



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 (κ) and molar conductivity (Λ_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 electrochemical 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 $\text{Fe}^{2+}(\text{aq}) \mid \text{Fe}(\text{s})$ and $\text{Bi}^{3+}(\text{aq}) \mid \text{Bi}(\text{s})$ 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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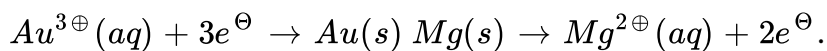
53. A voltaic cell consisting of $\text{Fe}^{2+}(\text{aq}) \mid \text{Fe}(\text{s})$ and $\text{Bi}^{3+}(\text{aq}) \mid \text{Bi}(\text{s})$ electrodes is constructed. When the circuit is closed mass of Fe electrode decreases and that of Bi electrode increases: Which electrode is cathode and which is anode?

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54. A voltaic cell consisting of $\text{Fe}^{2+}(\text{aq}) \mid \text{Fe}(\text{s})$ and $\text{Bi}^{3+}(\text{aq}) \mid \text{Bi}(\text{s})$ 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:



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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 ΔG° , E° (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. $Br_{2(l)}$ (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: $Pb_{(aq)}^{2+}$ ($-0.13V$) or $Co_{(aq)}^{2+}$ ($-0.28V$)

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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: $Cl_2(g)$ ($1.36V$) or $Cr_{(aq)}^{3+}$ ($-0.74V$)

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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: $Co_{(aq)}^{2+}$ (1.61V) or $In_{(s)}$ (- 0.14V)

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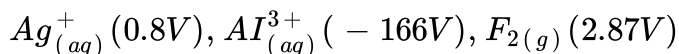
76. Which species in each of the following pairs is better reducing agent under standard state conditions? E° values are given. Give reasons for your answer: $Ce_{(aq)}^{3+}$ (1.61V) or $Ti_{(aq)}^{2+}$ (- 0.37V)

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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)

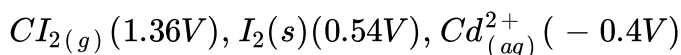
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78. Arrange the following oxidizing agents in order of increasing strength under standard state conditions. The standard potentials for the reduction half reaction are given:



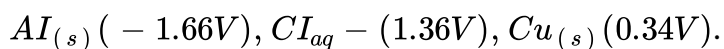
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79. Arrange the following oxidizing agents in order of increasing strength under standard state conditions. The standard potentials for the reduction half reaction are given:



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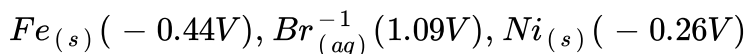
80. Arrange the following reducing agents in order of increasing strength under standard state conditions, the standard potentials for the reduction half reactions being given.





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



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82. Predict whether, Ag^+ can oxidize $Pb \rightarrow Pb^{2+}$ under standard state conditions. $E_{Ag}^{\circ} = 0.799V$ and $E_{Pb}^{\circ} = -0.126V$



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



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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 reactions 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 $H_2 - O_2$ 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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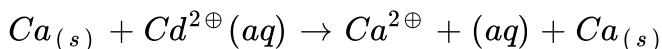
103. Define EMF series and explain any two applications of the electrochemical series.

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104. Predict whether the following reactions occur under standard state conditions: *Oxidation of Ag(s) by Cl_{2(g)}* $E_{Ag}^{\circ} = 0.8V$ $E_{Cl_2}^{\circ} = 1.36V$

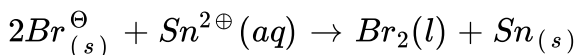
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105. Predict whether the following reactions would occur spontaneously under standard state conditions:



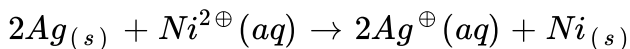
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106. Predict whether the following reactions would occur spontaneously under standard state conditions:



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



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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 $0.00141\Omega^{-1}cm^{-1}$. 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 $25^{\circ}C$ is $0.00141\Omega^{-1}cm^{-1}$]

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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+} , Cl^{\ominus} , 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 acid at $25^{\circ}C$ is $16.5\Omega^{-1}cm^2mol^{-1}$. Calculate its degree of dissociation in 0.01 M solution and dissociation constant if molar conductivity of acetic acid at zero concentration is $390.7\Omega^{-1}cm^2mol^{-1}$.

