CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

Electrochemistry

MULTIPLE CHOICE QUESTIONS

1. The cell constant is the product of resistance and

A. conductance

B. molar conductance

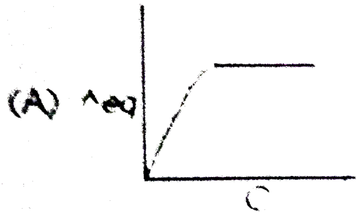
C. specific conductance

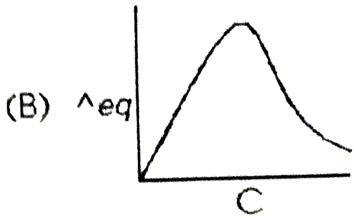
D. specific resistance.

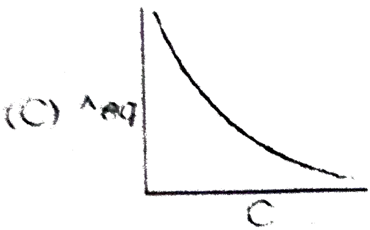
Answer: C

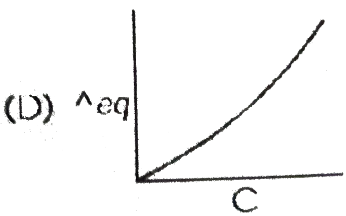
Watch Video Solution

2. The variation of equivalent conductance versus concentration of a strong electrolyte is correctly given in the plot

A. 

B. 

C. 

D. 

Answer: C

Watch Video Solution

3. Which of the following solutions has the highest equivalent conductance?

A. 0.01 M NaCl

B. 0.05 M NaCl

C. 0.005 M NaCl

D. 0.02 M NaCl.

Answer: C

Watch Video Solution

4. The resistance of 0.01N solution of an electrolyte AB at 328K is 100ohm. The specific conductance of solution is cell constant $=1cm^{-1}$

A. 100ohm

B. $10^{-2} ohm^{-1}$

C. $10^{-2} ohm^{-1} cm^{-1}$

D. $10^{2} ohm - cm$

Answer: C

Watch Video Solution

5. The two Pt electrodes fitted in a conductance cell are 1.5 cm apart while the cross - sectional area of each electrode is $0.75 cm^{2}$. What is the cell constant?

A. 1.125

B. 0.5cm

C. 2.0 cm^{-1}

D. 0.2 cm^{-1}

Answer: C

Watch Video Solution

6. The units of cell cosntnat are

A. ohm^{-1}

B. $ohm - cm$

C. cm^{-1}

D. $ohm^{-1}cm^{2}eq^{-1}$

Answer: C

Watch Video Solution

7. If X is the specific resistance of the solution and N is the normality of the solution, the equivalent conductivity of the solution is given by

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

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

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

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

Answer: B

Watch Video Solution

8. The units of conductivity of the solution are

A. ohm^{-1}

B. ohms

C. $ohm^{-1}cm^{-1}$

D. $ohm^{-1}eq^{-1}$

Answer: C

Watch Video Solution

9. The increase in the molar conductivity of acetic acid with dilution is due to

A. decrease in interionic forces

B. increase in degree of ionisation

C. increase in self ionisation of water

D. none of these

Answer: B

Watch Video Solution

10. The increase in the molar conductivity of HCl with dilution is due to

A. increase in the self ionisation of water

B. hydrolysis of HCl

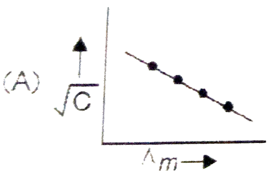
C. decrease in the self ionisation of water

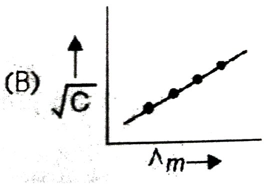
D. decrease in the interionic, forces.

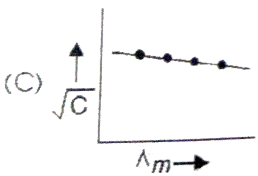
Answer: D

Watch Video Solution

11. Which of the following curve gives the variation of Λ_m° with $\sqrt{C}$ to CH_3COOH?

A. 

B. 

C. 

D. None of these

Answer: D

Watch Video Solution

12. The value of molar conductivity of HCl is greater than that of $NaCl$ at a particular temperature because

A. molecular mass of HCl is less than that of NaCl

B. velocity of H^{+} ions is more than that of Na^{+} ions

C. HCl is strongly acidic.

D. ionisation of HCl is larger than that of NaCl.

Answer: B

Watch Video Solution

13. Pick out the incorrect statement

A. Equivalent conductance inc rease with dilution

B. Molar conductance increase with dilution

C. Specific conductance increase with dilution

D. Specific resistance increase with dilution

Answer: C

Watch Video Solution

14. For an electrolyte solution of $0.05 molL^{-1}$, the conductivity has been found to be $0.0110 Scm^{-1}$. The molar conductivity is

A. $0.055 Scm^2 \text{mol}^{-1}$

B. $550 Scm^2 \text{mol}^{-1}$

C. $0.22 Scm^2 \text{mol}^{-1}$

D. $220 Scm^2 \text{mol}^{-1}$

Answer: D

Watch Video Solution

15. According of Kohlrausch law, the limiting value of molar conductivity of an electrolyte A_2B is

A. $\lambda\mathring{}\left(A^{+}\right)+\lambda\mathring{}\left(B^{-}\right)$

B. $\lambda\mathring{}\left(A^{+}\right)-\lambda\mathring{}\left(B^{-}\right)$

C. $2\lambda\mathring{}\left(A^{+}\right)+\frac{1}{2}\lambda\mathring{}\left(B^{-}\right)$

D. $2\lambda\mathring{}\left(A^{+}\right)+\lambda\mathring{}\left(B^{2-}\right)$

Answer: D

Watch Video Solution

16. The values of $\wedge_{eq}^{\infty}$ for $NH_4Cl, NaOH$ and $NaCl$ are, respectively, $149.74, 248.1,$ and $126.4 ohm^{-1}cm^{2}eq^{-1}$. The value of $\wedge_{eq}^{\infty}NH_4OH$ is

A. 371.44

B. 271.44

C. 71.44

D. It cannot be calculated from the data given.

Answer: B

Watch Video Solution

17. At infinite dilution, the equivalent conductivity of the electrolyte is given by the expression:

$$\Lambda_{eq}^{\infty} = \lambda_{(+)}^{\infty} + \lambda_{(-)}^{\infty}$$

The above expression is given by

A. Kohlrausch

B. Hittoff

C. Ostwald

D. De-bye Huckel.

Answer: A

Watch Video Solution

18. For which of the following electrolyte the value of $. - (m)$ and $\bigwedge eq$ are same?

A. Na_2SO_4

B. $BaCl_2$

C. KCl

D. $Al_2(SO_4)_3$.

Answer: C

Watch Video Solution

19. The molar conductance of HCl, NaCl and CH_3COONa are 426,12 6 and 91 $\Omega^{-1}cm^2\text{mol}^{-1}$ respectively. The molar c onductance for CH_3COOH is

A. $561\Omega^{-1}\text{mol}^{-1}$

B. $391\Omega^{-1}cm^2\text{mol}^{-1}$

C. $261\Omega^{-1}cm^2\text{mol}^{-1}$

D. $612\Omega^{-1}cm^2\text{mol}^{-1}$

Answer: B

Watch Video Solution

20. Which expressions can be used to calculate degree of ionisation of weak electrolyte of type A^+B^- ?

A. $\sqrt{K/C}$

B. $\Lambda_m / \Lambda_m^\infty$

C. Both A and B

D. Neither A nor B

Answer: C

Watch Video Solution

21. The values of Λ_m^∞ for KCl and KNO_3 are 149.86 and $154.96\Omega^{-1}cm^2\text{mol}^{-1}$. Also λ_{Cl}^∞ is 71.44 $ohm^{-1}cm^2\text{mol}^{-1}$. The value of $\lambda_{NO_3^-}^\infty$ is

A. $76.54ohm^{-1}cm^2\text{mol}^{-1}$

B. $133.08ohm^{-1}cm^2\text{mol}^{-1}$

C. $37.7ohm^{-1}cm^2\text{mol}^{-1}$

D. unpredictable.

Answer: A

Watch Video Solution

22. The quantity of electricity required to librate 0.1 g equivalent of an element at the electrode is

A. 9650C

B. 96500C

C. 965C

D. 96.5C

Answer: C

Watch Video Solution

23. When an aqueous solution of H_2SO_4 is electrolysed, the ion discharged at anode is

A. H^-

B. OH^-

C. SO_4^{2-}

D. O^{2-}

Answer: B

Watch Video Solution

24. The unit of electrochemical equivalent is

A. gm ampere^{-1}

B. gm/coulomb

C. gm-ampere

D. coulomb/gram.

Answer: B

Watch Video Solution

25. Ione faraday of electricity will liberate one gram atom of a metal from a solution of

A. $AuCl_3$

B. $CuSO_4$

C. $BaCl_2$

D. KCl.

Answer: D

Watch Video Solution

26. An aqueous solution of Na_2SO_4 is electrolysed using Pt electrodes. The products at the cathode and anode are respectively:

A. H_2, SO_2

B. $O_2, NaOH$

C. H_2, O_2

D. O_2, SO_2

Answer: C

Watch Video Solution

27. What weight of copper will be deposited by passing 2 faradays of electricity through a cupric salt (atomic weight of $Cu = 63.5$) ?

A. 63.5g

B. 31.75g

C. 127g

D. 2.0g.

Answer: A

Watch Video Solution

28. How many coulombs are required for the reduction of 1 mol of MnO_4^- to Mn^{2+} ?

A. $96500C$

B. $1.93 \times 10^5 C$

C. $4.83 \times 10^5 C$

D. $9.65 \times 10^6 C$.

Answer: C

Watch Video Solution

29. How many coulombs are required for the oxidation of $1 mol$ of H_2O to O_2?

A. $9.65 \times 10^4 C$

B. $4.825 \times 10^5 C$

C. $1.93 \times 10^5 C$

D. $1.93 \times 10^4 C$

Answer: C

Watch Video Solution

30. For how long 2.5 ampere of current is passed to supply 5400C of charge?

A. 1hr

B. 2.5hr

C. 6hr

D. 9 hr.

Answer: C

Watch Video Solution

31. On passing 3 A of electricity for 50 min, 1.8 g of metal deposits. The equivalent mass of metal is

A. 20.5

B. 25.8

C. 19.3

D. 30.7

Answer: C

Watch Video Solution

32. On passing C ampere of electricity through an electrolyte solution for I secodns, m gram metal deposits on cathode. The eq. wt. of metal is

A. $E = \dfrac{C \times t}{m \times 96500}$

B. $E = \dfrac{C \times m}{t \times 96500}$

C. $E = \dfrac{96500 \times m}{C \times t}$

D. $E = \dfrac{C \times t \times 96500}{m}$

Answer: C

Watch Video Solution

33. $0.5F$ of electricity is passed through $500mL$ of copper sulphate solution. The amount of copper which can be deposited will be

A. 63.5g

B. 31.75g

C. 15.8g

D. unpredictable.

Answer: C

Watch Video Solution

34. On carrying out the electrolysis of acidified water, the volume of hydrogen liberated at STP condition is $22.4L$. The volume of oxygen liberated is

A. 22.4L

B. 44.8L

C. 11.2L

D. 2.24L

Answer: C

Watch Video Solution

35. During the electrolysis of the aqueous solution of copper sulphate using Pt electrode, the reaction taking place at anode electrode is

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

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

C. $2H_2O \rightarrow 4H^{+} + O_2 + 4e^{-}$

D. $H_2O + e^{-} \rightarrow OH^{-} + \frac{1}{2}H_2$

Answer: C

Watch Video Solution

36. In passing $3F$ of electricity through three electrolytic cells connect in series containing $Ag^{\oplus}$, Ca^{2+}, and Al^{3+} ions, respectively. The molar ratio in which the three metal ions are liberated at the electrodes is

A. $1:2:3$

B. $3:2:1$

C. $6:3:2$

D. $3:4:2$

Answer: C

Watch Video Solution

37. When electrolysis of silver nitrate solution is carried out using silver electrodes, wich of the following reaction occurs at the anode?

