CHEMISTRY

BOOKS - CHETANA PUBLICATION

Electrochemistry

Exercise

1. What is electrochemistry?

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2. Define the following/write notes:

Oxidation Reaction

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3. Define the following/write notes:

Reduction Reaction

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4. Define the following : Oxidant

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5. Define the terms: Reductant

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6. Which form of energy is converted into electrical energy in dry cells?

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7. What is redox reaction?

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8. How is NaOH manufactured from NaCl?

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9. What is the origin of electrical conductivity of metals?

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10. Explain the term 'conductors' with examples.

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11. Distinguish between Electrolyte and Non-electrolyte.

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12. Distinguish between electronic and electrolytic conductors.

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13. Fill in the blanks:

Resistance =...../electric current.

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14. Define conductance. State its unit and dimension

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15. Define the terms: resistivity, conductivity and molar conductivity. Give their SI units.

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16. Write the relationship between conductivity and molar conductivity and hence unit of molar conductivity.

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17. Derive the relation between conductivity (k) and molar conductivity ($\hat{}_m$).

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18. Explain the effect of dilution of solution on conductivity?

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19. How the conductivity of a solution vary with concentration?

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20. How does the variation in molar conductivity of an electrolyte with concentration differ for strong and weak electrolytes?

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21. Explain the different behavior of strong and weak electrolytes towards the variation of conductivity with concentration?

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22. Explain the variation of molar conductivity with concentration.

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23. How is the molar conductivity of strong electrolytes at zero concentration determined by graphical method? Why is this method not

useful for weak electrolytes?

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24. State and explain Kohlrausch law of independent migration of ion. How it is useful to determine the molar conductivity of weak electrolytes at zero concentration?

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25. Write a note on applications of Kohlrausch theory.

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26. Explain the determination of molar conductivity of a weak electrolyte at infinite dilution using Kohlrausch's law.

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27. Give the relation between molar conductivity and degree of dissodation of weak electrolytes.

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28. Describe a conductivity cell. What is cell constant? What are its units?

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29. What is a cell constant ? What are its units? How is it determined experimentally?

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30. What is the reaction involving transfer of electrons from one chemical species to another called?

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31. What is an electrochemical cell?

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32. What are types of electrochemcial cells.

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33. Define (1) Electric conduction (2) Metallic conduction (3) Ionic conduction.

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34. What are electrochemical reactions? What are electrodes?

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35. Define Electrolysis.

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36. Describe the electrolysis of aqueous NaCl.

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37. Write the electrode reactions for the electrolysis of aqueous NaCl.

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38. Write the electrode reactions for the electrolysis of molten KCl.

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39. Why is cathode in an electrolytic cell considered to be negative and anode positive?

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40. Define the terms: (1) Coulomb (2) Faraday.

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41. How will you calculate the number of moles of electrons actually passed and mass of the substance produced during electrolysis of a salt solution using reaction stoichiometry?

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42. How many electrons will have a total charge of 1 coulomb?

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43. How many Faradays would be required to plateout 1.00 mole of free metal from the following cations? Mg^{2+}, Cr^{3+} Pb^{2+} Cu^{+}

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44. Define voltaic cell or Galvanic cell.

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45. Describe Galvanic cell or voltaic cell.

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46. What is the difference between electrolytic cell and voltaic cell?

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47. Why is cathode in an electrolytic cell considered to be negative and anode positive?

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48. What is a salt bridge? Write any two functions of salt bridge.

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49. What are the conventions used to represent galvanic cell?

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50. What are the conventions used to write cell diagram?

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51. What is the significance of the single vertical line and double vertical line in the formation of galvanic cell?

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52. A voltaic cell consisting of Fe^(2+)_((aq)) I Fe_((s)) and Bi^{3+} _ $(aq)IBi(s)$ electrodes is constructed. When the circuit is closed mass of Fe electrode decreases and that of Bi electrode increases: Write cell formula.

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53. A voltaic cell consisting of Fe^(2+)_((aq)) I Fe_((s)) and Bi^{3+} _ $(aq)IBi(s)$ electrodes is constructed. When the circuit is closed mass of Fe electrode decreases and that of Bi electrode increases: Which electrode is cathode and which is anode?

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54. A voltaic cell consisting of Fe^(2+)_((aq)) I Fe_((s)) and $Bi^{3+}\_(aq)IBi(s)$ electrodes is constructed. When the circuit is closed mass of Fe electrode decreases and that of Bi electrode increases: Write electrode reactions and cell reaction.

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55. Formulate a cell from the following electrode reactions: $Au^{3\oplus}(aq)+3e^{\Theta}\rightarrow Au(s)\ Mg(s)\rightarrow Mg^{2\oplus}(aq)+2e^{\Theta}$.

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56. You have learnt Daniel cell in XI the standard write notations for anode and cathode. Write the cell formula.

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57. Define the terms:Oxidation potential

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58. Define the term: Reduction potential

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59. Define the term: Cell potential

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60. Define the term: Standard potential

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61. Define the term: Electrode potential

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62. Define the term: Standard potential

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63. What conditions are required for a cell potential to be called standard cell potential?

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64. Write Nernst equation and explain the terms involved in it.What part of the equation represents the correction factor for non-standard state conditions?

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65. Why is equilibrium constant related to E° cell and not to E_{cell}?

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66. Derive the relationship between standard cell potential and equilibrium constant of cell reaction.

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67. How are $\Delta G^\circ, E^\circ(cell)$ and equilibrium constant related for a particular reaction?

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68. ΔG° for a redox reaction depends on the number of electrons transferred. Explain.

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69. Using the relationship between ΔG° of cell reaction and the standard potential associated with it, how will you show that the electrical potential is an intensive property ?

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70. Which species in each of the following pairs is better oxidizing agent under standard state conditions (standard potentials are given)? Give reason for your answer. $Br_{2(I)}(1.09V)$ or $Au_{aq}^{3+}(1.49V)$

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71. Which species in each of the following pairs is better oxidizing agent under standard state conditions (standard potentials are given)? Give reason for your answer: $H_{(aq)}^{+}$ or $Ag_{(aq)}^{+}(0.8V)$

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72. Which species in each of the following pairs is better oxidizing agent under standard state conditions (standard potentials are given)? Give reason for your answer: $Pb^{2+}_{(aq)}(-0.13V)$ or $Co^{2+}_{(aq)}(-0.28V)$

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73. Which species in each of the following pairs is better oxidizing agent under standard state conditions (standard potentials are given)? Give reason for your answer: $CI_2(g)(1.36V)$ or $Cr^{3+}_{(aq)}(-0.74V)$

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74. Which species in each of the following pairs is better reducing agent under standard state conditions? E° values are given.Give reasons for your answer: $K_{(s)}(-2.93V)$ or $Mg_{(s)}(-2.36V)$

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75. Which species in each of the following pairs is better reducing agent under standard state conditions? E° values are given.Give reasons for your answer: $Co^{2+}_{(aq)}(1.61V)$ or $In_{(s)}(-0.14V)$

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76. Which species in each of the following pairs is better reducing agent under standard state conditions? E° values are given.Give reasons for your answer: $Ce^{3+}_{(aq)}(1.61V)$ or $Ti^{2+}_{(aq)}(-0.37V)$

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77. Which species in each of the following pairs is better reducing agent under standard state conditions.E° values are, given. Give reasons for your answer :-$Hg_I(0.86V)$ or $Ni_s(-0.23V)$

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78. Arrange the following oxidizing agents in order of increasing strength under standard state conditions.The standard potentials for the reduction half reaction are given:

$Ag^{+}_{(aq)}(0.8V), AI^{3+}_{(aq)}(-166V), F_{2(g)}(2.87V)$

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79. Arrange the following oxidizing agents in order of increasing strength under standard state conditions.The standard potentials for the reduction half reaction are given:

$CI_{2(g)}(1.36V), I_2(s)(0.54V), Cd^{2+}_{(aq)}(-0.4V)$

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80. Arrange the following reducing agents in order of increasing strength under standard stateconditions, the standard potentials for the reduction half reactions being given.