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111. The conductivity of 0.02M $AgNO_3$ 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 $AgNO_3$ 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 $0.02M H_2SO_4$ at $25^\circ C$ gives a resistance of 122ohms. If the molar conductivity of $0.02M H_2SO_4$ is $618 \Omega^{-1} cm^2 mol^{-1}$, what is the cell constant?

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114. A conductivity cell filled with $0.02M H_2SO_4$ at $25^\circ C$ gives a resistance of 122ohms. If the molar conductivity of $0.02M H_2SO_4$ is $618 \Omega^{-1} cm^2 mol^{-1}$, what is the cell constant?

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115. The molar conductivities at zero concentrations of NH_4Cl , $NaOH$ and $NaCl$ are respectively $149.7 \Omega^{-1} cm^2 mol^{-1}$, $248.1 \Omega^{-1} cm^2 mol^{-1}$ and $126.5 \Omega^{-1} cm^2 mol^{-1}$.

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 Λ° values of NaI, AgNO₃ and NaNO₃ 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 diameter 1 cm 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 0.025 mol L⁻¹ methanoic acid is 46.1 S cm² mol⁻¹. Calculate its degree of dissociation and dissociation constant.

(NCERT)

Given:

$$\lambda_{H^+}^\circ = 349.6 S cm^2 mol^{-1} \text{ and } \lambda_{HCOO^-}^\circ = 54.6 S cm^2 mol^{-1}$$

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119. What is the mass of copper metal produced during the passage of 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 XCl_2 solution in series with $AgNO_3$ cell. Calculate the molar mass of X. Molar mass of Ag is $107.9g\ mol^{-1}$.

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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 1hr through the solution.

$$R = 0.08205L \cdot atmK^{-1}mol^{-1}.$$

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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? How many moles of electrons are required? Molar mass of Ag is $107.9gmol^{-1}$.

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125. What current strength in ampere will be required 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 $AlCl_3$ 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 $ZnSO_4$ solution. Calculate the mass of Al deposited in another cell containing $AlCl_3$ solution connected in series with $ZnSO_4$ cell. Molar masses of Zn and Al are 65.4g mol^{-1} and 27g mol^{-1} , respectively.

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129. In the 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 107.9g mol^{-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. Molar masses of Na and chlorine gas are 23g mol^{-1} and 71g mol^{-1} respectively.



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131. Calculate the mass of Mg and volume 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 respectively 24 g mol^{-1} and 71 g mol^{-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 g mol^{-1} and 63.5 g mol^{-1} respectively.



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133. Two electrolytic cells one containing $AlCl_3$ solution and the other containing $ZnSO_4$ 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 1hr through the solution. $R = 0.08205\text{L. atmK}^{-1}\text{mol}^{-1}$.

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136. A constant electric current flows for 4 hours through two electrolytic cells connected in series. One contains $AgNO_3$ solution and the second contains $CuCl_2$ 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 connected in series. One contains $AgNO_3$ solution and the second contains $CuCl_2$ 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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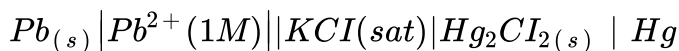
138. The standard potential of the electrode, $Zn^{2+}(0.02M) | Zn(s)$ is $-0.76V$. Calculate its potential.

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139. Write the cell reaction and calculate the standard potential of the cell. $Ni_{(s)} | Ni^{2+}(M) || Cl(1M) | Cl_2(g, 1atm) | Pt$ $E_{Cl_2}^{\circ} = 1.36 V$ and $E_{Ni}^{\circ} = -0.25 V$

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140. Write the cell reaction and calculate the emf of the cell.



$E_{anode}^{\circ} = -0.126V$, $E_{cathode}^{\circ} = 0.242V$. 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

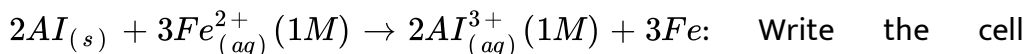
$3Ni(s) + 2Al^{3+}(1M) \rightarrow 3Ni^{2+}(1M) + 1Al(s)$ if $E_{Ni}^{\circ} = -0.25 V$ and

$E_{Al}^{\circ} = -1.66V$?