A. $Ag \rightarrow Ag^{+} + e^{-}$

B. $Ag^{+} + e^{-} \rightarrow Ag$

C. $2H_2O \rightarrow 4H^+ + O_2 + 4e^-$

D. $4OH^- \rightarrow 2H_2 + O_2 + 4e^-$

Answer: A

Watch Video Solution

38. According to Faradays law of electrolysis, one faraday of electricity

A. produces one gram-equivalent of the element

B. produces 0.5gm equivalent of the element at each electrode

C. produces 2 gm-equivalent of the element at each electrode

D. none is correct.

Answer: A

Watch Video Solution

39. In the electrolysis of water, one faraday of electrical energy would evovle at STP

A. one mole of oxygem

B. one g atom of oxygen

C. 8g of oxygen

D. 22.4litres of oxygen

Answer: C

Watch Video Solution

40. One faraday of electricicy is passed through aqueous solution of sodium chloride. It produces

A. one mole of oxygen at anode

B. 1gm of hydrogen at cathode

C. neighter hydrogen nor oxygen is produc ed

D. sodium is deposited at cathode in equivalent proportion.

Answer: B

Watch Video Solution

41. During the electrolysis of aqueous sodium chloride the cathodic reaction is

A. Oxidation of Cl^- ion

B. Oxidation of Na^+ ion

C. Reduction of H_2O

D. Oxidation of H_2O.

Answer: C

Watch Video Solution

42. The charge required for the reduction of $1 mol\ Cr_2O_7^{2-}$ ions to Cr^{3+} is

A. 96500C

B. $2 \times 96500C$

C. $3 \times 96500C$

D. $6 \times 96500C.$

Answer: D

Watch Video Solution

43. How long 2 ampere of current is passed to supply $7200C$ of charge ?

A. 1 hr

B. 10 hr

C. 15 hr

D. 20 hr

Answer: A

Watch Video Solution

44. $10800C$ of electricity passed through the electrolyte deposited $2.977g$ of metal with atomic mass $106.4gmol^{-1}$. The charge on the metal cation is

A. $+4$

B. $+3$

C. $+2$

D. $+1$

Answer: A

Watch Video Solution

45. How much quantity of electricity has to be passed through 200ml of 0.5 M $CuSO_4$ solution to completely deposit copper?

A. 96500C

B. $2 \times 9650C$

C. $2 \times 96500C$

D. $4 \times 96500C$

Answer: B

Watch Video Solution

46. How many coulombs of electricity are c onsumed when a 100mA current is passed through a solution of $AgNO_3$ for half an hour during an electrolysis experiment?

A. 1080

B. 18000

C. 180

D. 2000

Answer: C

Watch Video Solution

47. In which one of the following one faraday of electricity will liberate 1/2 gram -atom of the metal?

A. $AuCl_3$

B. $FeCl_3$

C. $CuSO_4$

D. $NaCl.$

Answer: C

Watch Video Solution

48. The number of coulombs required to deposit 5.4 g of Al when the electrode reaction is $Al^{3+} + 3e^- \rightarrow Al$

A. $1.83 \times 10^5 C$

B. $57900C$

C. $5.86 \times 10^5 C$

D. None of the above

Answer: B

Watch Video Solution

49. How many coulombs are required for the oxidation of 1 mol of H_2O_2 ?

A. 93000C

B. $1.93 \times 10^5 C$

C. $9.65 \times 10^4 C$

D. $19.3 \times 10^2 C$

Answer: B

Watch Video Solution

50. 1 faraday of electricity will liberate 1 gram atom of the metal from the solution of

A. Copper sulphate

B. Calcium chloride

C. Gold III chloride

D. silver I chloride

Answer: D

Watch Video Solution

51. Loss of electrons is oxidation. The process at anode is

A. Oxidation

B. Reduction

C. Both

D. None.

Answer: A

Watch Video Solution

52. Point out the correct statement about Zn - $CuSO_4$ cell.

A. The flow of electrons occurs from copper to zinc.

B. The value of E° of copper electrode is less than that of zinc electrode.

C. Zinc is anode while Cu is cathode electrode

D. All the statement are correct.

Answer: C

Watch Video Solution

53. The standard reduction potential of Pb and Zn electrodes are -0.126 and -0.763 volts respectively . The e.m.f of the cell

$Zn|Zn^{2+}(0.1M)||Pb^{2+}|(1M)Pb$ is

A. $0.637V$

B. $< 0.637V$

C. $> 0.637V$

D. 0.889

Answer: C

Watch Video Solution

54. The function of the salt bridge is to

A. allow solutions of two half cells to intermix

B. does not allow the ions to move from anode to cathode

C. keep the solutions electrically neutral in two half cells

D. none of the above.

Answer: C

Watch Video Solution

55. Which one of the following does not hold good for S.H.E ?

A. The pressure of hydrogen gas is 1.5 atmosphere

B. The concentration of H^{+} in solution 1M

C. The temperature is 298K

D. The surface of platinum electrode is coated with platinum black.

Answer: A

Watch Video Solution

56. which of the following will increase the voltage of the cell with following cell reaction?

$Sn(s) + 2Ag^{+}(aq) \rightarrow Sn^{+2}(aq) + 2Ag(s)$

A. Increase in the size of silver rod

B. Increase in the conc. Of Sn^{2+} ions

C. Increase in the concentration of Ag^{+} ions

D. decrease in the concentration of Ag^{+} ions

Answer: C

Watch Video Solution

57. Which of the following does not differentiate between electrochemical cell and elec trolytic cell?

A. Spontaneous or non-spontaneous nature of the chemical process

B. Chemical reactions occuring at the electrodes

C. Positive or negative nature of anode

D. None of the answer is correct.

Answer: B

Watch Video Solution

58. An electrochemical cell stops working after some time because

A. Electrode potential of both the electrodes become zero

B. Electrode potential of both the electrodes become equal.

C. One of the electrdoe is eaten away

D. The reaction starts proceeding in opposite direction.

Answer: B

Watch Video Solution

59. Which of the following statements is correct for a galvanic cell?

A. Reduction occurs at cathode

B. Oxidation occurs at anode

C. Electrons flow from anode to cathode

D. All the statements are correct.

Answer: D

Watch Video Solution

60. Which of the following reactions occurs at the anode during the recharging of lead storage battery ?

A. $Pb + SO_4^{2-} \rightarrow PbSO_4 + 2e^-$

B. $Pb + PbO_2 + H_2SO_4 \rightarrow 2PbSO_4 + 2H_2O$

C. $PbSO_4 + 2e^- \rightarrow Pb + SO_4^{2-}$

D. $2PbSO_4 + 2H_2O \rightarrow Pb + PbO_2 + 2H_2SO_4$

Answer: C

Watch Video Solution

61. In H_2 - O_2 fuel cell the reaction occurring at cathode is:

A. $2H_2 + O_2 \rightarrow 2H_2O(l)$

B. $H^+ + OH^- \rightarrow H_2O$

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

D. $H^+ + e^- \rightarrow 1/2H_2$.

Answer: C

Watch Video Solution

62. An example of a simple fuel cell is

A. Lead storage battery

B. Laclanche cell

C. H_2 - O_2 cell

D. All

Answer: C

Watch Video Solution

63. For the electrochemical cell:

$Ag|AgCl(s)|KCl(aq)$ | $\left|AgNO_3(aq)\right|Ag$

The overall cell reaction is

A. $Ag^+ + KCl \rightarrow AgCl + K^+$

B. $Ag^+ + Cl^- \rightarrow + \frac{1}{2}Cl_2$

C. $AgCl \rightarrow Ag^+ + Cl^-$

D. $Ag^+ + Cl^- \rightarrow AgCl.$

Answer: D

Watch Video Solution

64. Electrical potential of a cell is an

A. intensive property

B. extensive property

C. isothermal property

D. isobaric property.

Answer: A

Watch Video Solution

65. Which one of the following reactions cannot be used to set u p an electrochemical cell?

A. $Fe + 2H^{+} \rightarrow Fe^{2+} + H_2$

B. $Mg + Sn^{2+} \rightarrow Mg^{2+} + Sn$

C. $Cl_2 + 2KBr \rightarrow 2KCl + Br_2$

D. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$.

Answer: D

Watch Video Solution

66. Which one of following statements is wrong about in electrochemical cell (ECC) and an electrolytic cell (ELC)?

A. ECC produces electricity ELC consumes electricity.

B. ECC uses a salt bridge/porous pot, ELC does not

C. Anode of ECC is negative while anode of ELC is positive

D. In both ECC and the redox reaction is spontaneous.

Answer: D

Watch Video Solution

67. Cell reaction for the cell

$Zn\left|Zn^{2+}(1.0M)\right|\left|Cd^{2+}(1.0M)\right|Cd$ is given by

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

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

C. $Cd + Zn^{2+} \rightarrow Zn + Cd^{2+}$

D. $Zn + Cd^{2+} \rightarrow Zn^{2+} + Cd.$

Answer: D

Watch Video Solution

68. The reduction potential of the two half cell reaction (occurring in an electrochemical cell) are

$PbSO_4(s) + 2e^{-} \rightarrow Pb(s) + SO_4^{2-}(aq)\left(E^\circ = -0.31V\right)$

$Ag^{+}(aq) + e^{-} \rightarrow Ag(s)\left(E^\circ = 0.80V\right)$

The feasible reaction will be

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

B. $PbSO_4(s) + 2Ag^+(aq) \rightarrow Pb(s) + SO_4^{2-}(aq) + 2Ag(s)$

C. $Pb(s) + SO_4^{2-}(s) + Ag(s) \rightarrow Ag^+(aq) + PbSO_4(s)$

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

Answer: A

Watch Video Solution

69. The cell reaction

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

is best represented by

A. $Ag\left|Ag^+\right|\left|Zn\right| Zn^{2+}$

B. $Zn\left|Zn^{2+}\right|\left| Ag^+\right| Ag$

C. $2Ag\left|Ag^+\right|\left|Zn\right| Zn^{2+}$

D. $Zn\left|Zn^{2+}\right|\left|2Ag\right|Ag^+$

Answer: B

Watch Video Solution

70. Which one of the following statements is correct?

A. In an electrochemical cell, the free energy of the system decreases while in an electrolytic cell, it increases

B. In an electrolytic cell, the free energy of the system decreases while in an electrochemical cell it increase

C. Free energy increase in both

D. Free energy decreases in both.

Answer: A

Watch Video Solution

71. Which of the following solutions can be safely stored in a copper vessel ?

A. $ZnSO_4$

B. $AgNO_3$

C. $AuCl_3$

D. All of them.

Answer: A

Watch Video Solution

72. The Nernst equation giving dependence of electrode reduction potential on concentration is

A. $E = E^{\circ} + \frac{2.303RT}{nF}\log\frac{[M]}{\left[M^{n+}\right]}$

B. $E = E^{\circ} + \frac{2.303RT}{nF}\log\frac{\left[M^{n+}\right]}{[M]}$

C. $E = E^\circ - \dfrac{2.303RT}{nF}\log\dfrac{\left[M^{n+}\right]}{[M]}$

D. $E = E^\circ + \dfrac{2.303RT}{nF}\log[M]^{n+}$

Answer: B

Watch Video Solution

73. Given that $I_2 + 2e^- \rightarrow 2I^- : E^\circ = 0.54V$

$Br_2 + 2e^- \rightarrow 2Br^- : E^\circ = 1.09V$

Predict which of the following is true

A. I^- ions will be able to reduce bromine

B. Br^- will be able to reduce iodine

C. Iodine will be able to reduce bromide ions

D. Bromine will be able to reduce iodide ions

Answer: A

Watch Video Solution

74. Which of the following will be able to react with dilute HCl to give hydrogen gas?

A. Cu

B. Mg

C. Hg

D. Ag

Answer: B

Watch Video Solution

75. The emf of a galvanic cell is positive when free energy change of reaction is

A. > 0

B. < 0

C. $= 0$

D. no relationship of free energy change and e.m.f.

Answer: B

Watch Video Solution

76. Consider the following reaction,

$$Cu\left|Cu^{2+}(1M)\right| \mid \left(Zn^{2+}(1M) \mid Zn\right.$$

A cell represented above should have emf

A. positive

B. negative

C. zero

D. cannot be predicted.

Answer: B

Watch Video Solution

77. The e.m.f. of the cell

$Ti \mid Ti^{+}(0.001M) \parallel Cu^{2+}(0.01M) \mid Cu$ is 0.83V the emf of this cell could b e increased by

A. increasing the concentration of Ti^{+} ions

B. increasing the concentration of Cu^{2+} ions

C. increasing the concentration of both

D. none of the above.

Answer: B

Watch Video Solution

78. A galvanic cell is set up from a zinc bar weighing $100g$ and $1.0L$ of $1.0MCuSO_4$ solution. How long would the cell run if it is assumed to deliver a steady current of $1.0A$. (Atomic mass of $Zn = 65$).