$AI_{(s)}(-1.66V), CI_{aq}-(1.36V), Cu_{(s)}(0.34V).$

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81. Arrange the following reducing agents in order of increasing strength under standard stateconditions, the standard potentials for the reduction half reactions being given. $Fe_{(s)}(-0.44V), Br^{-1}_{(aq)}(1.09V), Ni_{(s)}(-0.26V)$

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82. Predict whether, $Ag^{+}cano-x-idisePb \rightarrow Pb^{2+}$ under standard state conditions. $E^{\circ}_{Ag} = 0.799V$ and $E^{\circ}_{Pb} = -0.126V$

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83. Predict whether, Cu^{2+} can oxidize $Cd \rightarrow Cd^{2+}$ under standard state conditions. $E^{\circ}_{Cu} = 0.337V, E^{\circ}_{Cd} = -0.403V$

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84. Define the term: Reference electrode

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85. Define the term: Standard Hydrogen electrode

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86. What is SHE? What are the difficulties in setting of SHE?

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87. What are limitations of SHE?

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88. Write Nernst equation for Hydrogen gas electrode.

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89. How are voltaic cells in common use classified?

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90. Draw neat and labelled diagram of dry cell (Lechlanche cell)

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91. Explain alkaline dry cell.

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92. What are anode and Cathode for Leclanche dry cell? Write electrode reaction and overall cell reaction when it generate electricity.

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93. Write the electrode reactions and net cell reaction in NICAD battery.

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94. Sketch lead storage cell.

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95. Write cell reations of lead storage battery during discharge.

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96. Write applications of lead accumulator.

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97. Explain cell reactions of Mercury battery.

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98. Explain why Mercury dry cell is superior than Leclanche' dry cell

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99. Sketch and describe construction of $H_2 - O_2$ fuel cell.

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100. What are anode and cathode of $H_2 - 0_2$ fuel cell? Name the electrolyte used in it. Write electrode reactions and net cell reaction taking place in the fuel cell.

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101. Write applications of fuel cells

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102. What are advantages and disadvantages(drawbacks) of fuel cells?

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103. Define EMF series and explain any two applications of the electrochemical series.

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104. Predict whether the following reactions occur under standard state conditions: $O\xi dationofAg_{(s)}byCl_{2(g)}\ E^{\circ}_{Ag} = 0.8V'E^{\circ}_{C12} = 1.36V$

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105. Predict whether the following reactions would occur spontaneously under standard state conditions:

$Ca_{(s)} + Cd^{2\oplus}(aq) \rightarrow Ca^{2\oplus} + (aq) + Ca_{(s)}$

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106. Predict whether the following reactions would occur spontaneously under standard state conditions:

$2Br^{\Theta}_{(s)} + Sn^{2\oplus}(aq) \rightarrow Br_2(l) + Sn_{(s)}$

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107. Predict whether the following reactions would occur spontaneously under standard state conditions:

$2Ag_{(s)} + Ni^{2\oplus}(aq) \rightarrow 2Ag^{\oplus}(aq) + Ni_{(s)}$

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108. A conductivity cell filled with 0.01M KCl gives at $25^{\circ}C$ gives the resistance of 604 ohms. The conductivity of KCl at $25^{\circ}C$ is $0.00141\Omega^{-1}1cm^{-1}$. The same cell filled with 0.001M $AgNO_3$ gives a resistance of 6529 ohms. Calculate the molar conductivity of 0.001M $AgNO_3$ [Conductivity of 0.01M KCl at $25^{\circ}Cis0.00141\Omega^{-1}cm^{-1}$]

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109. Calculate molar conductivities at zero concentration for $CaCl_2$, and Na_2SO_4. Given : molar ionic conductivities of $Ca^{2\oplus}, Cl^{\Theta}, Na^{\oplus}$ and $SO_4^{\oplus}$ ions are respectively, 104, 76.4, 50.1 and $159.6ohm^{-1}cm^2mol^{-1}$.

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110. The molar conductivity of 0.01M acetic add at $25^{\circ}C$ is $16.5\Omega^{-1}cm^{2}mol^{-1}$. Calculate its degree of dissodation in 0.01 M solution and dissodation constant if molar conductivity of acetic add at zero concentration is $390.7\Omega^{-1}cm^{2}mol^{-1}$.

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111. The conductivity of 0.02M AgN03 at $25^{\circ}C$ is $2.428 \times 10^{-3}\Omega^{-1}cm^{-1}$. What is its molar conductivity?

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112. The conductivity of 0.02M AgN03 at $25^{\circ}C$ is $2.428 \times 10^{-3}\Omega^{-1}cm^{-1}$. What is its molar conductivity?

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113. A conductivity cell filled with $0.02MH_2SO_4at25^\circ C$ gives a resistance of 122ohms. If the molar conductivity of $0.02MH_2SO_4is618\ \Omega^{-1}cm^2mol^{-1}$, what is the cell constant?

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114. A conductivity cell filled with $0.02MH_2SO_4at25^\circ C$ gives a resistance of 122ohms. If the molar conductivity of $0.02MH_2SO_4is618\ \Omega^{-1}cm^2mol^{-1}$, what is the cell constant?

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115. The molar conductivities at zero concentrations of $NH_4C1, NaOH$ and NaCl are respectively $149.7\Omega^{-1}cm^2mol^{-1}, 248.1\Omega^{-1}cm^2mol^{-1}$ and $126.5\Omega^{-1}cm^2mol^{-1}$. What is the molar conductivity of NH_4OH at zero concentration?

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116. What is the molar conductivity of AgI at zero concentration if the $\wedge_o$ values of NaI, AgNO3 and $NaNO_3$ are respectively $126.9\Omega^{-1}cm^2mol^{-1}133.4\Omega^{-1}cm^2mol^{-1}$ and $121.5\Omega^{-1}cm^2mol^{-1}$?

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117. The electrical resistance of a column of 0.05 mol L^1 NaOH solution of diameter1cm and length 50 cm is 5.55×10^3 ohm. Calculate its resistivity, conductivity and molar conductivity.

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118. The molar conductivity of 0.025mol L'1methanoic acid is 46.1 S cm2 mol'1. Calculate its degree of dissociation and dissociation constant. (NCERT) Given:

$\lambda^\circ_{H+} = 349.6Scm^2mol^1$ and $\lambda^\circ_{HCOO-} = 54.6Scm^2mol^{-1}$

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119. What is the mass of copper metal produced during thepassageof 5A current through $CuSO_4$ solution for 100 minutes. The molar mass of Cu is 63.5g mol^{-1}.

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120. How many moles of electrons are passed when 0.8 ampere current is passed for 1 hour through molten $CaCl_2$?

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121. In a certain electrolysis experiment 0.79 g of Ag was deposited in one cell containing aqueous $AgNO_3$ solution, while 0.231 g of an unknown metal X was deposited in another cell containing aqueous XCI_2 solution in series with $AgNO_3$ cell. Calculate the molar mass of X. Molar mass of Ag is $107.9gmol^{-1}$.

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122. In the electrolysis of water, one of the half reaction is $2H_{aq}^{+} + 2e^{-} \rightarrow H_{2(g)}$. Calculate the volume of H_2 gas collected at $25^{\circ}C$ and 1 atm pressure by passing 2A for lhr through the solution. $R = 0.08205L.\ atmK^{-1}mol^{-1}$.

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123. How much time will be required to liberate 3×10^{-2} kg of iodine from KI solution by the passage of 4 A current through it? Molar mass of iodine is $127gmol^{-1}$.

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124. How long will it take to produce 2.415 g of Ag metal from its salt solution by passing a current of 3A?Howmany molesof electrons are required? Molar mass of Ag is $107.9gmol^{-1}$.

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125. What current strengthinampere will berequired to produce 2.369×10^{-3} kg of Cu from $CuSO_4$ solution in one hour? How many moles of electrons are required? Molar mass of Cu is $63.5 gmol^{-1}$.

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126. A current of 6 amperes is passed through $AICI_3$ solution for 15 minutes using Pt electrodes, when 0.504 g of Al is produced. What is the molar mass of Al ?