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142. The following redox reaction occurs in a galvanic cell.

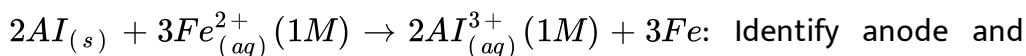


Write the cell notation.



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143. The following redox reaction occurs in a galvanic cell.

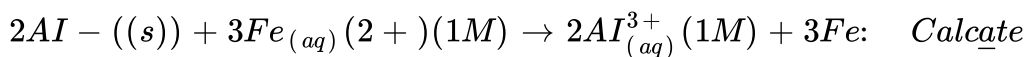


Identify anode and cathode



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144. The following redox reaction occurs in a galvanic cell.



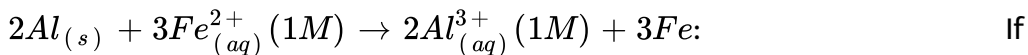
Calculate E_{cell}° if $E_{(anode)}^{\circ} = -1.66$ V and

$$E_{Sn}^{\circ} = -0.136V, E_{Ag}^{\circ} = 0.799V, (0.8744V) \Big] = -0.44V.$$



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145. The following redox reaction occurs in a galvanic cell.

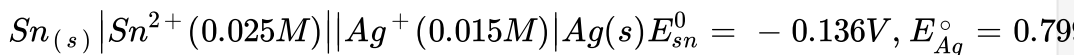


If $E^{\circ}_{anode} = -1.66V$ and $E^{\circ}_{cathode} = -0.44V$ Calculate ΔG° for reaction.



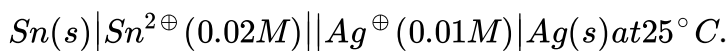
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146. Calculate the potential of the following cell at $25^{\circ}C$.



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147. Calculate the voltage of the cell,

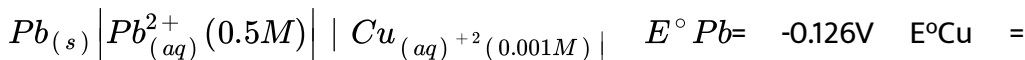


$$E^{\circ} = -0.136V, E^{\circ}_{Ag} = 0.800V.$$



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148. Consider the following cell

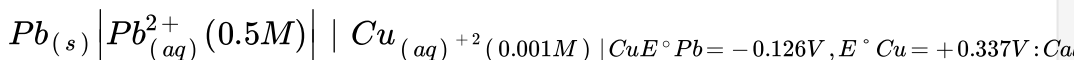


+0.337V: Write the cell reaction.



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149. Consider the following cell

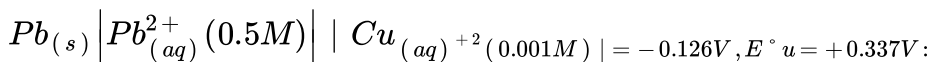


E_{cell} and E_{cell}° at $25^\circ C$.



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150. Consider the following cell



Calculate ΔG and ΔG° for cell reaction.



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

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

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

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

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154. Construct a cell consisting of $Ni^{2+}|Ni$ half cell and $H^+ | H_2$ (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 $H^+ | H_2$ (g. latm) | Pt half cell: Calculate emf of the cell if $[Ni^{2+}] = 0.1M$, $[H^+] = 0.05M$ and $E_{NI}^0 = -0.257$.

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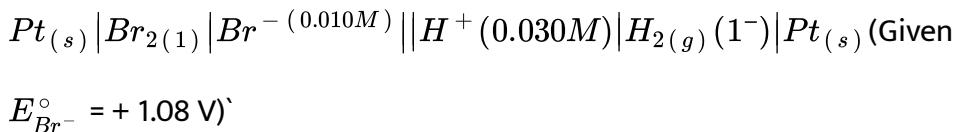
156. Write the Nernst equation and emf of the following cells at 298 K.