A. 1.1 hr

B. 46hr

C. 53. 6hr

D. 24.00hr

Answer: C

Watch Video Solution

79. The cell voltage of a galvanic cell becomes zero after using for some tme because

A. All the free electrons are used up

B. Oxidation potential of the two half cell become different

C. Reduction potential of the two half cells become equal

D. Oxidation potentials of two half cells become equal in magnitude but opposite in sign.

Answer: C

View Text Solution

80. Zinc is used to protect corrosion of iron because

A. E_{oxi} of $Zn < E_{\text{oxi}}$ of iron

B. E_{red} of $Zn < E_{\text{red}}$ of iron

C. Zn is cheaper than iron

D. Zn is abundantly available

Answer: B

Watch Video Solution

81. The half-cell reduction potential of a hudrogen electrode at $pH = 10$ will be.

A. 0.59V

B. - $0.59V$

C. Zero votls

D. - $0.059V$

Answer: B

Watch Video Solution

82. The value of E_{cell} of hydrogen electrode at $pH = 0$ 298 K and 1 atm, is

A. 0.59V

B. zero volt

C. - $0.59V$

D. - $0.059V$

Answer: B

Watch Video Solution

83. The electrode potential measures the

A. tendency of the electrode to gain or lose electrons

B. tendency of a cell reaction to occur

C. difference in the ionisation potential of electrode and metal ion.

D. current carried by an electrode.

Answer: A

Watch Video Solution

84. Given :

$Ag^{+} + /Ag \rightarrow \; +0.80V$

Co^{2+}/C or $\rightarrow \; -.28V$

$Cu^{2+}/Cu \rightarrow \; +0.34V$

$Zn^{2+}/Zn \rightarrow \; -0.76V.$

The most reactive metal which displaces other metals from their salts in solution is

A. Ag

B. Cu

C. Co

D. Zn.

Answer: D

Watch Video Solution

85. The emf of the cell involving the reaction

$2Ag^{+}(aq) + H_2(g) \rightarrow 2Ag(s) + 2H^{+}(aq)$ is $0.080V$.

The standard oxidation potential od silver electrode is

A. 0.80V

B. -$0.80V$

C. $0.40V$

D. $0.20V$.

Answer: B

Watch Video Solution

86. The electrode potential of hydrogen electrode at the pH=12 will be

A. 0

B. $+ve$

C. $-ve$

D. unpredictable.

Answer: C

View Text Solution

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

A. Decrease by 60mV

B. Increase by 30V

C. Decreses by 30mV

D. Decreases by 60V.

Answer: C

Watch Video Solution

88. The oxidation potential of hydrogen electrode H_2/H_2O^+ (aq) will be greater than zero if,

A. conc. Of $\left[H_3O^+\right]$ ions is 2M

B. conc. Of $\left[H_2O^+\right]$ ions is 1M

C. Partial pressure of H_2 is 2atm.

D. E_{oxi} can never be +ve.

Answer: C

Watch Video Solution

89. When the cell reaction attains a state of equilibrium, the EMF of the cell is

A. zero

B. positive

C. negative

D. not definite.

Answer: A

View Text Solution

90. The EMF of a cell is related to the equilibrium constant of the cell reaction as

A. In $k_c = \frac{nFE^{\circ}_{\text{cell}}}{RT}$

B. $k_c = \frac{nFE^{\circ}_{\text{cell}}}{RT}$

C. $E^{\circ}_{\text{cell}} = \frac{RT}{nF}$ in k_c

D. $k_c = \frac{RT}{nF}$ in E°_{cell}

Answer: A

Watch Video Solution

91. The correct relationship between Gibb's free energy change and the EMF of a cell is

A. $\Delta G^{\circ} = nFE^{\circ}$

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

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

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

Answer: B

Watch Video Solution

92. For a reaction $A(s) + 2B^{+} \rightarrow A^{2+} + 2B$

K_c has been found to be 10^{12}. The E°_{cell} is

A. $0.354V$

B. $0.708V$

C. $0.0098V$

D. $1.36V$

Answer: A

Watch Video Solution

93. The free energy change in related to equilibrium constant as

A. $\Delta G = RT$ in k_c

B. $-\Delta G = RT\log k_c$

C. $-\Delta G = 2.303Rt\log k_c$

D. $-\Delta G = \left(RT\log k_c\right)/2.303.$

Answer: C

Watch Video Solution

94. The relationship between free energy and electrode potential is

A. $\Delta G = nEF$

B. $\Delta G = nFE$

C. $\Delta G = \dfrac{nFE}{R}$

D. $\Delta G = \dfrac{\Delta H}{nFE}$

Answer: A

Watch Video Solution

95. Which of the following involves the reduction of copper:

A. $Cu(s) + \frac{1}{2}O_2(g) \rightarrow CuO(s)$

B. $Cu^{2+}(aq) + 2I^-(aq) \rightarrow 2Ca\underline{q}$

C. $CuCl_2(g) + 2F^-(aq) \rightarrow CuF_2 + Cl_2(g)$

D. None of the above.

Answer: B

Watch Video Solution

96. In which of the following, the corrosion of iron will be most rapid?

A. In pure water

B. In pure oxygen

C. In air and moisture

D. In air and saline water.

Answer: D

Watch Video Solution

97. In electrochemical corrosion of metals, the metal undergoing corrosion

A. becomes anode

B. becomes cathode

C. becomes inert

D. none is correct.

Answer: A

Watch Video Solution

98. The chemical reaction:

$Zn^{2+} + 2e^{-} \rightarrow Zn$

Is an example of

A. Redox process

B. Reversible process

C. Oxidation

D. Reduction

Answer: D

Watch Video Solution

99. Which one of the following metal can decompose copper sulphate solution?

A. Mercury

B. Iron

C. Gold

D. Platinum.

Answer: B

Watch Video Solution

100. The thermodynamic efficiency of cell is given by

A. $\Delta H / \Delta G$

B. $\dfrac{nFE}{\Delta G}$

C. $\dfrac{-nFE}{\Delta H}$

D. nFE°

Answer: C

Watch Video Solution

101. The reduction potential of the two half cell reactions (occuring in an electrochemical cell) are

$$PbSO_4 + 2e^- \rightarrow Pb + SO_4^{2-} \left(E^{\circ} = -0.31V\right)$$

$$Ag^+(aq) + e^- \rightarrow Ag(s) \left(E^{\circ} = +0.80V\right)$$

The fessible reaction will be

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

B. $PbSO_4 + 2Ag^+(aq) \rightarrow Pb + SO_{4-}^{2} + 2Ag(s)$

C. $Pb + SO_4^{2-} + Ag(s) \rightarrow Ag^+(aq) + PbSO_4^{2-}$

D. $PbSO_4 + Ag(S) \rightarrow Ag^+(aq) + Pb + SO_4^{2-}$

Answer: A

Watch Video Solution

102. When a lead storage battery is charged it acts as:

A. a fuel cell

B. an electrolytic cell

C. a galvanic cell

D. a concentration cell.

Answer: B

Watch Video Solution

103. The approximate voltage of dry cell is

A. 2

B. 1.2V

C. 6V

D. 1.5

Answer: D

Watch Video Solution

104. Which of the following solution will turn blue when placed in copper vessel?

A. $AgNO_3$

B. $NaCl$

C. $ZnSO_4$

D. KNO_3

Answer: A

Watch Video Solution

105. Which of the following reaction is anodic?

A. $SO_4^{2-} + H_2O \rightarrow H_2SO_4 + \frac{1}{2}O_2 + 2e^-$

B. $H^+ + e^- \rightarrow \frac{1}{2}H_2$

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

D. $H_2O + e^- \rightarrow OH^- + \frac{1}{2}H_2$

Answer: A

Watch Video Solution

106. A net cell reaction is given as

$$Cr + 3H_2O + Ocl^- \rightarrow Cr^{3+} + 3Cl^- + 6OH^-$$

The species undergoing reduction is

A. Cr

B. H_2O

C. Ocl^-

D. Cl^-

Answer: C

Watch Video Solution

107. Which of the following process represents disproportionation?

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

B. $Fe^{2+} \rightarrow \frac{1}{2}Fe^{3+} + e^-$

C. $Cu^{+2} + Zn \rightarrow Zn^{2+} + Cu$

D. All the above.

Answer: A

Watch Video Solution

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

A. 36 hors apporx

B. 18hours approx.

C. 9 hours approx

D. 4-5 hours approx.

Answer: A

Watch Video Solution

109. the number of electrons required to deposit 1g equivalent aluminium (At. Wt. =27) from a solution of aluminium chloride will be

A. 1

B. 2

C. 3

D. 4

Answer: A

Watch Video Solution

110. The charge required to liberate 11.5 g sodium from fused sodium chloride is

A. 1 Faraday

B. 0.5Faraday

C. 1.5Faraday

D. 96500 Coulomb.

Answer: A

Watch Video Solution

111. The amount of Aluminium deposited when 0.1 Faraday current is passed through aluminium chloride will be (R=27)

A. 0.9g

B. 0.3g

C. 0.27g

D. 2.7g

Answer: A

Watch Video Solution

112. A current liberates 0.504 g of hydrogen in 2 hours, the amount of copper lib erated from a solution $CuSO_4$ by the same current flowing for the same time would be

A. 31.8g

B. 63.6g

C. 15.9g

D. 6.36g

Answer: A

Watch Video Solution

113. 1.08 g of an element was displaced when a current of one ampere was passed through the solution of salt of the element for 16 minutes and five seconds. The equivalent weight of the element is

A. 108

B. 5.4

C. 1.08

D. 10.8

Answer: C

Watch Video Solution

114. The volume of hydrogen at NTP displaced by that amount of current which displaced 1.08 g of Ag (equivalent weight of Ag=108) will be

A. 1120cc

B. 11.2cc

C. 112cc

D. 11200cc.

Answer: A

Watch Video Solution

115. A current of 1 amp was passed for t seconds through cells P,Q andR connected in series. These contain respectively silver nitrate, mecruric nitrate and mercurous nitrate. AT the cathode of the cell P,0.21 6 g of Ag was deposited. The weights of mercury deposited in the cathode of Q and R respectively are.

A. 0.4012 and 0.8024g

B. 0-4012abd 0.2006g

C. 0-2006 and 0.4012g

D. 0.1003 and 0.2006 g .

Answer: C

Watch Video Solution

116. Ag is removed electrolyticaly from 20cc of a 0.1 N solution of $AgNO_3$ by a current of 0.1 amp. How long will it take to remove half of the silver from the solution?

A. 10min

B. 16min

C. 100min

D. 160min

Answer: D

Watch Video Solution

117. An elecric current 0.25 ampere was passed through acidified water for two hours, the volume of H_2 produced at N.T.P is

A. 20.16 litres

B. 0.2016litres

C. 2.016litres

D. 0.4032 litres.

Answer: B

Watch Video Solution

118. Two electrolytic cells, one containing acidified ferrous sulphate and another acidified ferric chloride, are in series. The ratio of masses of Iron deposited at the cathode in the two cells will be

A. $3:1$

B. $2:1$

C. $1:1$

D. $3:2$

Answer: D

Watch Video Solution

119. The standard electrode potneitla for $Pb \rightarrow Pb^{2+} + 2e$ is 0.13V. Calculate the potential of a lead electrdoe placed in a solution of 0.015 M in $Pb^{2} +$ ions at $25 ^{\circ} C$.

A. 0.185V

B. 0.37V

C. 0.092V

D. 2.0V

Answer: A

Watch Video Solution

120. At 298 K the resistance of a 0.1M KCl solution is found to be 39.0ohm. If the conductivity (k) of this solution is $1.29 \times 10^{-2} ohm^{-1} cm^{-1}$ at 298K, what is cell contant

A. $5.03 \times 10^{-1} cm^{-1}$

B. $10.06 \times 10^{-1} cm^{-1}$

C. $15.09 \times 10^{-1} cm^{-1}$

D. $2.51 \times 10^{-1} cm^{-1}$

Answer: A

Watch Video Solution

121. At 298K the resistance of a 0.5N NaOH solution is 35.0 ohm. The cell constant is 0.503 cm^{-1} the electrical conductivity of the solution is

A. $1.437 \times 10^{-2} ohm^{-1} cm^{-1}$

B. $1.473 ohm^{-1} cm^{-1}$

C. $1.06 ohm^{-1} cm^{-1}$

D. $3.5 ohm^{-1} cm^{-1}$.

Answer: A

Watch Video Solution

122. At 298K the electrolytic conductivity of a 0.2 M KCl solution is $2.5 \times 10^{-2} ohm^{-1} cm^{-1}$ compute its molar c onductivity.