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127. How many moles of electrons are required for the reduction of (i) 3 moles of Zn^{2+} to Zn (ii) 1 mole of Cr^{3+} to Cr? How many Faradays of electricity will be required in each case?

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128. In a certain electrolysis experiment 4.36 g of Zn are deposited in one cell containing ZnS04 solution. Calculate the mass of Al deposited in another cell containing $AICI_3$ solution connected in series with $ZnSO_4$ cell. Molarmassesof Zn and Al are $65.4gmol^{-1}$ and $27gmol^{-1}$, respectively.

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129. Inthe electrolysis of $AgNO_3$ solution 0.7g of Ag is deposited after a certain period of time.Calculate the quantity of electricity required in coulomb. Molar mass of Ag is $107.9gmol^{-1}$.

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130. Calculate the amounts of Na and chlorine gas produced during the electrolysis of fused NaCl by the passage of an ampere current for 25 minutes. Molarmasses of Naand chlorine gas are $23gmol^{-1}$ and $71gmol^{-1}$ respectively.

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131. Calculatethemassof Mg andvolume of chlorine gas at STP produced during electrolysis of molten $MgCl_2$ by the passage of 2 amperes of current for 1 hour. Molar masses of Mg and Cl_2 are respectivley 24 g mol^{-1} and $71 gmol^{-1}$.

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132. In a certain electrolysis experiment 0.561 g of Zn is deposited in one cell containing $ZnSO_4$ solution. Calculate the mass of Cu deposited in another cell containing $CuSO_4$ solution in series with $ZnSO_4$ cell. Molar masses of Zn and Cu are $65.4 gmol^{-1}$ and $63.5 gmol^{-1}$ respectively.

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133. Two electrolytic cells one containing $AlCl_3$ solutionand the other ontaining $ZnSO_4$ solution are connected in series. The same quantity of

electricity is passed between the cells, Calculate the amount of Zn deposited in $ZnSO_4$ cell if 1.2 g of Al are deposited in $AlCl_3$ cell. The molar masses of Al and Zn are $27gmol^{-1}$ and $65.4gmol^{-1}$ respectively.

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134. The passage of 0.95 A for 40 minutes deposited 0.7493 g of Cu from $CuSO_4$ solution. Calculate the molar mass of Cu.

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135. In the electrolysis of water, one of the half reaction is $2H_{aq}^{+} + 2e^{-} \rightarrow H_{2(g)}$. Calculate the volume of H_2 gas collected at $25^{\circ}C$ and 1 atm pressure by passing 2A for lhr through the solution. $R = 0.08205L.\ atmK^{-1}mol^{-1}$.

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136. A constant electric current flows for 4 hours through two electrolytic cells connectedin series. Onecontain $AgNO_3$ ssolutionandsecondcontains $CuCl_2$ solution. During this time, 4 grams of Ag are deposited in the first cell: How many grams of Cu are deposited in the second cell?

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137. A constant electric current flows for 4 hours through two electrolytic cells connectedin series. Onecontain $AgNO_3$ ssolutionandsecondcontains $CuCl_2$ solution. During this time, 4 grams of Ag are deposited in the first cell: What is the current flowing in amperes?

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138. Thestandard potential of the electrode, $Zn^{2\oplus}(0.02M) \mid Zn(s)is - 0.76V$. Calculate its potential.

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139. Write the cell reaction and calculate the standard potential of the cell. $Ni_{(s)}\left|Ni^{2+}(M)\right|\left|CI(1M)\right|CI_2(g.\,latm)\mid Pt$ `E_(Cl2)^@ = 1.36 V and E_^@ = -0.25 V

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140. Write the cell reaction and calculate the emf of the cell. $Pb_{(s)}\left|Pb^{2+}(1M)\right|\left|KCI(sat)\right|Hg_2CI_{2(s)}\mid Hg$ $E^{\circ}_{anode} = -0.126V, E^{\circ}_{cathode} = 0.242V.$ Identify anode and cathode. Name the right hand side electrode

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141. What is standard cell potential for the reaction Cell notation $3Ni(s) + 2AI^{3\oplus}(1M) \rightarrow 3Ni^{2\oplus}(1M) + 1Al(s)$ if E°_{Ni} =-0.25 V and E^{0}_{AI} =-1.66V?

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142. The following redox reaction occursin a galvanic cell. $2AI_{(s)} + 3Fe^{2+}_{(aq)}(1M) \rightarrow 2AI^{3+}_{(aq)}(1M) + 3Fe$: Write the cell notation.

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143. The following redox reaction occursin a galvanic cell. $2AI_{(s)} + 3Fe^{2+}_{(aq)}(1M) \rightarrow 2AI^{3+}_{(aq)}(1M) + 3Fe$: Identify anode and cathode

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144. The following redox reaction occursin a galvanic cell. $2AI - ((s)) + 3Fe_{(aq)}(2+)(1M) \rightarrow 2AI^{3+}_{(aq)}(1M) + 3Fe$: $Calcate$ E_(Call)^@ if E_(anode)^@=-1.66 V and $E^{\circ}_{Sn} = -0.136V, E^{\circ}_{Ag} = 0.799V, (0.8744V)\Big] = -0.44V.$

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145. The following redox reaction occurs in a galvanic cell. $2Al_{(s)} + 3Fe^{2+}_{(aq)}(1M) \rightarrow 2Al^{3+}_{(aq)}(1M) + 3Fe$: If $E^{\circ}anode = -1.66V$ and $E^{\circ}cathode = -0.44$Calculate ΔG° for reaction.

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146. Calculate the potential of the following cell at $25^{\circ}C$. $Sn_{(s)}\left|Sn^{2+}(0.025M)\right|\left|Ag^{+}(0.015M)\right|Ag(s)E^{0}_{sn} = -0.136V, E^{\circ}_{Ag} = 0.79$

.

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147. Calculate the voltage of the cell, $Sn(s)\left|Sn^{2\oplus}(0.02M)\right|\left|Ag^{\oplus}(0.01M)\right|Ag(s)at25^{\circ}C.$

$E^{\circ} = -0.136V, E^{\circ}_{Ag} = 0.800V.$

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148. Consider the following cell $Pb_{(s)}\left|Pb^{2+}_{(aq)}(0.5M)\right| \mid Cu_{(aq)}{}^{+2}(0.001M)\mid$ $E^{\circ}Pb$= -0.126V $E^{o}Cu$ = +0.337V: Write the cell reaction.

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149. Consider the following cell $Pb_{(s)}\left|Pb^{2+}_{(aq)}(0.5M)\right| \mid Cu_{(aq)}{}^{+2}(0.001M)\mid CuE^{\circ}Pb=-0.126V, E^{\circ}Cu=+0.337V: Ca$ E_(cell) and $E^{\circ}_{cell} at 25^{\circ}C.$

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150. Consider the following cell $Pb_{(s)}\left|Pb^{2+}_{(aq)}(0.5M)\right| \mid Cu_{(aq)}{}^{+2}(0.001M)\mid =-0.126V, E^{\circ}u=+0.337V:$ Calculate ΔG and ΔG° for cell reaction.

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151. Construct a galvanic cell from the electrodes $Co^{3\oplus}|Co$ and $Mn^{2\oplus}|Mn$. $E^0_{Co} = 1.82V$.

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152. Consider the following redox reaction $Mg_{(s)} + Sn^{2+}_{aq} \rightarrow Mg^2 + Sn_{(s)}$ Calculate E_{cell} for the reaction at $25^\circ C$ if $\left[Mg^{2+}\right] = 0.035M$, $\left[Sn^{2+}\right] = 0.025M$, $E^0_{Mg} = -2.37V$ and $E^0_{Sn} = -0.136V$.

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153. Consider the following redox reaction $Mg_{(s)} + Sn^{2+}_{aq} \rightarrow Mg^{2+}_{aq} + Sn_{(s)}$ $\left[Mg^{2+}\right] = 0.035M$, $\left[Sn^{2+}\right] = 0.025M$,

$E^0_{Mg} = -2.37V$ and $E^0_{Sn} = -0.136V$. Calculate ΔG for the cell reaction.