$Sn_{(s)}|Sn_{(aq)}^{2+}(0.050M)|H_{(aq)}^+(0.020 M)|H_2(g)(1 \text{ bar})|Pt_{(s)}$

(Given $E_{\text{Sn}^{(2+)}/\text{Sn}^0} = -0.136 \text{ V}$)

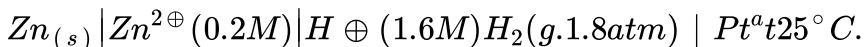
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157. Write the Nernst equation and emf of the following cells at 298 K.



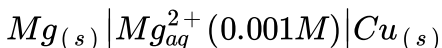
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158. Calculate emf of the cell



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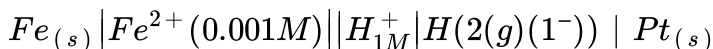
159. Write the Nernst equation and emf of the following cells at 298K.



(Given $E_{\text{Mg}^{2+}/\text{Mg}}^{\circ} = -2.37\text{V}$, $E_{\text{Cu}^{2+}/\text{Cu}}^{\circ} = 0.34\text{V}$)

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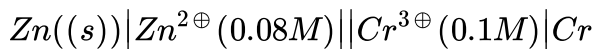
160. Write the Nernst equation and emf of the following cells at 298K.



$$\left(\text{Given } E_{Fe^{2+}/Fe}^0 = -0.440V \right)$$

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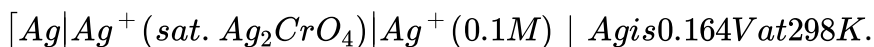
161. Calculate emf of the following cell at $25^\circ C$.



$$E_{Zn}^0 = -0.76V, E_{Cr}^0 = -0.74V$$

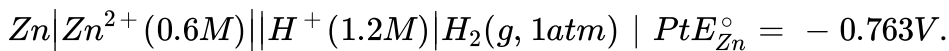
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162. Find the solubility product of a saturated solution of Ag_2CrO_4 in water at 298 K if the e.m.f of the cell :



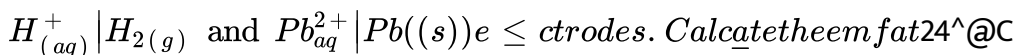
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163. Calculate the potential of the following cell at $25^\circ C$.



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164. Set up the cell consisting of

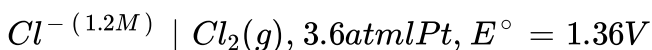


and H_2 is at 1 atm pressure. $E^\circ(Pb) = -0.126 \text{ V}$.



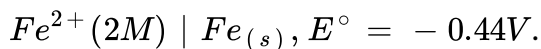
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165. Write balanced equations for the half reactions and calculate the reduction potentials at $25^\circ C$ for the following half cells :



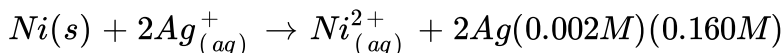
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166. Write balanced equations for the half reactions and calculate the reduction potentials at 25°C for the following half cells :



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167. Calculate the emf of the cell in which the following reaction takes place:

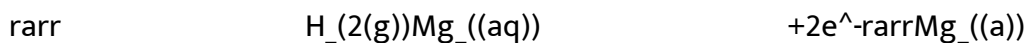


$$E_{\text{cell}}^{\circ} = 1.05\text{V}.$$



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168. Consider a galvanic cell that uses the half reactions: $2\text{H}_{(aq)}^{+} + 2e^{-}$



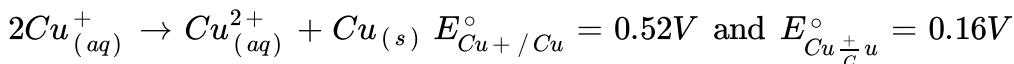
Write balanced equation for the cell reaction. Calculate E_{Cell}° and

ΔG° if concentrations are 1M each and $P_{\text{H}_2} = 10$ atm.

$$E_{\text{Mg}}^{\circ} = -2.37\text{V}.$$

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169. Calculate E_{cell}° , ΔG° and equilibrium constant for the reaction :



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170. Device galvanic cell for each of the following reactions and calculate

ΔG° for the reaction, (i) Zn dissolves in HCl to produce Zn^{2+} and H_2

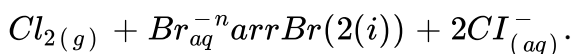
gas. $E_{Zn}^{\circ} = -0.763V$. (ii) Cr dissolves in dilute HCl to produce Cr^{3+} and

H_2 gas. $E_{Cr}^{\circ} = -0.74V$.