A. $62.5 ohm^{-1} cm^{2} \mathrm{mol}^{-1}$

B. $125 ohm^{-1} cm^{2} \mathrm{mol}^{-1}$

C. $250 ohm^{-1} cm^{2} \mathrm{mol}^{-1}$

D. $175 ohm^{-1} cm^{2} \mathrm{mol}^{-1}$

Answer: B

Watch Video Solution

123. The resistance of 0.05 MCH_3COOH solution is found to be 100ohm. If the cell constant is 0.037 cm^{-1}, the molar conductivity of the solution is

A. $3.7 ohm^{-1} cm^{2} \mathrm{mol}^{-1}$

B. $74 ohm^{-1} cm^{2} \mathrm{mol}^{-1}$

C. $7.4 ohm^{-1} cm^{2} \text{mol}^{-1}$

D. $37 ohm^{-1} cm^{2} \text{mol}^{-1}$

Answer: C

Watch Video Solution

124. Compouter the m olar conducitivity of a solution of $MgCl_2$ at infinite dilution. Given that $\lambda_{Mg}^{2+} = 106.12 ohm^{-1} cm^{2} \text{mol}^{-1}$

$\lambda_{Mg}^{2+} = 106.12 ohm^{-1} cm^{2} \text{mol}^{-1}$

A. $182.46 ohm^{-1} cm^{2} \text{mol}^{-1}$

B. $258.8 ohm^{-1} cm^{2} \text{mol}^{-1}$

C. $212.24 ohm^{-1} cm^{2} \text{mol}^{-1}$

D. $152.68 ohm^{-1} cm^{2} \text{mol}^{-1}$

Answer: B

Watch Video Solution

125. Calculate the molar conductivity of acetic acid at infinite dilution. Given that molar conductivity of $HCl. CH_3COONa$ and NaCl is 426.1,91.0 and 126.5 $ohm^{-1}cm^2\text{mol}^{-1}$ respectively.

A. $390.6ohm^{-1}cm^2\text{mol}^{-1}$

B. $195.3ohm^{-1}cm^2\text{mol}^{-1}$

C. $585.9ohm^{-1}cm^2\text{mol}^{-1}$

D. $292.95ohm^{-1}cm^2\text{mol}^{-1}$

Answer: A

Watch Video Solution

126. Calculate the degree of dissociation of 0.02 M acetic acid at 298K, given that

$\lambda_{CH_3COOH} = 11.7ohm^{-1}cm^2\text{mol}^{-1}$

$\lambda\left(CH_3COO^-\right) = 40.9 ohm^{-1} cm^2 \text{mol}^{-1}$

$\lambda\left(H^+\right)^\circ = 349.1 ohm^{-1} cm^2 \text{mol}^{-1}$

A. 0.06

B. 0.015

C. 0.03

D. 0.09.

Answer: C

Watch Video Solution

127. Compute the standard free energy chagne $\left(\Delta G^\circ\right)$ for the process

$Zn^{2+}(aq) + 2e^- \rightarrow Zn(s)$:

$E^\circ Zn^{2+} = -0.76V$

A. 146.68kJ

B. 73.34kJ

C. 220.2kJ

D. 1100kJ.

Answer: A

Watch Video Solution

128. Calculate the emf of the following cell:

$$Cu(s)\left|Cu^{2+}(aq)\right|\left|Ag^{+}(aq)\right|Ag(s)$$

Given that, $E^{\circ}_{Cu^{2+}/Cu} = 0.34V, E^{\circ}_{Ag/Ag^{+}} = -0.80V$

A. $+0.46V$

B. $+1.14V$

C. $+0.57V$

D. $-0.46V$

Answer: A

Watch Video Solution

129. What is the electrode potent ial Fe^{3+}/Fe electrode in which concentration of Fe^{3+} ions is 0.1M Given $E^{\circ}Fe^{3+}/Fe = +0.771V$

A. $+0.79V$

B. $+0.75V$

C. $1.50V$

D. $+1.0V$

Answer: B

Watch Video Solution

130. What is the EMF of the cell?

$Zn(s)\left|Zn^{2+}+(0.1M)\right|\left|Sn^{2+}+(0.001M)\right| \mid Sn(s).$

Given $E^{\circ}Zn^{2+}/Zn = 0.76V, E_{Sn^{\circ 2+}/Sn = -0.14V}$

A. 0.62V

B. 0.56V

C. 1.12V

D. 0.31V

Answer: B

Watch Video Solution

131. Four moles of electrons were transferred from anode to cathode in an experiment on electrolysis of water. The total volume of the tow gases (dry and at STP) produced will be approximately (in litres)

A. 22.4

B. 44.8

C. 67.2

D. 89.2

Answer: C

132. The standard oxidation potential E° for the half cell reactions are

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

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

EMF of the cell reaction

$Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$ will be

A. $-0.35V$

B. $+0.35V$

C. $0.17V$

D. $1.17V$

Answer: B

133. The charge in coulombs on 1 g ion of N^{3-} is

A. 96500

B. 2.89×10^5

C. 1.45×10^6

D. 6×10^{23}

Answer: B

Watch Video Solution

134. What is the cell potential of a cell in which the following reaction occurs.

$Ni(s) + Cu^{2+}(1M) \rightarrow Sn^{2+}(1M) \mid Fe$

$E_{Ni}/Ni)^{2+} = -0.25V. E^{\circ +}_{Cu} = 0.34V$

A. 0.295V

B. $+0.59V$

C. $0.885V$

D. $0.442V.$

Answer: B

Watch Video Solution

135. What is the potential for the cell

$Cr\left|Cr^{3+}(0.1M)\right|\left|Fe^{2+}(0.01M)\right|Fe$

$E^{\circ}Cr^{3+}/Cr = -0.74V,$

$E^{\circ}Fe^{2+}/Fe = -0.44V$

A. $+0.2606V$

B. $+0.5212V$

C. $+0.1303V$

D. $-0.2606V.$

Answer: A

Watch Video Solution

136. The EMF of the following cell is 0.86 volts $Ag \left| AgNO_3(0.0093M) \right|\left| AgNO_3(xM) \right| Ag$. The value of x will be

A. 82.8M

B. 2.28M

C. 0.228M

D. 1.14M

Answer: C

Watch Video Solution

137. A concentration cell is shown below

A. $Ag(s) \left| AgNO_3(0.01M) \right|\left| AgNO_3(0.001M) \right| Ag(s)$

The EMF of the cell will b e

B. 59.00volts

C. 5.90volts

D. 0.059volts

Answer: C

Watch Video Solution

138. Atomic weight of Al is 27.5 Faraday of electricity is passed in the solution of Al^3+ ions. Which of the following amounts of Al will b e deposited at the cathode?

A. 27g

B. 36g

C. 45.0g

D. 9.0g

Answer: C

Watch Video Solution

139. Which of the following is the correct value of EMF of a following concentration cell?

$Cu \left| Cu^{2+}(0.01M) \right| \left| Cu^{2+}(0.1M) \right| Cu$ at $25^{\circ}C$

A. 0.0295V

B. 0.295V

C. 29.5V

D. 0.00295V

Answer: A

Watch Video Solution

140. When 2 Faraday of electricity is passed in an aqueous solution of cupric sulphate, the amount of copper deposited on cathode is

A. 63.5g

B. 127.0g

C. 31.75g

D. 250g

Answer: A

Watch Video Solution

141. When the electrolytis of silver sulphate was carried out by Pt electrodes. 1-6 g oxygen was liberated at the anode, the amount of silver deposited at cathode will be

A. 108g

B. 1.6g

C. 21.6 0g

D. 0.8g

Answer: C

Watch Video Solution

142. When an electric current is passed through acidified water, $112ml$ of H_2 gas at NTP is collected at the cathode is 965 seconds. The current passed in amperes is

A. 2.0 amperes

B. 1.5ampere

C. 1 ampere

D. 0.11ampere.,

Answer: C

Watch Video Solution

143. Following are the values of standard potentials of two half cells, which of the following will be the value of standard cell potential $\left(E^{\circ}_{\text{cell}}\right)$

$Ni^{2+}/Ni : E^\circ = -0.25V$

$Zn^{2+}/Zn : E^\circ = +0.77V$

A. $-0.52V$

B. $+0.52V$

C. $-1.02V$

D. $+1.02V$

Answer: B

Watch Video Solution

144. When 0.1 Faraday of electricity is passed in aqueous solution of $AlCl_3$. The amount of Al deposited on cathode is

A. 27g

B. 9g

C. 0.27g

D. 0.9g

Answer: D

Watch Video Solution

145. When 0.5 ampere of electricity is passed in aqueous solution of $AgNO_3$ for 200 seconds, the amount of silver deposited on cathode is $(Z = 0.00118gC$ for Ag)

A. 0.1118g

B. 0.0118g

C. 0.9560g

D. 0.00956g

Answer: A

Watch Video Solution

146. If in a galvanic cell, the cell reaction is reversed as

$$Cu(s)\left|Cu^{2+}(aq)\right|\left|Zn^{+2}(aq)\right|Zn$$

the cell potential will be

A. 11.1V

B. $-11.1V$

C. $-1.1V$

D. $1.1V$

Answer: C

Watch Video Solution

147. Number of coulombs required to reduce on e mole of MnO_4^- to Mn^{2+}

A. 96500 coulomb

B. 2×96500 coulomb

C. $5x96500$ columb

D. 3×96500 coulomb.

Answer: c

Watch Video Solution

148. Number of moles of oxygen liberated by electrolysis of 90g of water

A. 9 moles

B. 4-5 moles

C. 2.5moles

D. 5 moles.

Answer: c

Watch Video Solution

149. How many coulombs are required for the oxidation of $1mol$ of H_2O to O_2?

A. $1.93 \times 10^5 C$

B. $96500C$

C. $\frac{92500}{2}C$

D. $19.30 \times 10^5 C$.

Answer: a

Watch Video Solution

150. For hydrogen oxygen fuel cell with reaction

$2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

$\Delta G_f^{c-}\left(H_2O\right) = -237.2kJmol^{-1}$. Hence, EMF of the fuel cell is

A. $+2.46V$

B. $-2.46V$

C. $+1.23V$

D. $-1.23V$

Answer: c

Watch Video Solution

151. ΔG^{c-} or the reaction is ,

$$4Al + 3O_2 + 6H_2O + 4\overset{c-}{OH} \rightarrow 4Al(OH)_4^{c-}$$

$$E^{c-}{}_{\cdot cell} = 2.73V$$

$$\Delta_f G^{c-}.\left(\overset{c}{OH}\right) = -157kJmol^{-1}$$

$$\Delta_f G^{c-}.\left(\overset{c-}{OH}\right) = -237kJmol^{-1}$$

A. $-3.16 \times 10^3 kJ\text{mol}^{-1}$

B. $0.079 \times 10^3 kJ\text{mol}^{-1}$

C. $-0.263 \times 10^3 kJ\text{mol}^{-1}$

D. $+0.263 \times 10^3 kJ\text{mol}^{-1}$

Answer: a

Watch Video Solution

152. ΔG^{c-} or the reaction is ,

$$4Al + 3O_2 + 6H_2O + 4\overset{c-}{OH} \rightarrow 4Al(OH)_4^{c-}$$

$$E^{c-}{}_{\cdot cell} = 2.73V$$

$$\Delta_f G^{c-}.\left(\overset{c}{OH}\right) = -157kJmol^{-1}$$

$$\Delta_f G^{c-}.\left(\overset{c-}{OH}\right) = -237kJmol^{-1}$$

A. $5.21 \times 10^3 kJ\text{mol}^{-1}$

B. $1.438 \times 10^3 kJ\text{mol}^{-1}$

C. $1.303 \times 10^3 kJ\text{mol}^{-1}$

D. $3.59 \times 10^3 kJ\text{mol}^{-1}$

Answer: c

Watch Video Solution

153. For a Ag-Zn button cell, the net reaction is

$Zn(s) + Ag_2O(s) \rightarrow ZnO(s) + 2Ag(s)$

$\Delta G_f^\circ\left(Ag_2O\right) = -11.21 k\text{Jmol}^{-1}$ and

$\Delta G_f^\circ(ZnO) = -318.3 k\text{Jmol}^{-1}$

The E°_{cell} of this button cell is

A. 1.71V

B. 1.591V

C. 3.182V

D. 3.07V

Answer: b

Watch Video Solution

154. In the electrochemic al cell

$Zn\left|Zn^{2+}\right|\left|H^+\right|Pt, H_2$

$E^{\circ}_{cell} = E_{cell}$ when

A. $\left[Zn^{2+}\right] = \left[H^{+}\right] = 1M$ and $pH_2 = 1$ atm.

B. $\left[Zn^{2+}\right] = 0.01M. \left[H^{+}\right] = 0.1M$ and $pH_2 = 1$ atm

C. $\left[Zn^{2+}\right] = 1M. \left[H^{+}\right] = 0.1M$ and $pH_2 = 0.01$atm

D. All of the above.

Answer: d

Watch Video Solution

155. For half cells Ti^{3+}/Ti^{+} and $Ti^{+}/Ti, E^{\circ}$ values are 1.26 and $-0.336V$ respec tively. The E° value for the half cell Ti^{3+}/Ti is

A. 0.924V

B. 0.72V

C. 2.184V

D. 1.596V

Answer: b

Watch Video Solution

156. The value of the reaction quotient, Q, for the cell:

$Ni(s)\left|Ni^{2+}(0.9M)\right|\left|Cl^{-}(0.40M)\right|Cl_2(g0.10\text{atm}), Pt(s)$ is

