong?

A. Na^+ has different molar conductance at infinite dilution in NaCl and NaBr

B. Degree of dissociation (α) = $\frac{\lambda_c}{\lambda_\infty}$

C. Kohlraush law is used to find Λ_{∞} value

for weak electrolytes

$$D. \mu_{\infty}(H_2SO_4) = 2\mu_{\infty}(H^+) + \mu_{\infty}(SO_4^{2-})$$

Answer:



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34. Which of the following statement is true about $Zn - CuSO_4$ cell?

A. Electron flows from Cu to Zn-electrode

B. Standard reduction potential of 'Zn' is more than 'Cu'

C. 'Zn' is anode and 'Cu' is cathode

D. All the statements are correct

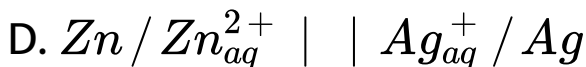
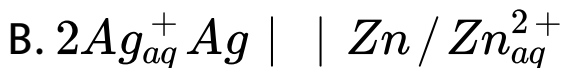
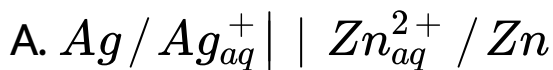
Answer:



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35. The cell reaction, $Zn + 2Ag_{aq}^+ \rightarrow Zn^{+2} + 2Ag$

can be represented by



Answer:



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36. The electrode potential of normal hydrogen electrode is

A. 0 volt

B. 1 volt

C. 10 volt

D. 0.1 V

Answer:



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37. When an electric current is passed through acidified water, 112ml of H_2 gas collected at

NTP at cathode in 965sec. the current strength is

A. 1 amp

B. 0.5 amp

C. 0.1 Amp

D. 2amp

Answer:



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38. Which of the following does not change the value of electrode potential?

- A. Concentration of the solution
- B. Temperature
- C. Pressure of the gaseous substance
- D. stoichiometry of half cell reaction

Answer:



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39. Which will be decomposed when electric current is passed through its aqueous solution?

A. Glucose

B. Urea

C. Common salt

D. Benzene

Answer:



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40. The degree of dissociation of $CH_3COOH_{Sol}^n$, can be increased by

A. Adding more CH_3COOH to the solution

B. Adding more water to the solution

C. Decreasing temperature of the solution

D. Stirring the solution vigorously

Answer:



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41. The unit of equivalent conductance is

A. Ohm

B. $\text{Ohm}^{-1}\text{cm}^2\text{eq}^{-1}$

C. $\text{Ohm}^{-1}\text{cm}^{-2}$

D. $\text{Ohmcm}^{-2}\text{eq}^{-1}$

Answer:



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42. In galvanic cell

- A. Electrons move from anode to cathode
- B. Electrons move from cathode to anode
- C. Electrons move through the salt bridge
- D. Oxidation occurs at cathode

Answer:



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43. Which of the following will increase the cell potential of the cell?

- A. Increasing the size of 'Zn' rod
- B. Increasing Zn^{2+} ion concentration
- C. Increasing the size of 'Cu' rod
- D. Increasing Cu^{2+} ion conc.

Answer:



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44. By electrolysing a solution of dilute H_2SO_4 in presence of platinum electrodes the gas evolved at anode is

A. SO_2

B. SO_3

C. O_2

D. H_2

Answer:



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45. What is the ECE of Ag? (Atomic weight =108)



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46. Write the unit of resistivity.



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47. 1 Faraday of electricity is _____ coulomb.



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48. During discharging of lead storage battery which electrolyte is consumed?



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49. Write the relationship between cell potential and equilibrium constant.



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50. How many moles of H_2 will be liberated when 2 faradays of electricity is passed through 0.1M H_2SO_4 solution?



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51. Write the Nernst equation for a half cell reaction.



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52. In galvanized iron, the iron is coated with a layer of _____ metal.



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53. Name the chemical substances used for silver plating.



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54. During electrolysis of molten calcium hydride H_2 gas is liberated at_____.



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55. What is electrolytic cell?



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56. Write the electrolysis products of $CuSO_4$ solution using Pt-electrode.



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57. In the cell $Zn/Zn^{2+} // Cu^{2+}/Cu$, electrons flow from _____ electrode to _____ electrode.