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171. The equilibrium constant for the following reaction at

$25^{\circ}C$ is 2.9×10^9 . Calculate standard voltage of the cell.



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172. Calculate the equilibrium constant for the redox reaction at 25°C , $\text{Sr}_{(s)} + \text{Mg}_{(aq)}^{2+} \rightarrow \text{Sr}_{(aq)}^{2+} + \text{Mg}_{(s)}$ that occurs in a galvanic cell. Write the cell formula. $E_{\text{Mg}}^\circ = -2.37\text{V}$ and $E_{\text{Sr}}^\circ = -2.89\text{V}$.

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

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

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

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

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

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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.

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

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

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

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182. The molar conductivities at zero concentrations of NH_4Cl , $NaOH$ 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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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.

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

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185. In a conductivity cell at 275 K temperature, the resistance of 0.02 M HCl solution was found to be 150 ohm. The specific conductance of this solution is $3.2 \times 10^{-3}Scm^{-1}$. What is the cell constant?

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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 = $27 g mol^{-1}$

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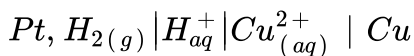
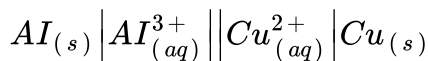
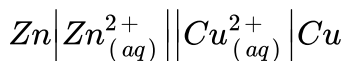
187. An electric current of 240 mA is passed through an electrolyte for 1 hour, 15 minutes. Find the quantity of electricity passed.

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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?

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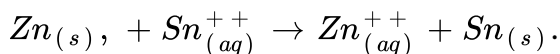
189. Give the cell reactions for the following cells:



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190. For the following reaction at 298 K, calculate, using Nernst equation, cell potential, standard free energy change, if

$$E_{Zn}^{\circ} = -0.76V, E_{Sn}^{\circ} = -0.14V, [Sn^{++}] = 0.03M, [Zn^{++}] = 0.04M$$



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

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

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

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

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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 $25^\circ C$?

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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?

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197. Resistance of a conductivity cell filled with 0.1 M KCl solution is 100 ohm. If the resistance of the same cell when filled with 0.02 M KCl solution is 520 ohms, calculate the conductivity and molar conductivity of 0.02 M KCl solution. The conductivity of $0.1molL^{-1}$ KCl solution is $1.29 \times 10^{-2}\Omega^{-1}cm^{-1}$.

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

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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 g mol^{-1} .

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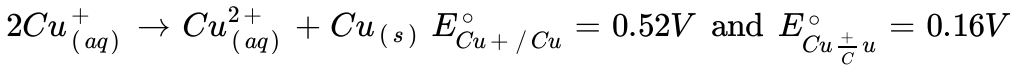
200. Consider the following redox reaction
 $Mg_{(s)} + Sn_{(aq)}^{2+} \rightarrow Mg_{(aq)}^{2+} + Sn_{(s)}$: Write the cell formula.

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

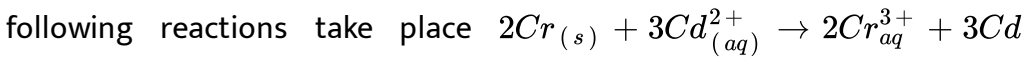
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202. Calculate E_{cell}° , ΔG° and equilibrium constant for the reaction :



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203. Calculate the standard cell potentials of galvanic cell in which the



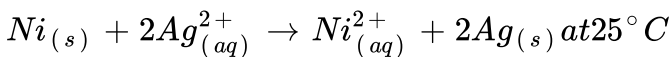
$$E^{\circ}_{Cr} = -0.740V, E^{\circ}_{Cd} = -0.403V, \text{ Calculate } \Delta_r G^{\circ} \quad \text{and}$$

equilibrium constant of the reactions.