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154. Construct a cell consisting of Ni^{2+}|Ni half cell and $H^+ \mid H_2$ (g. latm) | Pt half cell. Write the cell reaction.

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155. Construct a cell consisting of Ni^{2+}|Ni half cell and $H^+ \mid H_2$ (g. latm) | Pt half cell: Calculate emf of the cell if $\left[Ni^{2+}\right] = 0.1M \left[H^+\right] = 0.05M$ and $E^0_{NI} = -0.257$.

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156. Write the Nernst equation and emf of the following cells at 298 K. `Sn_((s))|Sn_(aq)^2+(0.050M)|H_(aq)^+(0.020 M)|H(2(g))(1 bar)Pt_((s))

(Given E_(Sn^(2+)//Sn)^0 =- 0.136 V)

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157. Write the Nernst equation and emf of the following cells at 298 K. $Pt_{(s)}\left|Br_{2(1)}\right|Br^{-(0.010M)}\left|\left|H^{+}(0.030M)\right|H_{2(g)}(1^{-})\right|Pt_{(s)}$ (Given $E^{\circ}_{Br^{-}}$ = + 1.08 V)`

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158. Calculate emf of the cell $Zn_{(s)}\left|Zn^{2\oplus}(0.2M)\right|H\oplus(1.6M)H_{2}(g.1.8atm)\mid Pt^{a}t25^{\circ}C.$

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159. Write the Nernst equation and emf of the following cells at 298K. $Mg_{(s)}\left|Mg^{2+}_{aq}(0.001M)\right|Cu_{(s)}$

$\left(GivenE^{\circ}_{Mg^{2+}/Mg}=-2.37V,E^{\circ}_{Cu^{2+}/Cu}=0.34V\right)$

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160. Write the Nernst equation and emf of the following cells at 298K.

$Fe_{(s)}\left|Fe^{2+}(0.001M)\right|\left|H^{+}_{1M}\right|H(2(g)(1^{-}))\mid Pt_{(s)}$

$\left(GivenE^{0}_{Fe^{2+}/Fe}=-0.440V\right)$

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161. Calculate emf of the following cell at $25^{\circ}C$.

$Zn((s))\left|Zn^{2\oplus}(0.08M)\right|\left|Cr^{3\oplus}(0.1M)\right|Cr$

$E^{0}_{Zn}=-0.76V, E^{0}_{Cr}=-0.74V)$

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162. Find the solubility product of a saturated solution of Ag_2CrO_4 in water at 298 K if the e.m.f of the cell :

$\left[Ag\right|Ag^{+}(sat.\ Ag_2CrO_4)\left|Ag^{+}(0.1M)\mid Agis0.164Vat298K.\right.$

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163. Calculate the potential of the following cell at $25^{\circ}C$. $Zn\left|Zn^{2+}(0.6M)\right|\left|H^{+}(1.2M)\right|H_2(g, 1atm)\ |\ PtE^{\circ}_{Zn} = -0.763V.$

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164. Set up the cell consisting of $H^{+}_{(aq)}\left|H_{2(g)}\right.$ and $Pb^{2+}_{aq}\left|Pb((s))e \leq ctrodes.Calcatetheemfat24\text{^}@C\right.$ $ofthe$[Pb^(2+)] = 0.1 M, [H^+] = 0.5 M and $hydro \geq ngasisat2atmpressure.$ E_(Pb)^@ = -0.126 V`.

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165. Write balanced equations for the half reactions and calculate the reducation potentials at $25^{\circ}C$ for the following half cells : $Cl^{-(1.2M)}\ |\ Cl_2(g), 3.6atmlPt, E^{\circ} = 1.36V$

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166. Write balanced equations for the half reactions and calculate the reducation potentials at $25^{\circ}C$ for the following half cells : $Fe^{2+}(2M) \mid Fe_{(s)}, E^{\circ} = -0.44V.$

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167. Calculate the emf of the cell in which the following reaction takes place: $Ni(s) + 2Ag^{+}_{(aq)} \rightarrow Ni^{2+}_{(aq)} + 2Ag(0.002M)(0.160M)$ $E^{\circ}_{cell} = 1.05V.$

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168. Consider a galvanic cell that uses the half reactions: $2H^{+}_{(aq)} + 2e^{-}$ rarr H_(2(g))Mg_((aq)) +2e^-rarrMg_((a)) $Writebalancedequationf$ or $thecellreaction. Calcate$E_(Cell)^@ and DeltaG^@ if $concentrationsare1Meach$ and P_(H2)=10 atm. E_(Mg)^@=-2.37V`.

Watch Video Solution

169. Calculate $E^{\circ}_{cell}, \Delta G^{\circ}$ and equilibrium constant for the reaction : $2Cu^{+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + Cu_{(s)}$ $E^{\circ}_{Cu+/Cu} = 0.52V$ and $E^{\circ}_{Cu\frac{+}{C}u} = 0.16V$

Watch Video Solution

170. Device galvanic cell for each of the following reactions and calculate ΔG° for the reaction, (i) Zn dissolves in HCI to produce Zn^{2+} and H_2 gas. E°_{Zn}= -0.763V.(ii) Cr dissolves in diluteHCl to produce Cr^{3+} and $H_2 gas. E^{\circ}_{Cr} = -0.74V.$

Watch Video Solution

171. The equilibrium constant for the following reaction at $25^{\circ} Cis 2.9 \times 10^{9}$. Calculate standard voltage of the cell. $Cl_{2(g)} + Br^{-n}_{aq} arrBr(2(i)) + 2CI^{-}_{(aq)}$.

Watch Video Solution

172. Calculate the equilibrium constant for the redox reaction at $25^\circ C$, $Sr_{(s)} + Mg^{2}_{(aq)} + \rightarrow Sr^{2+}_{(aq)} Mg_{(s)}$ that occursina galvaniccell. Write thecell formula. $E^{\circ}_{Mg} = -2.37V$ and $E^{\circ}_{Sr} = -2.89V$.

Watch Video Solution

173. Equilibrium constant of the reaction, $2Cu^{\oplus}(aq) \rightarrow Cu^{2\oplus}(aq) + Cu_{(s)} is 1.2 \times 10^{6}$. What is the standard potential of the cell in which the reaction takes place?

Watch Video Solution

174. Calculate standard Gibbs energy change and equilibrium constant at $25^\circ C$ for the cell reaction, $Cd(s) + Sn^{2\oplus}(aq) \rightarrow Cd^{2\oplus}(aq) + Sn(s) Given$: E_(Cd)^@ = -0.403V and E_(Sn)^@ = -0.136 V`. Write formula of the cell.

Watch Video Solution

175. The resistance of a solution is 5×10^3 ohm. Find the conductance of the solution.

Watch Video Solution

176. A conductivity cell has two electrodes 50 mm apart and of cross section area $2.5cm^2$. Find the cell constant.

Watch Video Solution

177. At 278 K temperature molar conductivity of H_2SO_4 is $5.25ohm^{-1}cm^2mol^{-1}$. Calculate its conductivity in 0.03 M H_2SO_4.

Watch Video Solution

178. a conductivity cell, the distance between two electrodes is 0.62 cm and the area of cross section of the electrode is $1.15cm^2$. Find the cell constant of the cell.

Watch Video Solution

179. The specific conductance of 0.036 M KBr solution is $5.40 \times 10^{-4} Scm^{-1}$. Find the molar conductivity of the solution.

Watch Video Solution

180. Conductivity at 278 K of $0.15mol.\, L^{-1}$ NaCl solution is $1.5 \times 10^{-2} ohm^{-1} cm^{-1}$. Find molar conductance.

Watch Video Solution

181. Resistance and conductivity of a cell containing 0.002 M KCI solution at 298 K are 2000Ω and $1.84 \times 10^{-4} S.\, cm^{-1}$ respectively. What is cell constant?