A. 1.3×10^{-1}

B. 8.0×10^{-2}

C. 3.0×10^{-1}

D. 3.0×10^{-2}

Answer: c

Watch Video Solution

157. Reduction electrode potentials of half cells

(1) $Pt\left(H_2\right)\left|H^+\left(C_f\right), (2)Pt\left(cl_2\right)\right|\left(Cl^-\right)\left(C_2\right)$ and (3) $Ag^+|Ag^+\left(C_3\right)$ on inc

reasing $C_1 C_2$, and C_3 (all gases are at 1 atm pressure)

A. will increase in all the three cases

B. will decrease in all the three cases

C. will increase in case (1) and (3) but decrease in case (2)

D. will decrease in case (1) and (3) but increase in case (2).

Answer: c

Watch Video Solution

158. One litre 1 M $CuSO_4$ solution is electrolysed. After passing 2 F of electricity, the molarity of solution will be

A. $M/3$

B. $M/2$

C. $M/4$

D. 0

Answer: d

Watch Video Solution

159. $2Ce^{4+} + Co \rightarrow 2Ce^{3+} + Co^{2+}, E^{\circ}_{cell} = 1.89V$

$E^{\circ}_{Co^{2+}/Co} = -0.277V$. Hence $E^{\circ}_{Ce^{4+}/Ce^{3+}}$ is

A. 0.805V

B. 1.61V

C. $-0.805V$

D. $-1.61V$

Answer: b

Watch Video Solution

160. Equivalent conductance of saturated $BaSO_4$ is 400 S cm^2eq^{-1} an d specific conductyance is 8 $\times 10^{-5}Scm^{-1}$. Solubility product. K_{sp} of $BaSO_4$

is

A. 4×10^{-8}

B. 1×10^{-8}

C. 2×10^{-4}

D. 1×10^{-4}

Answer: B

Watch Video Solution

161. A 0.20 M KOH solution is electrolysed for 1.5h using a current of 8.00A . The number of moles of O_2 produced at anode is

A. 0.48

B. 0.224

C. 0.112

D. 2.24×10^{-2}

Answer: C

Watch Video Solution

162. For $M^{2+} + 2e^{-} \rightarrow M : 0.275$ g of metal M is depoited at cathode on passing 1 A of current for 965 s. the atomic mass of metal M is

A. 55

B. 27.5

C. 13.75

D. 110

Answer: A

Watch Video Solution

163. For the concentration cell

$Cu\left|Cu^{2+}\left(C_1\right)\right|\left|Cu^{2+}\left(C_2\right)\right|Cu, \Delta G$ will be negative if

A. $C_1 = C_2$

B. $C_1 > C_2$

C. $C_2 > C_1$

D. None of these.

Answer: C

Watch Video Solution

164. For the concentration cell

$Cu\left|Cu^{2+}\left(C_1\right)\right|\left|Cu^{2+}\left(C_2\right)\right|Cu$, ΔG will be negative if

$Pt\left(Cl_2 - P_1\right)|HCl(0.1M)|Pt\left(Cl_2 - P_2\right)$ the cell reaction is spontaneous if

A. $p_1 = p_2$

B. $p_1 > p_2$

C. $p_2 > p_1$

D. None of these.

Answer: C

Watch Video Solution

165. For the concentration cell

$Pt\left(H_2 - p_1\right)\left|H^+(0.5M)\right|Pt\left(H_2 - P_2\right)$ the cell reaction will be spontaneous if

A. $p_1 = p_2$

B. $p_1 > p_2$

C. $p_2 > p_1$

D. None of these

Answer: B

Watch Video Solution

166. Four pure water, degree of dissociation is $1.9 \times 10^{-9}, \lambda_m^0 = 350 Scm^2 \text{mol}^{-1}$ and $\lambda_m^0 = 200 Scm^2 \text{mol}^{-1}$. Hence molar conductance of water is

A. $1.045 \times 10^{-6} Scm^2 \text{mol}^{-1}$

B. $1.045 \times 10^{-14} Scm^2 \text{mol}^{-1}$

C. $1.045 \times 10^{-14} Scm^2 \text{mol}^{-1}$

D. $1.045 \times 10^{-7} Scm^2 \text{mol}^{-1}$

Answer: A

View Text Solution

167. Calculate the equilibrium constant for the reaction $Cu(s) + 2Ag^{+}(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s), E_{cell}^{\circ} = 0.46V.$

A. $579 jK^{-1}$

B. $386 jK^{-1}$

C. $193jK^{-1}$

D. None of these.

Answer: B

Watch Video Solution

REVISION QUESTIONS FROM COMPETITIVE EXAMS

1. A cell constant is generally found b y mesuring the conductivity of aqueous solution of

A. $BaCl_2$

B. KCl

C. $NaCl$

D. $MgCl_2$.

Answer: B

Watch Video Solution

2. For measuring the conductivity of an electrolyte its solution should be prepared in

A. Tap water

B. Distilled water

C. Conductivity water

D. Polywater.

Answer: C

View Text Solution

3. A solution of sodium sulphate was electrolyzed using some inert electrode. The product at the electrodes are

A. O_2, H_2

B. O_2, Na

C. O_2, SO_2

D. O_2, S_2, O_8^2

Answer: A

Watch Video Solution

4. The name associated with equation

$E = E^\circ + \frac{RT}{nF} In \frac{\left[M^{n+}\right]}{[M]}$ is

A. van der Waal's equation

B. berthelot equation

C. Nernst equation

D. Diterici equation.

Answer: C

Watch Video Solution

Watch Video Solution

5. A Current of 9.65 ampere flowing for 10 minutes deposits 3.0g of the metal which is monovalent. The atomci mass of the metal is

A. 10

B. 50

C. 30

D. 96.5

Answer: B

Watch Video Solution

6. If the half-cell reaction $A + e^- \rightarrow A^-$ has a large negative reduction potential, it follows that .

A. A is readily reduced

B. A is readily oxidized

C. A^- is readily reduced

D. A^- is readily oxidized.

Answer: D

Watch Video Solution

7. An electrolytic cell contains a solution of Ag_2SO_4 and have platinum electrodes. A current is passed until 1.6gm of O_2 has been liberated at anode. The amount of silver deposited at cathode would be

A. 107.88gm

B. 1.6gm

C. 0.8gm

D. 21.60gm.

Answer: D

Watch Video Solution

8. A certain current liberates $0.5g$ of hydrogen in 2 hours. How many grams of copper can be liberated by the same current flowing for the same time in a copper sulphate solution ?

A. 12.7gm

B. 15.9gm

C. 31.8gm

D. 63.5gm

Answer: A

Watch Video Solution

9. A cell constituted by two electrodes A

$\left(E^{\circ} A/A + 0.35V\right)$ and $B\left(E^{\circ} B/B = -0.42V\right)$

Has value of E°_{Cell} equal to

A. 0.07V

B. 0.77V

C. $0.77V$

D. $-0.07V$.

Answer: B

Watch Video Solution

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

A. Ag

B. Cu

C. Zn

D. Fe.

Answer: C

Watch Video Solution

11. Which of the following isnot a strong electrolyte?

A. NaCl

B. KNO_3

C. NH_4OH

D. $FeSO_4$

Answer: C

Watch Video Solution

12. The conductivity of a strong electrolyte:

A. increases on dilution slightly

B. does not change on dilution

C. decreases on diluton

D. depends on density of electrolyte itself.

Answer: A

Watch Video Solution

13. The amount of electricity that can deposit 108g of silver from silver nitrate solution is

A. 1 ampere

B. 1 coulomb

C. 1 faraday

D. 2 ampere.

Answer: C

Watch Video Solution

14. The standard emf of the cell

$Zn + Cu^{2+} \rightarrow Cu + Zn^{2+}$ is 1.10V at

$25\,^\circ c$ the emf of the cell when 0.1 M Cu^{2+} and 0.1 M Zn^{2+} solution are used will be

A. 1.10V

B. 0.110V

C. $-1.10V$

D. $-0.110V$

Answer: A

Watch Video Solution

15. The standard electrode potential of the half cells are given below.

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

$Fe \rightarrow Fe^{2+} + 2e^- : E^\circ = 0.44V$

The emf of the cell

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

A. $-0.32V$

B. $+0.32V$

C. $+1.20V$

D. $-1.20V$

Answer: B

Watch Video Solution

16. The standard E°_{Red} values of A,B,C are 0.68V, - 2.54V,- 0.50V respectively. The order of their reducing power is

A. $A > B > C$

B. $A > C > B$

C. $C > B > A$

D. $B > C > A$

Answer: D

Watch Video Solution

17. In a galvanic cell .

A. Chemical energy is converted into electricity

B. Chemical energy is converted into heat

C. Electrical energy is converted into heat

D. Electrical energy is converted into chemcial energy.

Answer: C

Watch Video Solution

18. The mass of copper that will be deposited at cathode in electrolysis of $0.2M$ solution of copper sulphate when a quantity of electricity equal to that required to liberate $2.24L$ of hydrogen from $0.1M$ aqueous H_2SO_4 is passed (atomic mass of $Cu = 63.5$) will be

A. 1.59g

B. 3.18g

C. 6.35g

D. 12.70g

Answer: C

Watch Video Solution

19. When $E^{\circ}_{Ag^+/Ag} = 0.8V$ and $E_{Zn^{\circ}2^+./Zn}$

$=$ - $0.76V$. Which of the following is correct?

A. Ag^+ can be reduced by H_2

B. Ag can oxidise H_2 into H^+

C. Zn^{2+} can be reduced by H_2

D. Ag can reduce Zn^{2+} ion.

Answer: A

Watch Video Solution

20. When electricity is passed through molten electrolyte consisting of alumina and cryolite 13.5 g of Al are deposited. The number of faradays of electricity passed must be

A. 2

B. 1.5

C. 1

D. 0.5

Answer: B

Watch Video Solution

21. The electroplating with chromium is underataken because

A. chromium can form alloys with other metals

B. chromium gives a protective and decorative coating to the base metal

C. of high reactivity of chromium metal.

D. None of these

Answer: A

View Text Solution

22. Which of the following is a strong electrolyte?

A. $Ca(NO_3)_2$

B. HCN

C. CH_3COOH

D. NH_4OH

Answer: A

View Text Solution

23. The standard reduction potential of $Li^+/Li, Ba^{2+}/Ba, Na^+/Na$ and Mg^{2+}/Mg. Are -3.05,-2.73,-2.71 and -2.37 volts respectively which one of the following is strongest oxidising agent?

A. Na^+

B. Li^+

C. Ba^{2+}

D. Mg^{2+}

Answer: D

Watch Video Solution

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

A. 4.6

B. 9.2

C. 18.4

D. 0.023

Answer: A

Watch Video Solution

25. Pure water does not conduct electricity because it :

A. has low boiling point

B. is almost unionised

C. is neutral

D. is readily decomposed

Answer: B

Watch Video Solution

26. Which of the following reactions occurs at the anode during the recharging of lead storage battery ?

A. $Pb^{2+} + 2e^{0} \rightarrow Pb$

B. $Pb^{2+} + SO_4^{2-} \rightarrow PbSO_4$

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

D. $PbSO_4 + 2H_2O \rightarrow 2PbO_2 + 4H^{+} + SO_4^{2-} + 2e^{-}$

Answer: D

Watch Video Solution

27. Electrode potentials $\left(E^{\circ}_{\text{red}}\right)$ of 4 element A,B, C,D are -1.36,-0.32,0,-1.26V respectively. The decreasing reactivity order of these elements is

A. A,D,B and C

B. C,B,D and A

C. B,D,C and A

D. C,A,D and B

Answer: B

Watch Video Solution

28. 96500C of electricity liberates from $CuSO_4$ solution.

A. 63.5g of Cu

B. 31.75g of Cu

C. 96500g of Cu

D. 100g of Cu

Answer: B

Watch Video Solution

29. In the cell $Zn\left|Zn^{2+}\right|\left|Cu^{2+}\right|Cu$, the negaitve terminal is

A. Cu

B. Cu^{2+}

C. Zn is cheaper than iron

D. Zn^{2+}

Answer: C

Watch Video Solution

30. Which of the following is the use of electrolysis?

A. Electrorefining

B. Electroplating

C. Both A and B

D. None of the above.

Answer: A

View Text Solution

31. In electroefining of copper a minor percentage of gold accumulates in

A. Anode mud

B. Cathode mud

C. Electrolyte

D. Cathode.

Answer: A

View Text Solution

32. In a solution of $CuSO_4$ how much time will be required to preciitate 2 g copper by 0.5 ampere current?

A. 12157.48sec

B. 102sec

C. 510sec

D. 642sec

Answer: A

Watch Video Solution

33. In the electrolysis of dilute H_2SO_4 using platinum electrode

A. H_2 is liberated at cathode

B. O_2 is produced at cathode

C. Cl_2 is produced at cathode

D. Cl_2 is obtained at anode.

Answer: A

View Text Solution

34. 2.5 faradays of electricity is passed through solution of $CuSO_4$. The number of gram equivalents of c opper depsoited on the cathode would be

A. 1

B. 2

C. 2.5

D. 1.25

Answer: C

Watch Video Solution

35. An unknown metal M displaces nickel from nickel (II) sulphate solution but does not displace magnese from magnese sulphate solution which order represents the correct order of reducing power?