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204. Calculate equilibrium constant for the reaction,



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



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205. Set up the cell consisting of $H^+_{(aq)} | H_{2(g)}$ and $Pb^{2+}_{aq} | Pb(s)$ electrodes. Calculate the EMF of the cell at 25°C if $[Pb^{2+}] = 0.1 \text{ M}$, $[H^+] = 0.5 \text{ M}$ and $P_{H_2} = 1 \text{ atm}$. $E^\circ(Pb) = -0.126 \text{ V}$.

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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:

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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:



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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:



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

A. $-0.34V$

B. $0.34V$

C. $0.17V$

D. $-0.17V$

Answer:



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210. For the cell, $Pb(s) | Pb^{2+}(1M) || Ag^+(1M) | Ag(s)$, if concentration 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:



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211. The strongest oxidising and reducing agents respectively are

- A. Ag and Fe^{2+}
- B. Ag^+ and Fe
- C. Pb^{2+} and I^-

D. I_2 and Fe^{2+}

Answer:

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

- A. 110 kJ
- B. $-110kJ$
- C. 55 KJ
- D. $-55kJ$

Answer:

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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 = $-\Delta G$

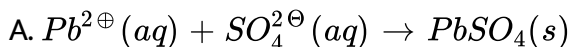
D. D. If half reaction is multiplied by a numerical factor, the corresponding E° value is also multiplied by the same factor

Answer:

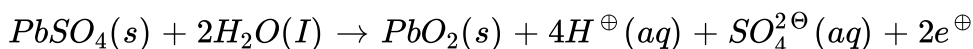


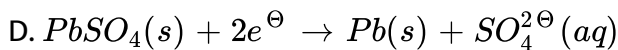
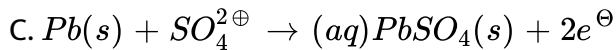
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214. The oxidation reaction that takes place in lead storage battery during discharge is



B.





Answer:

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215. Which of the following expressions represent molar conductivity of $Al_2(SO_4)_3$?

A. $3\lambda_{Al^{3(\oplus)}}^\circ + 2\lambda_{SO_4^{2\ominus}}^\circ$

B. $2\lambda_{Al^{3\oplus}}^\circ + 3\lambda_{SO_4^{2\ominus}}^\circ$

C. $\frac{1}{3}\lambda_{Al^{3\oplus}}^\circ + \frac{1}{2}\lambda_{SO_4^{2\ominus}}^\circ$

D. $\lambda_{Al^{3\oplus}}^\circ + \lambda_{SO_4^{2\ominus}}^\circ$

Answer:

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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:



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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:

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

A. 13.4h

B. 1287 min

C. 50000s

D. 1.5h

Answer:

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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:

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220. The number of coulombs necessary to deposit 1g of potassium metal (*molar mass* 39g mol^{-1}) from K^+ ions is

A. 96500C

B. $1.93 \times 10^5 C$

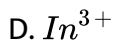
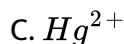
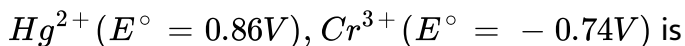
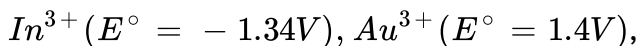
C. 1237C

D. 2474C

Answer:

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221. The strongest oxidizing agent among the species



Answer:

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222. The value of constant in Nemst equation constant

$$E = E^\circ - \frac{\text{constant}}{n} \ln Q \text{ at } 25^\circ \text{C is}$$

A. 0.0592 mV

B. 0.0592V

C. 25.7mV

D. 0.0296 V

Answer:

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223. The reaction, $2Br_{(aq)}^{(-)} + Sn_{(aq)}^{2+} \rightarrow Br_{2(l)} + Sn_{(s)}$ 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:

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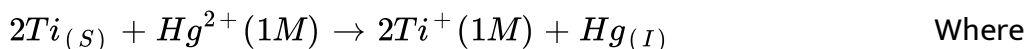
224. Daniel cell operates under non standard state conditions. If the equation of the cell reaction is multiplied by 2 then