Watch Video Solution

182. The molar conductivities at zero concentrations of NH_4C1, $NaOH$ and NaCl are respectively $149.7\Omega^{-1}cm^2mol^{-1}$, $248.1\Omega^{-1}cm^2mol^{-1}$ and $126.5\Omega^{-1}cm^2mol^{-1}$. What is the molar conductivity of NH_4OH at zero concentration?

Watch Video Solution

183. The molar conductivities of HCl, NaCl and CH_3COONa are 320.7, 224.2 and $105.3\Omega^{-1}cm^2mol^{-1}$ respectively. Find the molar conductivity of CH_3COOH at zero concentration.

Watch Video Solution

184. If the specific conductivity of 0.04 M electrolytic solution is $0.0649\Omega^{-1}m^{-1}$, calculate its molar conductivity.

Watch Video Solution

185. In a conductivity cell at 275 K temperature, the resistance of 0.02 M HC1solution was found to be 150 ohm.Thespecific conductanceof thissolution is $3.2 \times 10^{-3} Scm^{-1}$. What is the cell constant?

Watch Video Solution

186. How much electricity in terms of Faraday is required to produce? (a) 20 g of Ca from molten $CaCl_2$ (b) 40 g of Al from molten Al_2O_3 Given: Molar mass of $Ca = 40gmol^{-1}$ Molar mass of Al-27 g mol^{-1}

Watch Video Solution

187. An electric current of 240 mA is passed through an electrolyte for 1 hour, 15 minutes. Find the quantity of electricity passed.

Watch Video Solution

188. The standard emf of the following cell is 0.552 V. $Cd|cd^{2+}(1M)|Ag^{+}(1M)\ |\ Ag$If the standard potential of Cd electrode is 0.431V. what is the standard potential of Ag electrode?

Watch Video Solution

189. Give the cell reactions for the following cells:

$Zn|Zn^{2+}_{(aq)}||Cu^{2+}_{(aq)}|Cu$ $AI_{(s)}|AI^{3+}_{(aq)}||Cu^{2+}_{(aq)}|Cu_{(s)}$

$Pt, H_{2(g)}|H^{+}_{aq}|Cu^{2+}_{(aq)}\ |\ Cu$

Watch Video Solution

190. For the following reaction at 298 K, calculate, using Nemst equation, cell potential, standard free energy change, if $E^{\circ}_{Zn} = -0.76V, E^{\circ}_{Sn} = -0.14V, \left[Sn^{++}\right] = 0.03M, \left[Zn^{++}\right] = 0.04M$

$Zn_{(s)}, + Sn^{++}_{(aq)} \rightarrow Zn^{++}_{(aq)} + Sn_{(s)}.$

Watch Video Solution

191. The equilibrium constant for the reaction in the Daniell call is 1.7×10^{37} at $25^{\circ}C$.If $E^{\circ}_{Zn^{2+}/Zn} = -0.52$, find the standard reduction potential of Cu^{2+}/Cu electrode.

Watch Video Solution

192. The distance between the electrodes of a conductivity cell is 0.98 cm and area of cross section of theeletrodeis $1.3cm^2$. Calculate the cell constant for the cell.

Watch Video Solution

193. If the specific conductivity of 0.04 M electrolytic solution is $0.0649\Omega^{-1}m^{-1}$, calculate its molar conductivity.

Watch Video Solution

194. The molar condutivity of 0.02 M HCI solution is $407.2\Omega cm^2 mol^{-1} at 25^\circ C$. Calculate its conductivity.

Watch Video Solution

195. A conductivity cell dipped in 0.0005 M NaCl gives at $25^\circ C$ resistance of 13710 ohms.If the electrode of the conductivity cell are 0.7 cm apart and the area of cross section of the electrode is $0.82cm^2$,what is the molar conductivity of the solution at $25^\circ C$?

Watch Video Solution

196. A conductivity cell dipped in 0.01 M $AgNO_3$ solution at $25^\circ C$ gives a resistance of 1442 ohms. If the molar conductivity of 0.01M $AgNO_3$ solution is $124.8\Omega^{-1}cm^2mol^{-1}$, what is the cell constant?

Watch Video Solution

197. Resistance of a conductivity cell filled with 0.1 M KC1 solution is 100 ohm. If the resistance of the same cell when filled with 0.02 M KC1 solution is520 ohms, calculate the conductivity and molar conductivity of 0.02 M KC1 solution. The conductivity of $0.1molL^{-1}$ KCl solution is $1.29 \times 10^{-2}\Omega^{-1}cm^{-1}$.

Watch Video Solution

198. Calculate the amount of electricity required to liberate 112 mL of hydrogen at NTP during electrolysis of dil.H_2SO_4.

Watch Video Solution

199. How much time will be required to liberate 3×10^{-2} kg of iodine from KI solution by the passage of 4 A current through it? Molar mass of iodine is $127 gmol^{-1}$.

Watch Video Solution

200. Consider the following redox reaction $Mg_{(S)} + Sn^{2+}_{(aq)} \rightarrow Mg^{2+}_{(aq)} + Sn_{(s)}$: Write the cell formula.

Watch Video Solution

201. Consider the following redox reaction $Mg_{(s)} + Sn^{2+}_{aq} \rightarrow Mg^{2} + Sn_{(s)}$ Calculate E_{cell} for the reaction at $25^{\circ} C$ if $\left[Mg^{2+}\right] = 0.035M$, $\left[Sn^{2+}\right] = 0.025M$, $E^{0}_{Mg} = -2.37V$ and $E^{0}_{Sn} = -0.136V$.

Watch Video Solution

202. Calculate $E^{\circ}_{cell}, \Delta G^{\circ}$ and equilibrium constant for the reaction : $2Cu^{+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + Cu_{(s)}$ $E^{\circ}_{Cu+/Cu} = 0.52V$ and $E^{\circ}_{Cu\frac{+}{C}u} = 0.16V$

Watch Video Solution

203. Calculate the standard cell potentials of galvanic cell in which the following reactions take place $2Cr_{(s)} + 3Cd^{2+}_{(aq)} \rightarrow 2Cr^{3+}_{aq} + 3Cd$ $E^{\circ}_{Cr} = -0.740V, E^{\circ}_{Cd} = -0.403V, Calcatethe$Delta_rG^@` and equilibrium constant of the reactions.

Watch Video Solution

204. Calculate equilibrium constant for the reaction, $Ni_{(s)} + 2Ag^{2+}_{(aq)} \rightarrow Ni^{2+}_{(aq)} + 2Ag_{(s)} at 25^{\circ}C$

$E^{\circ}_{Ni} = -0.25V$ and $E^{\circ}_{Ag} = 0.799V$.

Watch Video Solution

205. Set up the cell consisting of $H^+_{(aq)}|H_{2(g)}$ and $Pb^{2+}_{aq}|Pb((s))e \leq ctrodes.Calcatetheemfat24^@C ofthe$[Pb^(2+)] = 0.1 M, [H^+] = 0.5 M and $hydro \geq ngasisat2atmpressure.$ E_(Pb)^@ = -0.126 V`.