A. $Mn > Ni > M$

B. $Ni > Mn > M$

C. $Mn > M > Ni$

D. $M > Ni > Mn.$

Answer: C

View Text Solution

36. Chlorine cannot displace

A. Fluorine from NaF

B. Iodine from NaI

C. Bromine from NaBr

D. None of these

Answer: A

Watch Video Solution

37. Reaction takes place at anode is

A. ionisation

B. Reduction

C. oxidation

D. hydrolysis.

Answer: C

View Text Solution

38. Reaction that takes place at graphite anode in dry cell is

A. $Zn^{2+} + 2d^{-} \rightarrow Zn(s)$

B. $Zn(s) \rightarrow Zn^{2-} + 2e^{-}$

C. $Mn^{2+} + 2e^{-} \rightarrow Mn(s)$

D. $Mn(s) \rightarrow Mn^{+} + e^{-} + 1.5V$

Answer: B

View Text Solution

39. 96500C electricity is passed through $CuSO_4$ the amount of copper precipitated is

A. 0.25 mole

B. 0.5mole

C. 1.0mole

D. 2.00mole

Answer: B

View Text Solution

40. In the reaction ,

$Cu(s) + 2Ag^{+}(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$, the reduction half cell reaction is

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

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

C. $Ag^{+} + e^{-} \rightarrow Ag$

D. $Ag^{-}e^{-} \rightarrow Ag^{+}$

Answer: C

View Text Solution

41. The molar conductances of $NaCI, HCI$ and CH_3COONa at infinite dilution are $12.45, 426.16$ and $91\text{ohm}^{-1}cm^2\text{hol}^{-1}$ respectively. The molar conductance of CH_3COOH at infinite dilution is .

A. 201.28 $ohm^{-1}cm^2$

B. $390.71ohmcm^2$

C. $698.28 ohm cm^2$

D. $540.48 ohm cm^2$

Answer: B

Watch Video Solution

42. The art of electroplating was given by

A. Faraday

B. Edison

C. Thomas Graham

D. Brugan.

Answer: A

View Text Solution

43. At STP 1.12 litre of H_2 is obtained on flowing a current for 965 seconds in a solution . The value of current is

A. 10

B. 1

C. 1.5

D. 2

Answer: A

View Text Solution

44. A depolariser chloride

A. Sodium Carbonate

B. Lead sulphate

C. Manganese dioxide

D. None of these

Answer: D

View Text Solution

45. The number of coulombs required for the deposition of 107.870 of silver is

A. 96500

B. 48250

C. 193000

D. 10000

Answer: A

Watch Video Solution

46. Electrode potential data are given below:

$Fe^{3+}(aq) + e^{-} \rightarrow Fe^{2+}(aq) : E^{\circ} = +0.77V$

$Al^{3+} + 3e^- \rightarrow Al(s) : E^\circ = -1.66V$

$Br_2(aq) + 2e^- \rightarrow 2Br^-(aq) : E^\circ = +1.08V,$

Based on the data, the reducing power of Fe^{2+} Al and Br^- will increase in the order

A. $Br^- < Fe^{2+} < Al$

B. $Fe^{2+} < Al < Br^-$

C. $Al < Br^- < Fe^{2+}$

D. $Al < Fe^{2+} < \; < Br^-$

Answer: A

Watch Video Solution

47. What will be the weight of deposited silver on passing 965 coulombs of electricity in solution of $AgNO_3$?

A. 1.08g

B. 2.16g

C. 0.54g

D. 0.27g.

Answer: A

Watch Video Solution

48. Mark the false statement

A. A salt bridge is used to eliminate liquid junction potential

B. The Gibbs free energy change , ΔG is related with electromovive force E as $\Delta G = -nFE$

C. Nernst equation for single electrode potential is $E = E^{\circ} - \frac{RT}{nF} \log d_M^{n+}$

D. The efficiency of a hydrogen oxygen fuel cell is 23%

Answer: C

Watch Video Solution

49. For the cell reaction

$$Cu^{2+}\left(C_1, aq.\right) + Zn(s) \Leftrightarrow Zn^{2+}\left(C_2, aq\right) + Cu(s)$$

of an electrochemical cell, the change in free energy (ΔG) of a given temperature is a function of

A. In $\left(C_1\right)$

B. $In\left(C_2/C_1\right)$

C. $In\left(C_1+C_2\right)$

D. $In\left(C_2\right)$

Answer: B

Watch Video Solution

50. Pick out the wrong statement, in electrochemical cell

A. electrons are released at anode

B. cathode is regarded as negative electrode

C. chemical energy is converted into electrical energy

D. salt bridge maintains the electrical neutrality of the solution.

Answer: B

Watch Video Solution

51. Consider the cell reaction :

$$Mg(s) + Cu^{2+}(aq) \rightarrow Cu(s) + Mg^{2+}(aq)$$

If $E^{c-} \cdot_{Mg^{2+} \mid Mg(s)}$ and $E^{c-} \cdot_{Cu^{2+} \mid Cu(s)}$ are -2.37 and $0.34V$, respectively. $E^{c-} \cdot_{cell}$ is

A. $-2.71V$

B. $2.71V$

C. $-2.03V$

D. $2.03V$

Answer: B

Watch Video Solution

52. Prevention of corrosion of iron by Zn coating is called

A. Galvanization

B. Cathodic protection

C. Electrolysis

D. Photoelectrolysis.

Answer: A

Watch Video Solution

53. Fluorine is the best oxidising agent because it has

A. highest electron affinity

B. highest $E^{\circ}_{\text{reduction}}$

C. highest $E^{\circ}_{\text{oxidation}}$

D. lowest electron affinity.

Answer: B

Watch Video Solution

54. The specific conductance of a $0.1NKCl$ solution at $23^{\circ}C$ is $0.012ohm^{-1}cm^{-1}$. The resistance of cell containing the solution at the same tempreature was found to be $55ohm$. The cell constant will be

A. $0.142cm^{-1}$

B. $0.66cm^{-1}$

C. $0.918cm^{-1}$

D. $1.12cm^{-1}$

Answer: B

Watch Video Solution

55. The unit of equivalent conductivity $\left(\Lambda_{eq.}\right)$ are

A. ohm cm

B. $ohm^{-1}cm^{+2}\left(0.66cm^{-1}(\text{g equivalent})^{-1}\right.$

C. $ohmcm^{2}$(g equivalent)

D. Scm^{-2}

Answer: B

Watch Video Solution

56. The standard reduction potnetials of 4 elements are given below. Which of the following will be the most suitable reducing agent?

$I = -3.04V, II \pm 1.90V, III = 0V, IV = 1.90V$

A. I

B. II

C. III

D. IV

Answer: A

View Text Solution

57. The substance having conductivity at room temperature among the following is

A. 0.1N HCl

B. 0.1 N NaCl

C. Graphite

D. Glass

Answer: C

Watch Video Solution

58. Consider the following cell reaction

$Cu(s) + 2Ag^{+}(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$

$E^{\circ}_{\text{cell}} = 0.46V$ By boubling the concentration of Cu^{2+}, E_{cell} is

A. Doubled

B. Halved

C. Unchanged

D. Decreases by small fraction.

Answer: E

Watch Video Solution

59. Best way to prevent rusting of iron is by

A. makin g iron cathode

B. putting it in saline water

C. both of these

D. none of these

Answer: A

Watch Video Solution

60. At infiinite dilution, the aqueous solution of $BaCl_2$. M olar conductivity of Ba^{2+} and Cl^- ions are =127.32 S cm^2 /mol and 76.34S cm^2 /mol respectively what is $\wedge_m^\circ$ for $BaCl_2$ at same dilution?

A. $280Scm^2\text{mol}^{-1}$

B. $330.98Scm^2\text{mol}^{-1}$

C. $90.98Scm^2\text{mol}^{-1}$

D. $203.6Scm^2\text{mol}^{-1}$

Answer: A

View Text Solution

61. The specific conductance of 0-1M NaCl solution is $1.6 \times 10^{-2} ohm^{-1} cm^{-1}$. Its molar conductance in $ohm^{-1} cm^{2} \mathrm{mol}^{-1}$ is

A. 1.06×10^{2}

B. 1.06×10^{3}

C. 1.06×10^{4}

D. 53

Answer: A

View Text Solution

62. The reduction potential of the two half cell reactions (occuring in an electrochemical cell) are

$PbSO_4 + 2e^- \rightarrow Pb + SO_4^{2-} \left(E^\circ = -0.31V\right)$

$Ag^+(aq) + e^- \rightarrow Ag(s) \left(E^\circ = +0.80V\right)$

The fessible reaction will be

A. $Pb^{2+} + 2Ag \rightarrow 2Ag^{+} + Pb$

B. $Pb^{2+} + H_2 \rightarrow 2H^{+} + Pb$

C. $2H^{+} + 2Ag \rightarrow 2Ag^{+} + H_2$

D. $2Ag^{+} + Pb \rightarrow Pb^{2+} + 2Ag$

Answer: D

Watch Video Solution

63. Aluminium displaces hydrogen from acids, but copper does not. A galvanic cell prepared by combining Cu/Cu^{2+} and Al/Al^{3+} has an emf of 2.0V at 298K. If the potential of copper electrode is +0.34V and that of Aluminium electrode is

A. $-2.3V$

B. $+2.34V$

C. $-1.66V$

D. $1.66V.$

Answer: C

View Text Solution

64. The quantitiy of electricity required to liberate 112 cm^3 of hydrogen at STP from acidified water is

A. $965C$

B. $1 Faraday$

C. $0.1F$

D. $96500C.$

Answer: A

Watch Video Solution

65. Calculate the amount of charge flowing in 2 minutes in a wire of resistance 10Ω when a potential difference of 20 V is applied between its ends

A. 120C

B. 240C

C. 20C

D. 4C

Answer: B

Watch Video Solution

66. Standard electrode potentials are

$Fe^{2+}/Fe, E^{\circ} = -0.44V$

$Fe^{3+}/Fe^{2+}, E^{\circ} = +0.77V$

If Fe^{3+}, Fe^{2+}, and Fe block are kept together, then

A. Fe^{3+} increases

B. Fe^{3+} decreases

C. Fe^{2+}/Fe^{3+} remains unchanged

D. Fe^{2+} decreases.

Answer: B

Watch Video Solution

67. Molar conductivity of a solutions is $1.26 \times 10^2 \Omega^{-1} cm^2 \text{mol}^{-1}$ its molarity is 0.01. its specific conductivity will be

A. 1.26×10^{-25}

B. 1.26×10^{-3}

C. 1.26×10^{-4}

D. 0.0063

Answer: B

Watch Video Solution

68. The equivalent conductivity of $0.1M$ weak acid is 100 times less than that at infinite dilution. The degree of dissociation of weak electrolyte at $0.1M$ is.

A. 1 00

B. 10

C. 0.01

D. 0.001

Answer: C

Watch Video Solution

69. Molar ionic conductivites of a bivalent electrolyte are 57 and 73. the molar conductivity of the solution will be

A. $130Scm^2\text{mol}^{-1}$

B. $65.\ Scm^2\text{mol}^{-1}$

C. $260 Scm^2 \mathrm{mol}^{-1}$

D. $187 Scm^2 \mathrm{mol}^{-1}$

Answer: A

Watch Video Solution

70. On passing 0.1 faraday of electricity through fused sodium chloride, the amount of chlorine liberated is (At. Mass of $Cl = 35.45$)

A. 35.45g

B. 70.9g

C. 3.545g

D. 17.77g

Answer: C

Watch Video Solution

71. The standard EMF of a Daniell cell is 1.10 volt. The maximum electrical work obtained from the Daniell cell is .

A. 212.3kJ

B. 175.4kJ

C. 106.15kJ

D. 53.07kJ

Answer: A

Watch Video Solution

72. For the reaction, $C + O_2 \rightarrow CO_2, \Delta H = -393J$

$2Zn + O_2 \rightarrow 2ZnO, \Delta H = -412J$

A. carbon can oxidise zinc

B. oxidation of carbon is not possible

C. oxidation of zinc is not fessible

D. zinc can oxidise carbon.

Answer: A

Watch Video Solution

73. When the sample of copper with the zinc impurity is to be purified by electrolysis, the appropriate electrodes are

A.

Cathode	Anode
Pure zinc	Pure copper

B.

Cathode	Anode
Impure sample	Pure copper

C.

Cathode	Anode
Impure zinc	Impure sample

D.