- A. E and E° remain unchanged
- B. E is doubled
- C. n remains unchanged in Nernst equations
- D. Q is halved in Nernst equation

Answer:

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225. The standard potential for the cell reaction



$$E_{Ti}^\circ = -0.34V, E_{Hg}^\circ = 0.86V \text{ is}$$

A. 0.52 V

B. $-0.52V$

C. $-1.2V$

D. $+1.2V$

Answer:



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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:



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

- A. 0.68V
- B. 0.36V
- C. $-0.36V$
- D. $-0.68V$

Answer:



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228. 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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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:

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230. The same quantity of electricity is passed through two cells one containing AlCl_3 solution and the other containing ZnCl_2 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 $\text{Ag}^+ + e^- \rightarrow \text{Ag}$ is triple, then

A. n is tripled

B. ΔG° increased to three times

C. E° reduces to one third

D. All the above

Answer:

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232. Oxidation number of metal in its compounds is _____

A. reduction

B. oxidation

C. redox reaction

D. addition of electrons

Answer:

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233. Which of the following is an electrolytic conductor?

- A. Al
- B. ionic solids
- C. strong acids
- D. weak acids

Answer:



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234. Which of the following is an electrolytic conductor?

- A. Al
- B. Cu
- C. Ag

D. strong acid

Answer:



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235. _____ is SI unit of potential

A. Volt

B. Ohm

C. Mho

D. Coulomb

Answer:



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

- A. increases
- B. decreases
- C. remains the same
- D. become zero

Answer:



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237. Unit of current is _____

- A. volt
- B. ampere
- C. ohm
- D. metre

Answer:



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238. The cell constant is determined by using _____ solution.

- A. 1 m KCl
- B. 0.1 M KCl
- C. 0.01 M KCl
- D. all of these

Answer:



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239. The electronic configuration of copper is

- A. cations

B. anions

C. atoms

D. electrons

Answer:



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240. A device used in measurement of quantity of electricity is called

A. voltmeter

B. ammeter

C. calorimeter

D. coulometer

Answer:



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

- A. Galvanic
- B. Voltaic
- C. Daniell
- D. Electrolytic

Answer:



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242. Electrochemical equivalent has unit _____

- A. g/C
- B. kg/C
- C. gram
- D. kilogram

Answer:



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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:



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

_____.

A. increase gradually

B. increase rapidly

C. drops to zero

D. does not change

Answer:



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245. In the electrolysis mass of discharged ion is not proportional to _____

A. t

B. Q

C. resistance

D. equivalent mass

Answer:



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246. Daniel cell is _____

- A. spontaneous
- B. reversible
- C. cannot be recharged
- D. all of these

Answer:



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247. During electronation size of electrode _____

- A. increases
- B. decreases
- C. remains same

D. all of these

Answer:



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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:



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

A. $\Delta G = -nFE$

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

C. $\Delta G = -RT \ln K^\circ$

D. $\Delta G = -RT \ln K$

Answer:



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250. SHE is used as _____ electrode

A. oxidation

B. reduction

C. both (a) and (b)

D. null

Answer:



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251. Which of the following is secondary voltaic cell?

A. Lead accumulator

B. Dry cell

C. Leclanche cell

D. Alkaline dry cell

Answer:



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

A. Pb

B. Cd

C. Cu

D. Pb covered by PbO_2

Answer:

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

A. fuel cell

B. Dry cell

C. electrolytic cell

D. galvanic cell

Answer:

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

A. Zn

B. Cu

C. Ag

D. Cd

Answer:



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

A. NH_3

B. O_2

C. Cl_2

D. H_2

Answer:



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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:



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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:

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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:

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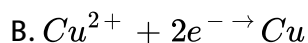
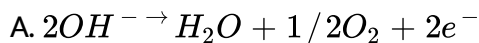
259. If a metal ion is less easily reduced than a hydrogen ion, the electrolysis of an aqueous solution of its salt.