Watch Video Solution

206. Two solutions have the ratio of their concentrations 0.4 and ratio of their conductivities 0.216. The ratio of their molar conductivities will be

A. 0.54

B. 11.574

C. 0.0864

D. 1.852

Answer:

Watch Video Solution

207. On diluting the solution of an electrolyte

A. both $\wedge$ and k increase

B. both $\wedge$ and k decrease

C. $\wedge$ increases and k decreases

D. $\wedge$ decreases and k increase

Answer:

Watch Video Solution

208. $1Sm^2mol^{-1}$ is equal to

A. $10^{-1}Sm^2mol^{-1}$

B. $10^4\Omega^{-1}cm^2mol^{-1}$

C. $10^{-2}Scm^2mol^{-1}$

D. $10^{-4}\Omega^{-1}cm^2mol^{-1}$

Answer:

Watch Video Solution

209. The standard potential of the cell in which the following reaction occurs $H_2(g, 1atm) + Cu^{2\oplus}(1M) \rightarrow 2H^{\oplus}(1M) + Cu(S)$, (E^0Cu = 0.34V)` is

A. $-0.34V$

B. 0.34 V

C. 0.17V

D. $-0.17V$

Answer:

Watch Video Solution

210. For the cell, $Pb(s)\left|Pb^{2\oplus}(1M)\right|\left|Ag^{\oplus}(1M)\right|Ag(s)$, if concentraton of an ion in the anode compartment is increased by a factor of 10, the emf of the cell will

A. increase by 10 V

B. increase by 0.0296 V

C. decrease by 10 V

D. decrease by 0.0296 V

Answer:

Watch Video Solution

211. The strongest oxidising and reducing agents respectively are

A. Ag and $Fe^{2\oplus}$

B. $Ag^{\oplus}$ and Fe

C. Pb^{2+} and I^{Θ}

D. I_2 and $Fe^{2\oplus}$

Answer:

Watch Video Solution

212. For the reaction $Ni(s) + Cu^{2\oplus}(1M) \rightarrow Ni^{2\oplus}(1M) + Cu(s), E^{\circ} cell = 0.57V \Delta G^{\circ}$ of the reaction is

A. 110 kJ

B. $-110kJ$

C. 55 Kj

D. $-55kJ$

Answer:

Watch Video Solution

213. Which of the following is not correct?

A. A. Gibbs energy is an extensive property

B. B. Electrode potential or cell potential is an intensive property.

C. C. Electrical work $= -\Delta G$

D. D. If half reaction is multiplied by a numerical factor, the corresponding E° value is also multiplied by the same factor

Answer:

Watch Video Solution

214. The oxidation reaction that takes place in lead storage battery during discharge is

A. $Pb^{2\oplus}(aq) + SO_4^{2\Theta}(aq) \rightarrow PbSO_4(s)$

B.

$$PbSO_4(s) + 2H_2O(I) \rightarrow PbO_2(s) + 4H^{\oplus}(aq) + SO_4^{2\Theta}(aq) + 2e^{\oplus}$$

C. $Pb(s) + SO_4^{2\oplus} \rightarrow (aq)PbSO_4(s) + 2e^{\Theta}$

D. $PbSO_4(s) + 2e^{\Theta} \rightarrow Pb(s) + SO_4^{2\Theta}(aq)$

Answer:

Watch Video Solution

215. Which of the following expressions represent molar conductivity of $AI_2(SO_4)_3$?

A. $3\lambda_{Ar^{3(\oplus)^\circ} + 2\lambda^\circ SO_4{}^{2\Theta}}$

B. $2\lambda_{Ar^{3\oplus}\hat{}\circ + 3\lambda^\circ O_4{}^{2\Theta}}$

C. $\frac{1}{3}\lambda^\circ_{Ar^3\oplus} + \frac{1}{2}\lambda^\circ SO_4{}^{2\oplus}$

D. $\lambda^\circ_{Ar^3\oplus}\lambda^\circ SO_4{}^{2\oplus}$

Answer:

Watch Video Solution

216. In the electrolysis of molten Al_2O_3 with inert electrodes

A. Al is oxidized at anode to Al^{3+}

B. O_2 gas is produced at anode

C. O^- is reduced at cathode

D. O is oxidized at anode

Answer:

Watch Video Solution

217. The number of electrons that have a total charge of 965 coulombs is

A. 6.022×10^{23}

B. 6.022×10^{22}

C. 6.022×10^{21}

D. 3.011×10^{23}

Answer:

Watch Video Solution

218. The time required to produce 2F of electricity with a current of 2.5amperes is

A. 13.4H

B. 1287 min

C. 50000s

D. 1.5h

Answer:

Watch Video Solution

219. The number of Faradays required to produce 0.5 mol of free metal from Al^{3+} is

A. 3

B. 2

C. 6

D. 1.5

Answer:

Watch Video Solution

220. The number of coulombs necessary to deposit 1g of potassium metal $\left(molarmass39gmol^{-1}\right)$ from K^+ ions is

A. 96500C

B. $1.93 \times 10^5 C$

C. 1237C

D. 2474C

Answer:

Watch Video Solution

221. The strongest oxidizing agent among the species $In^{3+}(E^\circ = -1.34V), Au^{3+}(E^\circ = 1.4V),$ $Hg^{2+}(E^\circ = 0.86V), Cr^{3+}(E^\circ = -0.74V)$ is

A. Cr^{3+}

B. Au^{3+}

C. Hg^{2+}

D. In^{3+}

Answer:

Watch Video Solution

222. The value of constant in Nemst equation constant $E = E^\circ - \frac{cons\tan t}{n} InQat25^\circ Cis$

A. 0.0592 mV

B. 0.0592V

C. 25.7mV

D. 0.0296 V

Answer:

Watch Video Solution

223. The reaction, $2Br_{(aq)}^{(-)} + Sn_{(aq)}^{2} \rightarrow Br_{2(I)} + Sn_{(s)}$ with the standard potentials, $E_{Sn}^{\circ} = -0.114V$, $E_{Br_2}^{\circ} = +1.09V$, is

A. spontaneous in reverse direction

B. spontaneous in forward direction

C. at equilibrium

D. non-spontaneous in reverse direction

Answer:

Watch Video Solution

224. Daniel cell operates under non standard state conditions. If the equation of the cell reaction is multiplied by 2 then

A. E and E° remain unchanged

B. E is doubled

C. n remains unchanged in Nernst eqations

D. Q is halved in Nernst equation

Answer:

Watch Video Solution

225. The standard potential for the cell reaction $2Ti_{(S)} + Hg^{2+}(1M) \rightarrow 2Ti^{+}(1M) + Hg_{(I)}$ Where $E_{Ti}^{\circ} = -0.34V, E_{Hg}^{\circ} = 0.86$ V is

A. 0.52 V

B. $-0.52V$

C. $-1.2V$

D. $+1.2V$

Answer:

Watch Video Solution

226. ΔG° for the reaction $Ag^{+}_{(aq)} + \frac{1}{2}H_{2(g)} \rightarrow H^{+}_{(aq)} + Ag_{(s)}$, where standard potential for silver half cell reaction is 0.8V, will be

A. 77.2KJ

B. $+77.2kJ$

C. $154.4kJ$

D. $-38.6KJ$

Answer:

Watch Video Solution

227. The following reaction occurs in a galvanic cell $2Cu^{+} \rightarrow Cu^{2+} + Cu$ If $E^{\circ}_{cu^{+}Cu^{2+}} = +0.16V$ and $E^{\circ}_{Cu^{+}Cu}$ = 0.52 V`, the standard cell potential will be

A. 0.68V

B. 0.36V

C. $-0.36V$

D. $-0.68V$

Answer:

Watch Video Solution

228. The SI unit of molar conductivity is

A. $Scm^{2}mol^{-1}$

B. Sdm^2mol^{-1}

C. Sm^2

D. Sm^2mol^{-1}

Answer:

Watch Video Solution

229. During electrolysis, 2A current is passed through an electrolytic solution for 965s. The number of moles of electrons passed will be

A. 0.02

B. 0.01

C. 200

D. 0.037

Answer:

Watch Video Solution

230. The same quantity of electricity is passed through two cells one containing AlCl3 solution and the other containing ZnCl2 solution. If 0.04 mole of Al is produced in the first cell, the number of moles of Zn produced in the second cell will be

A. 0.08

B. 0.0267

C. 0.06

D. 0.02

Answer:

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231. E° of an electrode half reaction is related to ΔG° by the equation, $E^\circ = -\Delta G^\circ / nF$. If the amount of Ag^+ in the half reaction $Ag^+ + e^- \rightarrow Ag$ is triple, then

A. n is tripled

B. ΔG° increased to three times

C. E° reduces to one third

D. All the above

Answer:

Watch Video Solution

232. Oxidation number of metal in its compounds is _____

A. reduction

B. oxidation

C. redox reaction

D. addition of electrons

Answer:

Watch Video Solution

233. Which of the following is an electrolytic conductor?

A. Al

B. ionic solids

C. strong acids

D. weak acids

Answer:

Watch Video Solution

234. Which of the following is an electrolytic conductor?

A. Al

B. Cu

C. Ag

D. strong acid

Answer:

Watch Video Solution

235. _____ is SI unit of potential

A. Volt

B. Ohm

C. Mho

D. Coulomb

Answer:

Watch Video Solution

236. Conductivity of electrolyte solution_____ with decrease in concentration of solution.

A. increases

B. decreases

C. remains the same

D. become zero

Answer:

Watch Video Solution

237. Unit of current is _____

A. volt

B. ampere

C. ohm

D. metre

Answer:

Watch Video Solution

238. The cell constant is determined by using _____solution.

A. 1 m KCI

B. 0.1 M KCI

C. 0.01 M KCI

D. all of these

Answer:

Watch Video Solution

239. The electronic configuration of copper is

A. cations

B. anions

C. atoms

D. electrons

Answer:

Watch Video Solution

240. A device used in meausrement of quantity of electricity is called _____

A. voltmeter

B. ammeter

C. calorimeter

D. coulometer

Answer:

Watch Video Solution

241. Which of the following is non-spontaneous cell?

A. Galvanic

B. Voltaic

C. Daniell

D. Electrolytic

Answer:

Watch Video Solution

242. Electrochemical equivalent has unit____

A. g/C

B. kg/C

C. gram

D. kilogram

Answer:

Watch Video Solution

243. Which of the following is first law of Faraday?

A. $E = mc^2$

B. $W = Zit$

C. $P_1V_1 = P_2V_2$

D. PV=RT

Answer:

Watch Video Solution

244. If a salt bridge is removed , between the two half-cells the voltage _____.

A. increase gradually

B. increase repidly

C. drops to zero

D. does not change

Answer:

Watch Video Solution

245. In th electrolysis mass of discharged ion is not propertional to _____

A. t

B. Q

C. resistance

D. equivalent mass

Answer:

Watch Video Solution

246. Daniel cell is _____

A. spontaneous

B. reversible

C. cannot be recharged

D. all of these

Answer:

Watch Video Solution

247. During electronation size of electrode _____

A. increases

B. decreases

C. remains same

D. all of these

Answer:

Watch Video Solution

248. In the Nernst equation n is _____

A. number of moles

B. number of ions

C. number of electrons

D. number of cation and anions

Answer:

Watch Video Solution

249. Gibbs energy change is related to equilibruim constant by the equation__

A. $\Delta G = -nFE$

B. $\Delta G = -nFE^{\circ}$

C. $\Delta G = -RTInK^{\circ}$

D. $\Delta G = -RTInK$

Answer:

Watch Video Solution

250. SHE is used as _____ electrode

A. oxidation

B. reduction

C. both (a) and (b)

D. null

Answer:

Watch Video Solution

251. Which of the following is secondary voltaic cell?

A. Lead accumulator

B. Dry cell

C. Leclanche cell

D. Alkaline dry cell

Answer:

Watch Video Solution

252. Which of the following is cathode in lead storage battery?

A. Pb

B. Cd

C. Cu

D. Pb covered by $Pb0_2$

Answer:

Watch Video Solution

253. When lead storage battery is charged it acts as.....

A. fuel cell

B. Dry cell

C. electrolytic cell

D. galvanic cell

Answer:

Watch Video Solution

254. In dry cell, the container is made up of ..... Metal.

A. Zn

B. Cu

C. Ag

D. Cd

Answer:

Watch Video Solution

255. The gas obtained at cathode during discharging of dry cell is .....

A. NH_3

B. O_2

C. CI_2

D. H_2

Answer:

Watch Video Solution

256. $H_2 - O_2$ fuel cells are used in space crafts for supply of ..... For astronauts.

A. H_2

B. O_2

C. H_2O

D. power

Answer:

Watch Video Solution

257. The source of electrical energy on the Apollo space flights was .....

A. Ni-Cd battery

B. Pb-acid storage cell

C. Generator

D. Fuel cell

Answer:

Watch Video Solution

258. The approximate voltage of $H_2 - O_2$ fuel cell is.....

A. 1.1 V

B. 1.8 V

C. 1.23 V

D. 1.54 V

Answer:

Watch Video Solution

259. If a metal ion is less easily reduced than a hydrogen ion, the electrolysis of an aqueous solution of its salt.

A. liberates hydrogen gas a the anode

B. liberates hydrogen gas at the cathode

C. produce the metal at either electrode

D. produces oxygen at the anode

Answer:

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260. When an aqueous solution of copper sulphate is electrolysed using copper electrodes the reaction at the anode is represented by

A. $2OH^- \rightarrow H_2O + 1/2O_2 + 2e^-$

B. $Cu^{2+} + 2e^- \rightarrow Cu$

C. $SO_{4(aq)}^{2} - \rightarrow SO_4 + 2e^-$

D. $Cu_{(s)} \rightarrow Cu_{aq}^{2+} + 2e^-$

Answer:

Watch Video Solution

261. Which of the following reactions would take place at the cathode during the electrolysis of an aqueous solution of sodium chloride?

A. $CI^- \rightarrow CI + e^-$

B. $2H^- \rightarrow H_2 + 2e^-$

C. $Na^+ + e^- \rightarrow Na$

D. $2H_2O + 2e^- \rightarrow 2OH^- + H_2$

Answer:

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262. In which of the following electrolysis, electrodes act as active electrodes. Electrolysis of.

A. fused NaCI between graphite electrodes

B. fused $AgNO_3$ between platinum electrodes

C. aqueous $AgNO_3$ solution between Ag electrodes

D. aqueous $AgNO_3$ solution between Pt electrodes

Answer:

Watch Video Solution

263. When an aqueous solution of copper sulphate is electrolysed using copper electrodes the reaction at the anode is represented by

A. $Cu \rightarrow Cu^{2+} + 2e^-$

B. $4OH^- \rightarrow 2H_2O + O_2 + 4e^-$

C. $Cu^{2+}_{(aq)} + 2e^- \rightarrow Cu_{(s)}$

D. $4H_2O + 4e^- \rightarrow 2H_2 + 4OH^-$

Answer:

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264. Electrochemical equivalent of an element is _____.

A. one ampere for one second

B. 96500 coulombs per sec

C. charge of one mdo

D. one ampere for one hour

Answer:

Watch Video Solution

265. On passing 3F electricity through three cells containing fused Na_2CO_3, fused $Cu(NO_3)_2$ and fused $AI(NO_3)_3$ the number of moles of the metals deposited are in the ratio.

A. $1:2:3$

B. $3:2:1$

C. $6:3:2$

D. $3:4:2$

Answer:

Watch Video Solution

266. How may coulombs of electricity are required for the oxidation of one mol of water to dioxygen ?

A. 93000C

B. $1.93 \times 10^5 C$

C. $9.65 \times 10^4 c$

D. $19.3 \times 10^2 c$

Answer:

Watch Video Solution

267. 1 coulomb of electricity produces m kg of a substance X. The electrochemical equivalent of X is.

A. m

B. $m \times 10^3$

C. $m \times 10^{-3}$

D. $0.1m$

Answer:

Watch Video Solution

268. The net electric charge on DNA and histones is

A. $4.8 \times 10^{-9}c$

B. $10 \times 1.6 \times 10^{-19}c$

C. $1.6 \times 10^{-19}c$

D. $2.89 \times 10^{5}c$

Answer:

Watch Video Solution

269. A copper voltameter, a silver voltameter and a water voltameter are connected in series and a current is passed for some time. The ratio of the number of moles of copper, silver andhydrogen formed at the cathode is.

A. $2:1:1$

B. $1:1:1$

C. $1:2:1$

D. $1:2:2$

Answer:

Watch Video Solution

270. If x the specific resistance of the solution and N is the normlaity of the solution. The equivalent conductivity of the solution is given by.