Cathode	Anode
Pure copper	Impure sample

Answer: D

Watch Video Solution

74. Which of the following reaction is possible at the angle?

A. $2Cr^{2+} + 7H_2O \rightarrow Cr_2O_7^{2-} + 14H^+$

B. $F_2 \rightarrow 2F^-$

C. $\frac{1}{2}O_2 + 3H^+ \rightarrow H_2O$

D. None of these

Answer: A

Watch Video Solution

75. What will be the emf for the given cell ?

$$Pt\left|H_2\left(g, P_1\right)\right|H^+(aq)\left|H_2\left(g, P_2\right)\right|Pt$$

A. $\frac{RT}{F}In\frac{p_1}{p_2}$

B. $\frac{RT}{2F}In\frac{p_1}{p_2}$

C. $\frac{RT}{F}In\frac{p_1}{p_2}$

D. None of these.

Answer: B

Watch Video Solution

76. Conductivity (unit siemens) is directly propotional to area of the vessel and the concentration of the solution it and is inversely proportional to the length of the vessel then the unit of constant of proportionality is

A. $Sm\text{mol}^{-1}$

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

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

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

Answer: A

Watch Video Solution

77. At anode in the electrolysis of fused $NaCI$:

A. Na^{+} is oxidised

B. Cl^{-} is oxidised

C. Cl is reduced

D. Na is reduced

Answer: B

Watch Video Solution

78. The reference calomel electrode is made from which of the following ?

A. $ZnCl_2$

B. $CuSO_4$

C. $HgCl_2$

D. Hg_2Cl_2.

Answer: D

Watch Video Solution

79. At cathode, the electrolysis of aqueous Na_3SO_4 gives

A. Na

B. H_2

C. SO_3

D. SO_2

Answer: B

View Text Solution

80. A smuggler could not carry gold by chemicaly depositing iron on the gold surface since

A. gold is denser

B. iron rusts

C. gold has higher reduction potential than iron

D. gold has lower reduction potential thatn iron.

Answer: C

Watch Video Solution

81. The relationship between standard reduction potential of a cell and equilibrium constant is shown by

A. $E^{\circ}_{\text{cell}} = \frac{n}{0.059}\log k_c$

B. $E^{\circ}_{\text{cell}} = \frac{0.059}{n}\log k_c$

C. $E^{\circ}_{\text{cell}} = 0.059 n \log k_c$

D. $E^{\circ}_{\text{cell}} = \frac{\log k_c}{n}$

Answer: B

Watch Video Solution

82. Zn gives H_2 gas with H_2SO_4 and HCl but not with HNO_3 because

A. zinc acts as oxidising agent when reacts with HNO_3

B. HNO_3 is a weaker acid than H_2SO_4 and HCl

C. in electrochemical series zinc is above hydrogen

D. NO_3^- is reduced in preference to hydronium ion.

Answer: D

Watch Video Solution

83. In electrolysis of $NaCl$ when Pt electrode is taken H_2 is liberated at cathode while Hg cathode it forms sodium amalgam because

A. Hg ismore inert than Pt

B. More voltage is required to reduce H^+ at Hg than at Pt.

C. Na is dissolved in Hg while it does not dissolve in Pt

D. Conc. Of H^+ ions is larger when Pt electrode is taken.

Answer: B

Watch Video Solution

84. Which reactions is not fesible

A. $2KI + Br_2 \rightarrow 2KBr + I_2$

B. $2KBr + I_2 \rightarrow 2KI + Br_2$

C. $2KBr + Cl_2 \rightarrow 2KCl + Br_2$

D. $2H_2O + 2F_2 \rightarrow 4HF + O_2$.

Answer: B

Watch Video Solution

85. Corrosion is basically a

A. altered reaction in presence of H_2O

B. electrochemical phenomenon

C. interaction

D. union between two light metals and a heavy metal

Answer: B

View Text Solution

86. The unit of electrical conductivity is

A. $ohncm^{-1}$

B. $ohmcm^{-2}$

C. $ohm^{-1}cm$

D. $ohm^{-1}cm^{-1}$

Answer: D

Watch Video Solution

87. The emf of a Daniell cell at $298K$ is E_1

$Zn \left| ZnSO_4(0.01M) \right| \left| CuSO_4(1.0M) \right| Cu$

When the concentration of $ZNSO_4$ is $1.0M$ and that of $CuSO_4$ is $0.01M$, the emf changed to E_2. What is the relationship between E_1 and $E(2)$?

A. $E_2 = 0 = E_1$

B. $E_1 > E_2$

C. $E_1 > E_2$

D. $E_1 = E_2$.

Answer: B

Watch Video Solution

88. On the basis of information available from the reaction

$\frac{4}{3}Al + O_2 \rightarrow \frac{2}{3}Al_2O_3, \Delta G = -827kJmol^{-1}$ of O_2, the minimum emf required to carry out of the electrolysis of Al_2O_3 is $\left(F = 96, 500Cmol^{-1}\right)$

A. 8.56V

B. 2.14V

C. 4.28V

D. 6.42V

Answer: B

Watch Video Solution

89. When, during electrolysis of a solution of $AgNO_3 9650$ colombs of charge pass through the electroplating path, the mass of silver deposited on the cathode will be:

A. 1.08g

B. 10.8g

C. 21.6g

D. 108g.

Answer: B

Watch Video Solution

90. For the redox reaction:

$Zn(s) + Cu^{2+}(0.1M) \rightarrow Zn^{2+}(1M) + Cu(s)$ taking place in a cell,

$E^{\circ}_{cell} is 1.10$ volt. E_{cell} for the cell will be $\left(2.303\frac{RT}{F} = 0l.0591\right)$

A. 2.14volt

B. 1.80volt

C. 1.07volt

D. 0.82volt

Answer: C

Watch Video Solution

91. For a cell reaction involvinig a two electron change, the standard emf of the cell is found to be 0.295 V at 25° C. The equilibrium constant of the reaction at $25^{\circ}C$ will be:

A. 1×10^{-10}

B. 29.5×10^{-2}

C. 10

D. 1×10^{10}

Answer: D

Watch Video Solution

92. Stadard reduction electrode potentials of three metals A,B and C are respectively $+0.5V$, $-3.0V$ and $-1.2V$. The reducing powers of these metals are:

A. $B > C > A$

B. $A > B > C$

C. $C > B > A$

D. $A > C > B$.

Answer: A

Watch Video Solution

93. Serveral blocks of magnesium are fixed to the bottom of a ship to

A. keep away the sharks

B. make the ship lighter

C. prevent action of water and salt

D. prevent puncturing by under-sea rocks.

Answer: C

Watch Video Solution

94. The standard reduction potentials of Zn and Ag in water at 298K are.

$Zn^{2+} + 2e^{-} \Leftrightarrow Zn, E^{\circ} = -0.76V$ and

$Ag^{+} + e^{-} \Leftrightarrow Ag : E^{\circ} = +0.80V$

Which of the following reactions take place?

A. $Zn^{2+}(aq) + Ag^{+}(aq) \rightarrow Zn(s) + Ag(s)$

B. $Zn(s) + Ag(s) \rightarrow Z^{2+}(aq) + Ag^{+}(aq)$

C. $Zn^{2+}(aq) + 2Ag(s) \rightarrow 2Ag^{+}(aq) + Zn(s)$

D. $Zn(s) + 2Ag^{+}(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$

Answer: D

Watch Video Solution

95. Which of the following reaction is reaction is used to make a fuel cell .

A. $Cd(s) + 2Ni(OH)_3(s) \rightarrow CdO(s) + 2Ni(OH)_2 + H_2O(l)$

B. $Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \rightarrow 2PbSO_4(s) + 2H_2O(l)$

C. $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

D. $2Fe(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{2+}(aq) + 2H_2O(l)$

Answer: C

Watch Video Solution

96. The reaction

$$\frac{1}{2}H_2(g) + AgCl(s) \Leftrightarrow H^+(aq) + Cl^-(aq) + Ag(s)$$

occurs in the galvanic cell

A. $Pt\left|H_2(g)\right|KCl_{(\text{ soln. })} \mid |AgCl(s)|Ag$

B. $Pt\left|H_2(g)\right|HCl_{(\text{soln. })} \mid |AgCl(s)|Ag$

C. $Pt\left|H_2(g)\right|HCl_{(\text{soln})} \mid \left|AgNO_3\right|Ag$

D. $Ag|AgCl(s)|KCl_{(\text{soln})}\left|H_2(g)\right|Pt.$

Answer: B

Watch Video Solution

97. Same amount of electric current is passed through solutions of $AgNO_3$ and HCl. If 1.08 g of silver is obtained in the first case, the amount of hydrogen liberated at S.T .P. in the second case is:

A. $112cm^3$

B. $22400cm^3$

C. $224cm^3$

D. $1.008g$.

Answer: A

Watch Video Solution

98. Time required to deposit one milli"mole" of aluminium metal by the passage of 9.65 amp through aqueous solution of aluminium ion is:

A. 30s

B. 10s

C. 30,000s

D. 10,000s.

Answer: A

Watch Video Solution

99. Which is correct for cell reaction?

A. $Zn + 2Ag^+ \rightarrow Zn^{2+} + 2Ag$

B. $2Ag + Zn^{2+} \rightarrow 2Ag^+ + Zn$

C. Both

D. None

Answer: A

Watch Video Solution

100. During electrolysis of NaOH

A. H_2 is liberarted at cathode

B. O_2 is liberated at cathode

C. H_2 is liberated at anode

D. O_2 is liberated at anode.

Answer: D

View Text Solution

101. Which of the following (1M) conducts more electricity?

A. sulphuric acid

B. boric acid

C. nitric acid

D. aluminium.

Answer: A

View Text Solution

102. Galvanization of iron denotes coating with ....

A. zinc

B. tin

C. copper

D. aluminium

Answer: A

Watch Video Solution

103. The standard e.m.f. for the cell reaction.

$2Cu^{+}(aq) \rightarrow Cu(s) + Cu^{2+}(aq)$ is +0.36 V at 298K. The equilibrium constant of the reaction is

A. 5×10^{6}

B. 1.4×10^{12}

C. 7.4×10^{12}

D. 1.3×10^{6}

Answer: D

Watch Video Solution

104. Ionic mobility of Ag^{+} at inifinite dilution is.

$\left(\lambda^{0}_{Ag^{+}} = 5 \times 10^{-3} ohm^{-1} m^{2} eq^{-1}\right)$

A. 5.2×10^{-8}

B. 2.4×10^{-8}

C. 1.52×10^{-8}

D. 8.25×10^{-8}

Answer: A

View Text Solution

105. The cell reaction of the galvanic cell:

$Cu(s)\left|Cu^{2+}(aq)\right|\left|Hg^{2+}(aq)\right|Hg(l)$ is

A. $Hg + Cu^{2+} \rightarrow Hg^{2+} + Cu$

B. $Hg + Cu^{2+} \rightarrow Cu^{+} + Hg^{+}$

C. $Cu + Hg \rightarrow CuHg$

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

Answer: D

Watch Video Solution

106. If the standard electrode poten tial of Cu^{2+}/Cu electrode is 0.34V. What is the electrode potential of 0.01 M concentration of Cu^{2+}?

A. 0.399V

B. 0.281V

C. 0.222V

D. 0.176V

Answer: B

Watch Video Solution

107. Which one of the following material conducts electricity?

A. diamond

B. crystalline sodium chloride

C. barium sulphate

D. fused potassium chloride

Answer: D

Watch Video Solution

108. An electric c urrent is passed through silver voltameter connected to a water voltmeter. The cathode of the silver voltameter is 0.108g more at the end of the electrolysis. The volume of oxygen evolved at STP:

A. $56cm^3$

B. $550cm^3$

C. $5.6cm^3$

D. $11.2cm^3$

Answer: C

Watch Video Solution

109. Specific conductance of 0.1M nitric acid is $6.3 \times 10^{-2} ohm^{-1} cm^{-1}$. The molar conductance of the solution is:

A. $630 ohm^{-1} cm^{2} \text{mol}^{-1}$

B. $315 ohm^{-1} cm^{2} \text{mol}^{-1}$

C. $100 ohm^{-1} cm^{2} \text{mol}^{-1}$

D. $6.300 ohm^{-1} cm^{2} \text{mol}^{-1}$

Answer: A

Watch Video Solution

110. The standard reduction potential for two reactions are given below

$AgCl(s) + e^{-} \rightarrow Ag(s) + Cl^{-}(aq), E^{\circ} = 0.22V$

$Ag^{+}(aq) + e^{-} \rightarrow Ag(s), E^{\circ} = 0.80V$

The solubility product of AgCl under standard conditions of temperature is given by

A. 1.6×10^{-5}

B. 1.5×10^{-8}

C. 3.2×10^{-10}

D. 1.5×10^{-10}

Answer: D

Watch Video Solution

111. The standard rectuion potentials for two half-cell reactions are given below

$Cd^{2+}(aq) + 2e^{-} \rightarrow Cd(s), E^{\circ} = -0.40V$

$Ag^{+}(aq) + e^{-} \rightarrow Ag(s), E^{\circ} = 0.80V$

The standard free energy change for the reaction

$2Ag^{+}(aq) + Cd(s) \rightarrow 2Ag(s) + Cd^{2+}(aq)$ is given by

A. $115.8kJ$

B. $-115.8kJ$

C. $-231.6kJ$

D. $231.6kJ$

Answer: C

Watch Video Solution

112. An aqueous solution containing one mole per litre of each $Cu\left(NO_3\right)_2, AgNO_3, Hg\left(NO_3\right)_2$ is being electrolysed using inert electrodes. The values of standard electrdoe potential in volts (reduction potential) are

$$Ag\left|Ag^{+}\right. = +0.802 Hg\left|Hg^{2+}\right. = +0.79$$

$$Cu\left|Cu^{2+}\right. = +0.34 Mg\left|Mg^{2+}\right. = -2.37$$

With increasing voltage, the sequence of deposition of metals on cathode will be

A. Ag, Hg, Cu, Mg

B. Mg, Cu, Hg, Ag

C. Ag, Hg, Cu

D. Cu, Hg, Ag

Answer: C

Watch Video Solution

113. An electric current is passed through silver nitrated solution using silver electrodes . $10.79g$ of silver qas found to be deposited on the cathode fi the same amount of electricity is passed through copper sulphate solutin using copper electrodes. the weihgt of copper deposited on teh cathode is .