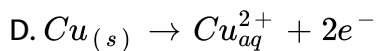
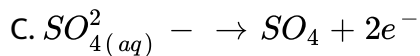
- A. liberates hydrogen gas at the anode
- B. liberates hydrogen gas at the cathode
- C. produce the metal at either electrode
- D. produces oxygen at the anode

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

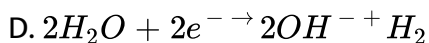
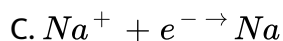
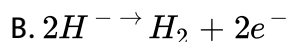
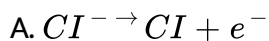




Answer:

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



Answer:

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

- A. fused NaCl 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

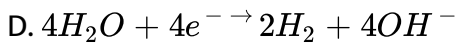
Answer:



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



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:



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265. On passing 3F electricity through three cells containing fused Na_2CO_3 , fused $Cu(NO_3)_2$ and fused $Al(NO_3)_3$ 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:



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266. How many 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:

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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:

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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. 2.89×10^5c

Answer:



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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 and hydrogen formed at the cathode is.

A. 2 : 1 : 1

B. 1 : 1 : 1

C. 1:2:1

D. 1:2:2

Answer:



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270. If x the specific resistance of the solution and N is the normality 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:



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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 dissociation of electrolytes
- D. all the three

Answer:



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272. According to Kohlrausch law, the limiting value of molar conductivity of an 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:

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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 conductance

Answer:

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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:



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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 electrons
- D. anode to cathode in the external circuit

Answer:



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276. In an experimental 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.

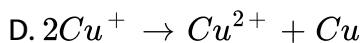
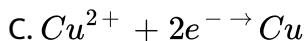
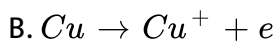
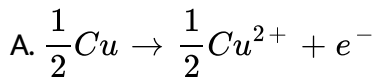
- A. increases to maximum
- B. decreases to half the value
- C. does not change
- D. drops to zero

Answer:



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

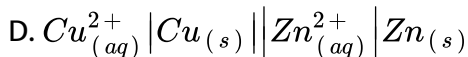
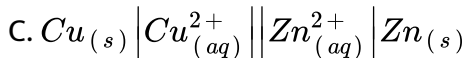
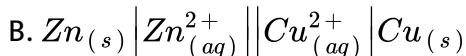
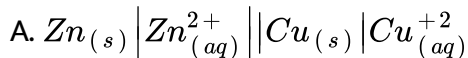


Answer:



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278. Daniell cell is shown as



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?

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

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

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

$$D. E^\circ = E - \frac{[Oxidized\ f\ or\ m]}{[Reduced\ f\ or\ m]}$$

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 KCl 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. $S\text{cm}^2\text{mol}^{-1}$

B. $S\text{dm}^2\text{mol}^{-1}$

C. $S\text{m}^2$

D. $S\text{m}^2\text{mol}^{-1}$

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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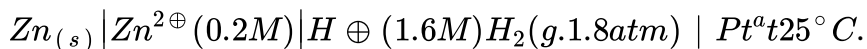
286. Write any two functions of salt bridge?

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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



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289. Calculate the mass of Mg and volume 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 respectively 24 g mol^{-1} and 71 g mol^{-1} .

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

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291. The molar conductivity of 0.025 mol L^{-1} methanoic acid is $46.1 \text{ S cm}^2 \text{ mol}^{-1}$. Calculate its degree of dissociation and dissociation constant.

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

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

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

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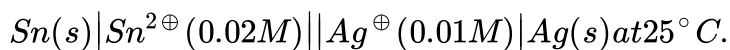
294. In the electrolysis of $AgNO_3$ solution 0.42g of Ag is produced at cathode after a certain period of time. Calculate the quantity of electricity required (molar weight of Ag is 107.9 gmol^{-1})

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295. Resistance of a conductivity cell filled with 0.1 M KCl solution is 100 ohm. If the resistance of the same cell when filled with 0.02 M KCl solution is 520 ohms, calculate the conductivity and molar conductivity of 0.02 M KCl solution. The conductivity of 0.1 mol L^{-1} KCl solution is $1.29 \times 10^{-2} \Omega^{-1} \text{ cm}^{-1}$.

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296. Calculate the voltage of the cell,



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

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297. The molar conductivities at zero concentrations of NH_4Cl , $NaOH$ 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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