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58. Two metals A and B have $E_{RP}^0 = -0.76V$ and $E_{RP}^0 = +0.80V$ respectively. Which metal will displace H_2 from dilute H_2SO_4 ?





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59. How many Faradays of charge are required to convert 1 mole $Cr_2O_7^{2-}$ to Cr^{3+} ?



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60. Define equivalent conductance of an electrolyte.



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61. What is the charge carried by 1 mole nitride ion?



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62. Write two factors influencing electrolytic conductance.



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63. Write two applications of electrolysis.



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64. Define electrochemical equivalent.



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65. What is the charge in coulomb carried by an oxide ion?



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66. Which one of the following is a weak electrolyte? $NaCl$, CH_3-COOH , HCl)



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67. Between 1M CH_3COOH and 0.1M CH_3COOH , which has higher electrical conductivity?



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68. Why does the equivalent conductance of a strong electrolyte increase with in dilution?



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69. Find the number of electrons present in 1 coulomb charge?



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70. How much electric charge is required to oxidise 1 mole water to oxygen?



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71. Write the factors influencing electrode potential of a metal.



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72. How does equivalent conductance of a weak electrolyte vary with dilution?



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73. Electrolytes conduct electricity due to movement of-



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74. Write the $Zn - CuSO_4$ cell reaction.



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75. What is strong electrolyte? Give an example.



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76. While constructing a galvanic cell, the electrode with higher reduction potential is chosen as _____ while the electrode with lower reduction potential is chosen as _____





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77. Why does fused NaCl conduct electricity?



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78. _____ quantity of electricity will deposit 10.8 gm of 'Ag' at cathode from a $AgNO_3$ solution.



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79. What is the charge on one mole of electrons ?



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80. If a spoon to be electroplated with silver , would it be made as cathode or anode in the cell?



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81. How does specific conductance vary with dilution?



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82. What is the relationship between molar conductance and equivalent conductance for an electrolyte?



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83. Write the Nernst equation for the electrode reaction: $Cu_{aq}^{2+} + 2e \rightarrow Cu(s)$



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84. At infinite dilution the molar conductance of Na^+ and SO_4^{2-} are $50\Omega^{-1}cm^2mo \leq^{-1}$ and $160\Omega^{-1}cm^2mo \leq^{-1}$ respectively. What will be the molar conductance of sodium sulphate at infinite dilution.



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85. Find the charge in coulomb required for oxidation of 1mole hydrogen proxide to oxygen.



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86. What is the effect of increasing conc. Of Zn^{2+} / Zn electrode?



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87. Give the relationship between chemical equivalent and electrochemical equivalent of an element?



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88. Between Li^+ and Na^+ which has ion which has higher ionic conductance in molten state?



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89. Define electrolyte and give an example.



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90. Which substance is used for Cu-plating?



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91. Define specific conductance of an electrolyte.



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92. Arrange the following in increasing order of their conductance in their aqueous solution. (urea, NaCl, CH_3COOH)



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93. Why can't CuSO_4 solution be stored in an iron vessel?



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94. For the zinc electrode the standard oxidation potential is +0.76V. then what is its standard reduction potential?



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95. Why can't 'Cu' displace H_2 gas from dilute acids?



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96. Define molar conductance.



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97. The unit of equivalent conductance is



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98. At which condition of ΔG , a cell will function?



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99. If same quantity of electricity is passed through $CuSO_4$ and $ZnSO_4$ solution, which metal will be deposited in more quantity?



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100. What are the electrolytic products of aqueous NaCl?



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101. What is galvanic cell?



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102. In an electrolytic cell oxidation occurs at _____ and reduction at _____.



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103. Suggest two materials other than H_2 that can be used as fuels in fuel cell.





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104. State Kohlrausch's law.



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105. What is fuel cell?



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106. Name the substance in fuel cell?





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107. What are the electrolytic products of aqueous NaCl?



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108. What happens to pH of NaCl solution after electrolysis and why?



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109. Explain, why liquid HCl and pure H_2O are non-conductor , while the solution of HCl in water is a strong electrolyte.



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110. Explain why 'Al' metal can't be obtained by electrolysis of $Al_2(SO_4)_3$ solution.