A. $\frac{1000x}{N}$

B. $\frac{1000}{Nx}$

C. $\frac{1000N}{x}$

D. $\frac{Nx}{1000}$

Answer:

Watch Video Solution

271. The reason for increase in electrical conduction of a weak electrolyte with increase in temperature is:

A. increase in the number of ions

B. increase in the speed of ions

C. increase in the degree of disscoiation of electrolytes

D. all the three

Answer:

Watch Video Solution

272. According to Kohlrausch law, the limitiing value of molar conductiviity of a electrolyte A_2B is

A. $\lambda_A^\alpha + \lambda_{B^{-2}}^\alpha$

B. $\lambda_{A^+}^\alpha + \lambda_{B^{-2}}^\alpha$

C. $\lambda_{A^+}^\alpha + \frac{1}{2}\lambda_{B^{-2}}^\alpha$

D. $2\lambda_{A^+}^{\alpha} + \frac{1}{2}\lambda_{B^{-2}}^{\alpha}$

Answer:

Watch Video Solution

273. The equivalent conductance of a 1N solution of an electrolyte is nearly:

A. 10^3 times its specific conductance

B. 10^{-3} times its specific conductance

C. 100 times its specific conductance

D. the same as its specific conductacne

Answer:

Watch Video Solution

274. The decrease in electrical conductivity of metals with increase in temperature is due to increase in.

A. the velocity of electrons

B. the resistance of the metal

C. the number of electrons

D. the number of metal atoms

Answer:

Watch Video Solution

275. In a galvanic cell electron flow will be from.

A. negative electrode to positive electrode

B. positive electrode to negative electrode

C. there will be no flow of lectrons

D. anode to cathode in the external circuit

Answer:

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276. In an experimetal set up, for the measurement of emf of a half cell using a reference electrode and salt bridge, when the salt bridge is removed, the voltage.

A. increases to maximum

B. decreases to half the value

C. does not change

D. drops to zero

Answer:

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277. The standard reduction potential (E°),0.34V for copper pertains to the reaction

A. $\frac{1}{2}Cu \rightarrow \frac{1}{2}Cu^{2+} + e^{-}$

B. $Cu \rightarrow Cu^{+} + e$

C. $Cu^{2+} + 2e^{-} \rightarrow Cu$

D. $2Cu^{+} \rightarrow Cu^{2+} + Cu$

Answer:

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278. Daniell cell is shown as

A. $Zn_{(s)} \left| Zn^{2+}_{(aq)} \right| \left| Cu_{(s)} \right| Cu^{+2}_{(aq)}$

B. $Zn_{(s)} \left| Zn^{2+}_{(aq)} \right| \left| Cu^{2+}_{(aq)} \right| Cu_{(s)}$

C. $Cu_{(s)} \left| Cu^{2+}_{(aq)} \right| \left| Zn^{2+}_{(aq)} \right| Zn_{(s)}$

D. $Cu^{2+}_{(aq)} \left| Cu_{(s)} \right| \left| Zn^{2+}_{(aq)} \right| Zn_{(s)}$

Answer:

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279. The wrong statement regarding "Electro chemical series" is.

A. metal lying at the top of the E.C.S have low S.R.P values

B. metals lying at the top act as strong reducing agents

C. metals lying at bottom act as strong reducing agents

D. metals lying above Hydrogen can displace H_2 when treated with dilute acids

Answer:

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280. Write Nernst equation and explain the terms involved in it.What part of the equation represents the correction factor for non-standard state

conditions?

A. $E = E^{\circ} - \frac{0.059}{n} \log \frac{[Reduced form]}{[O\xi died form]}$

B. $E = E^{\circ} - \frac{0.059}{n} \log \frac{[O\xi died form]}{[Reduced form]}$

C. $E = E^{\circ} - \frac{0.59}{n} \log \frac{[Reduced f \text{ or } m]}{[O\xi died form]}$

D. $E^{\circ} = E \cdot \frac{[O\xi died f \text{ or } m]}{[Reduced f \text{ or } m]}$

Answer:

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281. Bar magnet of pole strength m is cut into four equal parts such that the length and breadth of each part is half of the original dimensions. The pole strength of each part will be

A. part of the rod exposed to air

B. part of the immersed in KCI solution

C. Both a and b

D. No corrosion takes place

Answer:

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282. The SI unit of molar conductivity is

A. Scm^2mol^{-1}

B. Sdm^2mol^{-1}

C. Sm^2

D. Sm^2mol^{-1}

Answer:

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283. The number of electrons that have a total charge of 965 coulombs is

A. 6.022×10^{23}

B. 6.022×10^{22}

C. 6.022×10^{21}

D. 3.011×10^{23}

Answer:

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284. In dry cell, the container is made up of ..... Metal.

A. Zn

B. Cu

C. Ag

D. Cd

Answer:

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285. What is a cell constant ? What are its units? How is it determined experimentally?

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286. Write any two functions of salt bridge?

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287. What conditions are required for a cell potential to be called standard cell potential?

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288. Calculate emf of the cell $Zn_{(s)}\left|Zn^{2\oplus}(0.2M)\right|H\oplus(1.6M)H_2(g.1.8atm)\mid Pt^at25^\circ C.$

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289. Calculatethemassof Mg andvolume of chlorine gas at STP produced during electrolysis of molten $MgCl_2$ by the passage of 2 amperes of current for 1 hour. Molar masses of Mg and Cl_2 are respectivley 24 g mol^{-1} and $71 gmol^{-1}$.

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290. How much time will be required to liberate 3×10^{-2} kg of iodine from KI solution by the passage of 4 A current through it? Molar mass of iodine is $127 gmol^{-1}$.

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291. The molar conductivity of 0.025mol L'1methanoic acid is 46.1 S cm2 mol'1. Calculate its degree of dissociation and dissociation constant.

(NCERT) Given:

$\lambda^{\circ}_{H+} = 349.6 Scm^2 mol^1$ and $\lambda^{\circ}_{HCOO-} = 54.6 Scm^2 mol^{-1}$

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292. Device galvanic cell for each of the following reactions and calculate ΔG° for the reaction, (i) Zn dissolves in HCI to produce Zn^{2+} and H_2 gas. E°_{Zn}= -0.763V.(ii) Cr dissolves in diluteHCl to produce Cr^{3+} and $H_2 gas. E^{\circ}_{Cr} = -0.74V.$

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293. Device galvanic cell for each of the following reactions and calculate ΔG° for the reaction, (i) Zn dissolves in HCI to produce Zn^{2+} and H_2 gas. E°_{Zn}= -0.763V.(ii) Cr dissolves in diluteHCl to produce Cr^{3+} and $H_2 gas. E^{\circ}_{Cr} = -0.74V.$

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294. In the elctrolysis of $AgNO_3$ solution 0.42g of Ag is produced of cathode after o certain period of time. Calculate the quantity of electricity required $\left(molarweightofAgis107.9gmol^{-1}\right)$

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295. Resistance of a conductivity cell filled with 0.1 M KC1 solution is 100 ohm. If the resistance of the same cell when filled with 0.02 M KC1 solution is520 ohms, calculate the conductivity and molar conductivity of 0.02 M KC1 solution. The conductivity of $0.1molL^{-1}$ KCl solution is $1.29 \times 10^{-2}\Omega^{-1}cm^{-1}$.

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296. Calculate the voltage of the cell, $Sn(s)\left|Sn^{2\oplus}(0.02M)\right|\left|Ag^{\oplus}(0.01M)\right|Ag(s)at25^{\circ}C.$

$E^{\circ} = -0.136V, E^{\circ}_{Ag} = 0.800V.$

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297. The molar conductivities at zero concentrations of NH_4C1, $NaOH$ and NaCl are respectively $149.7\Omega^{-1}cm^2mol^{-1}$, $248.1\Omega^{-1}cm^2mol^{-1}$ and $126.5\Omega^{-1}cm^2mol^{-1}$. What is the molar conductivity of NH_4OH at zero concentration?

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298. State and explain Kohlrausch law of independent migration of ion. How it is useful to determine the molar conductivity of weak electrolytes at zero concentration?

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299. Derive the relationship between standard cell potential and equilibrium constant of cell reaction.

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300. It is impossible to measure the potential of a single electrode comment.

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