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111. What happens to the pH of the solution when acidulated water is electrolysed?



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112. Give a comparison between electrolytic cell and electrochemical cell ?



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113. Explain, why $AgNO_3$ solution can't be stored in copper vessel.



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114. Define electrochemical series ?



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115. Write the cell reaction that occur during discharging of lead storage battery.



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116. Why blue colour of $CuSO_4$ solution fades when an iron rod is dipped into it ?



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117. Between Na^+ and Li^+ what will have higher ionic conductance in their aqueous solution and why ?



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118. From Kohlrausch's law how can you find the degree of dissociation of a weak electrolyte ?



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119. Explain, why NaCl can conduct electricity in molten state and not in solid state.



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120. Explain, why sodium metal can't be obtained by the electrolysis of aqueous NaCl solution.



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121. Write the electrolytic products of $CuSO_4$ solution using Cu-electrode.



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122. What do you mean by equivalent conductance at infinite dilution ?



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123. Write two applications of electrochemical series.



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124. What is standard reduction potential ?

Write the cell potential in terms of reduction potential



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125. What is the relationship between molar conductance and equivalent conductance for an electrolyte?



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126. Represent in $Cu - AgNO_3$ cell and write the net cell reaction.



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127. Write the cell reactions in $H_2 - O_2$ fuel cell.



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128. Explain, why specific conductance decreases, while equivalent conductance increases with increase in dilution.



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129. Aqueous solution of $NaOH$ and H_2SO_4 using Pt-electrodes produces same products at the electrodes, explain.



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130. What is difference between metallic conductor and electrolytic conductor ?



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131. Find the mole ratio of 'Cu' and 'Ag' deposited when same quantity of charge is passed through solutions of $CuSO_4$ and $AgNO_3$ separately (Ag = 108, Cu - 63.5)



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132. 96500 coulomb charge deposits 108 gm silver considering the charge of one electron is $1.6 \times 10^{-19} C$, find the value of Avogadro's number



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133. Find the number of atoms of 'Ag' deposited at the cathode from $AgNO_3$ solution when 96.5C of electricity is passed through its solution. (Atomic mass of Ag = 108)



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134. Find the charge in coulomb required for reduction of 0.5 mole MnO_4^- to Mn^{2+} ion.



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135. A current of 0.15 A passed through a salt solution for 150 minute depositing 0.783 g of the metal . If atomic mass of the metal is 112, then find valency of the metal.



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136. The values of Λ_m° for NH_4Cl , NaOH and NaCl are 120.6, 248.2 and 136.4 $ohm^{-1}cm^2mol^{-1}$ respectively. Calculate Λ_m° for NH_4OH .



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137. Calculate the half cell potential at $25^\circ C$ for the cell reaction $Cu^{2+}(aq) + 2e \rightarrow Cu$,

When $[Cu^{2+}] = 4M$ and

$E^\circ (Cu^{2+} / Cu) = 0.34V$.





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138. How long a current of 2A is to be applied through a solution of $AgNO_3$ to coat a material of metal surface 100 cm^2 area and 0.005 mm thickness ? (density of $Ag = 10.5\text{ gm/cm}^3$, & atomic mass = 108)



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139. 0.35 mole of electron was passed through $AgNO_3$ solution. Calculate amount of Ag

metal deposited at the cathode.



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140. What weight of silver will be deposited by the same quantity of electricity which liberates 56 ml of O_2 at NTP from acidulated water ?



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141. Find the quantity of electricity needed to plate a metal of 100 cm^2 area and 10^{-2} cm

thickness using $CuSO_4$ solution. (density of copper = 9.94 gm/cm^3 and atomic mass = 63.5)



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142. The specific conductance of a 0.01N solution of CH_3COOH is $0.000158 \text{ ohm}^{-1}\text{cm}^{-1}$ at $18^\circ C$. The equivalent conductance of the acid at infinite dilution is $387 \text{ ohm}^{-1}\text{cm}^2 \text{ gm eq}^{-1}$. Calculate the degree of dissociation of the acid.



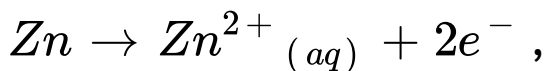
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143. How many moles of 'Al' can be deposited by the electrolysis of molten Alumina using 3 faradays of electricity ?



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144. Calculate the emf of the cell in which the following reaction takes place at two electrodes.





$$E^\circ = +0.80V$$



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145. A cell is set up between 'Zn' and 'Cu' electrode. If the two half cells work under standard condition, calculate the cell potential. Given $E^\circ (Zn^{2+} / Zn) = -0.76V$ and $E^\circ (Cu^{2+} / Cu) = +0.34V$.



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146. The equivalent conductance of 0.001N KCl solution is $147 \text{ ohm}^{-1} \text{cm}^2 \text{gmeq}^{-1}$ at 25°C .

Find the specific conductance.



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147. Find the quantity of charge required for the decomposition of 3.6 g water.



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148. The specific conductance of a 0.12N solution of an electrolyte is $2.4 \times 10^{-2} \text{ ohm}^{-1} \text{ cm}^{-1}$. Calculate its equivalent conductance.



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149. At a certain temperature the specific conductance of 0.40M KCl solution is $4.96 \times 10^{-2} \text{ ohm}^{-1} \text{ cm}^{-1}$. Calculate its molar conductance.





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150. During electrolysis of $ZnSO_4$ solution 6.023×10^{20} electrons flew through the solution. Find the quantity of 'Zn' deposited at the electrode. (Zn = 65.37)



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151. The specific conductance of a 0.12N solution of an electrolyte is 2.4×10^{-2}

$\text{ohm}^{-1}\text{cm}^{-1}$ Calculate its equivalent conductance.



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152. The specific conductance of a solution is $0.356 \text{ ohm}^{-1} \text{ cm}^{-1}$. The conductance of this solution in a cell was 0.0268 ohm^{-1} . Calculate the cell constant.



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153. A current of 4 amper is passed through $AgNO_3$ solution for 30 min, which deposits 7 gm of silver. Find the current efficiency. (Ag = 108)



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154. What volume of Cl_2 is liberated at NTP by the electrolysis of molten NaCl with 5A current flowing for 20 minutes ?



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155. If $E^\circ (Zn / Zn^{2+}) = + 0.76V$,
 $E^\circ (Ag^+ / Ag) = + 0.80V$, find the emf of
the cell
 $Zn / Zn^{2+} (0.01M) || Ag^+ (0.1M) / Ag$.



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156. 0.296 gm of a bivalent metal was deposited by the passage of 0.54 current for 30 minutes through a solution of metal sulphate. Calculate atomic mass of the metal.



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157. Calculate the volume of gaseous products at NTP obtained by the electrolysis of acidulated water using 10A current for 20 minutes.



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158. 24125 coulomb electricity when passed through an electrolyte deposits 2.25 gm of the

metal. If atomic mass of the metal is 27, find oxidation number of the metal ion.



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159. What amount of silver will be deposited by passing 2F electricity through two solutions containing $0.1M AgNO_3$ and $0.2M AgNO_3$?



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160. How much current is necessary to produce O_2 gas at the rate of 1 ml/sec from acidulated water ?



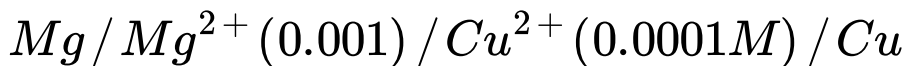
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161. What is Galvanic cell ? Discuss the construction and working of Daniell cell.



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162. Find the cell potential at $25^{\circ}C$ for the cell-



Given $E^{\circ} (Mg^{2+} / Mg) = - 2.37V,$

$$E^{\circ} (Cu^{2+} / Cu) = + 0.34V$$



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163. Define specific conductance and equivalent conductance. Establish a relation between them.





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164. The equivalent conductance of a decinormal $BaCl_2$ solution is $121 \text{ ohm}^{-1} \text{ cm}^2 \text{ em eq}^{-1}$ at a particular temperature. Find its specific conductance and molar conductance.



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165. Define electrochemical series ?



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166. Write short note on Law of independent migration of ions.



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167. Write short note on Nernst equation.



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168. Write short notes on : Lead storage battery



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169. State and explain laws of electrolysis. How much current in ampere is required to liberate H_2 gas at the rate of 1ml/sec at NTP from HCl solution ?



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