A. 6.4g

B. 2.3g

C. 12.8g

D. 3.2g

Answer: D

Watch Video Solution

114. Aluminium displaces hydrogen from dilute HCl whereas silver does not. The e.m.f. of a cell prepared by combining Al/Al^{3+} and Ag/Ag^{+} is 2.46V. The reduction potential of silver electrode is +0.80V. The reduction potential of aluminium electrode is

A. $+1.66V$

B. $-3.26V$

C. $3.26V$

D. $-1.66V$

Answer: D

Watch Video Solution

115. E° for the cell

$Zn(s)\left|Zn^{2+}(aq)\right|Cu^{2+}(aq) \mid Cu(s)$ is 1.1V at $25^{\circ}C$ the equilibrium constant for the cell reaction is about

A. 10^{-37}

B. 10^{37}

C. 10^{73}

D. 10^{73}

Answer: B

Watch Video Solution

116. The standard EMF of a galvanic cell involving cell reaction with $n = 2$ is found to be $0.295V$ at $25\,^{\circ}C$. The equilibrium constant of the reaction would be

A. 1.0×10^{10}

B. 2.0×10^{11}

C. 4.0×10^{12}

D. 1.0×10^2

Answer: A

Watch Video Solution

117. The ionic conductance of the following cations in a given concentration is in the order

A. $Li^+ < Na^+ < K^+ < Rb^+$

B. $Li^+ > Na^+ > K^+ > Rb^+$

C. $Li^+ < Na^+ > K^+ > Rb^+$

D. $Li^+ = Na^+ < K^+ < Rb^+$

Answer: A

Watch Video Solution

118. $\lambda_{ClCH_2COONa} = 224 ohm^{-1} cm^2$ gm eq^{-1}

$\lambda_{NaCl} = 38.2 ohm^{-1} cm^2$ gm $eq^{-1} \lambda_{HCl}$=203 $ohm^{-1} cm^2 gmeq^{-1}$, what is the value of λ_{ClCH_2COOH}?

A. $288.5 ohm^{-1} cm^2 gmeq^{-1}$

B. $289.5 ohm^{-1} ohm^{-1} cm^2 gmeq^{-1}$

C. $388.8 ohm^{-1} cm^2 gmeq^{-1}$

D. $59.5 ohm^{-1} cm^2 gmeq^{-1}$

Answer: C

View Text Solution

119. For spontaneity of a cell, which is correct?

A. $\Delta G = 0. \Delta E = 0$

B. $\Delta G = -ve, \Delta E = 0$

C. $\Delta G = +ve, \Delta E = 0$

D. $\Delta G = -ve$

Answer: D

View Text Solution

120. The hydrogen electrdoe is dipped in a solution of pH=3 at $25^{\circ}C$ the potential of the cell would be (the value of 2.303 RT/F is 0.059 V)

A. 0.177V

B. 0.087V

C. $-0.177V$

D. $0.059V$

Answer: C

View Text Solution

121. Specific conductivity of a solution

A. increases with dilution

B. decreases with dilution

C. remains unchanged with dilution

D. depends on mass of electrolyte.

Answer: B

View Text Solution

122. Which of the following statement is true for the electrochemical Daniell cell ?

A. Electrons flow from copper electrode to zinc electrode

B. Current flows from zinc electrode to copper electrode

C. Cations move toward copper electrode

D. Cations move toward zinc electrode.

Answer: C

Watch Video Solution

123. In the galvanic cell, flow of electrons is from

A. anode to cathode through the solution

B. cathode to anode through the solution

C. anode to cathode through the external circuit

D. cathode to anode through the external circuit.

Answer: C

Watch Video Solution

124. If three faradyas of electricity is passed through the solutions of $AgNO_3$, $CuSO_4$ and $AuCl_3$. The molar ratio of the cations deposited at the cathodes will be

A. $1:1:1$

B. $1:2:3$

C. $3:2:1$

D. $6:3:2$

Answer: D

View Text Solution

125. $E^\circ Cu = 0.34V, E^\circ_{Zn}$ = -0.76V. A Daniell cell contains 0.1M $ZnSO_4$ solution and 0.01 M $CuSO_4$ solution at its electrodes. E.M.F. of the cell is

A. 1.10V

B. 1.04V

C. 1.16V

D. 1.07V

Answer: D

View Text Solution

126. In a hydrogen-oxygen fuel cell, combustion of hydrogen occurs to :

A. generate heat

B. remove absorbed oxygen from electrode surfaces

C. produce high purity water

D. Create potential diffrence between two electrodes.

Answer: D

Watch Video Solution

127. Consider the following E° values

$E^{\circ}_{Fe^{3+}/Fe^{2+}} = +0.77V, E^{\circ}_{Sn^{2+}/Sn} = -0.14V$ Under standard conditions, the potential for the reaction

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

A. $1.68V$

B. $0.63V$

C. $0.91V$

D. $1.40V$

Answer: C

View Text Solution

128. The standard e.m.f. of a cell involving one electron charge is found to be 0.591V at $25^{\circ}C$ the equilibrium constant of the reaction is (F=96500C mol^{-1}:R=8.314 $JK^{-1}\text{mol}^{-1}$)

A. 1.0×10^{1}

B. 1.0×10^{30}

C. 1.0×10^{10}

D. 1.0×10^{5}

Answer: C

View Text Solution

129. The limmiting molar conductivites $\wedge^{\circ}$ for $NaCl_2$ Kbr and KCl are 126,152 and 150 S cm^2 respectively the $\wedge^{\circ}$ for NaBr is

A. $128Scm^2\text{mol}^{-1}$

B. $302Scm^2\text{mol}^{-1}$

C. $278Scm^2\text{mol}^{-1}$

D. $176Scm^2\text{mol}^{-1}$

Answer: A

View Text Solution

130. In a cell that utilizes the reactions.

$Zn(s) + 2H^{+}(aq) \rightarrow Zn^{2+}(aq) + H_2(g)$

addition of H_2SO_4 to cathode compartment, will

A. lower the E and shift equilibrium to the left

B. increase the E and shift equilibrium to the left

C. increase the E and shift equilibrium to the right

D. lower the E and shift equilibrium to the right.

Answer: C

Watch Video Solution

131. The $E^{\circ}_{M^{3+}/M^{2+}}$ values for Cr, Mn, Fe and Co are -0.41,+1.57,+0.7and +1.97V respectively. For which one of these metals the change in oxidation state from +2 to +3 is easiest?

A. Cr

B. Co

C. Fe

D. Mn.

Answer: A

View Text Solution

132. What is the quantity of electricity (in columbs) required to deposit all the silver from 250mL of 1M $AgNO_3$ solution ? (Ag=10R)

A. 2412.5

B. 24125

C. 4825

D. 28250

Answer: B

View Text Solution

133. $4.5g$ of aluminium (at mass $27u$) is deposited at cathode from Al^{3+} solution by a certain quantity of electric charge. The volume of hydrogen gas produced at STP from H^+ ions in solution by the same quantity of electric charge will be:

A. 44.8L

B. 11.2L

C. 22.4L

D. 5. 6L

Answer: D

Watch Video Solution

134. Aluminium oxide may be electrolysed at $1000\,^{\circ}$C to furnish aluminium metal (Atomic mass = 27 amu, 1 Faraday = 96500 Coulomb). The cathode reaction is $Al^{3+} + 3e^- \rightarrow Al$. To prepare 5.12 kg of aluminium metal by this method would require:

A. $5.49 \times 10^4 C$ of electricity

B. $5.49 \times 10^1 C$ of electricity

C. $5.49 \times 10^7 C$ of electricity

D. $1.83 \times 10^7 C$ of electricity.

Answer: C

Watch Video Solution

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

A. 0.1 M fluoroacetic acid

B. 0.1 M difluoroacetic acid

C. 0.1M acetic acid.

D. 0.1M chl oroacetic acid.

Answer: B

Watch Video Solution

136.

Electrolyte	KCl	KNO_3	HCl	NaOAc	NaCl
$\wedge^{\infty}(S\,cm^2\,mol^{-1})$	149·9	145·0	426·2	91·0	126·5

Calculate $\overset{\infty}{\wedge}HOAc$ using appropriate molar conductances of the electrolytes listed above at infinite dilution in water at $25^{\circ}C$

A. 390.7

B. 217.5

C. 517.2

D. 552.7

Answer: A

View Text Solution

137. How many coulombs are required for the reduction of 1 mol of MnO_4^- to Mn^{2+}?

A. $96500C$

B. $1.93 \times 10^5 C$

C. $4.83 \times 10^5 C$

D. $9.65 \times 10^6 C$.

Answer: C

Watch Video Solution

138. The chemical reaction

$2AgCl_{(\text{fused})} + H_{2(g)} \rightarrow 2HCl_{(aq)} + 2Ag_{(s)}$

taking place in a galvanic cell is represented by the notation

A. $Pt(s)\left|H_2(g), 1\text{bar}\right||1MKCl(aq)|AgCl(s) \mid Ag(s)$

B. $Pt(s)\left|H_2(g), 1\text{bar}\right|1MHCl\left(aq\left(\mid \right|1MAg^+(aq)\right|Ag(s)$

C. $Pt(s)\left|H_2(g), 1\text{bar}\right|1MHCl(aq) \mid |AgCl(s)|Ag(s)$

D. $Pt(s)\left|H_2(g), 1\text{bar}\right|1MHCl(aq) \mid |Ag(s)|AgCl(s)$.

Answer: C

Watch Video Solution

139. The conductivity of 0.001 M acetic acid is $5 \times 10^{-5} Scm^{-1}$ and $\Lambda(\circ)$ is 390.5 $Scm^2\text{mol}^{-1}$ then the calculated value of dissociation c onstnat of acetic acid would be

A. 81.78×10^{-4}

B. 81.78×10^{-5}

C. 18.78×10^{-6}

D. 18.78×10^{-5}

Answer: C

Watch Video Solution

140. The electrical resistance of a column of 0.04M NaOH solution of diameter 1.2 cm and length 50cm is $5.55 \times 10^3 ohm$, the resistivity of the column would be

A. 125.47ohm cm

B. 120.47ohmcm

C. 102,47 ohm cm

D. 12.547ohm cm.

Answer: A

Watch Video Solution

141. In electrolysis of dilute H_2SO_4 what is liberated at anode?

A. H_2

B. SO_4^{2-}

C. SO_2

D. O_2.

Answer: D

Watch Video Solution

142. When an electric cell is charged then

A. voltage of cell increases

B. electrolyte of cell dilutes.

C. resistance of cell increase

D. None of these.

Answer: A

View Text Solution

143. The half cell reaction for rusting of iron are:

$$2H^{+} + 2e^{-} + \frac{1}{2}O_2 \rightarrow H_2O(l), E^{\circ} = +1.23V$$

$$Fe^{2+} + 2e^{-} \rightarrow Fe(s), E^{\circ} = -0.44V$$

ΔG° (in KJ) for the reaction is

A. -76

B. -322

C. -122

D. -176

Answer: B

Watch Video Solution

144. For a spontaneous reaction, $\Delta G,$ equilibrium constant (K) and E°_{cell} will be respectively:

A. $-ve, \ > 1, \ +ve$

B. $+ve, \ > 1, \ + ev$

C. $-ve, \ < 1, \ -ve$

D. $-ve, \ > 1, \ -ve$

Answer: A

Watch Video Solution

145. $4.5g$ of aluminium (at mass $27u$) is deposited at cathode from Al^{3+} solution by a certain quantity of electric charge. The volume of hydrogen gas produced at STP from H^{+} ions in solution by the same quantity of electric charge will be:

A. 44.8L

B. 11.2L

C. 22.4L

D. 5. 6L

Answer: D

Watch Video Solution

146. The volume of H_2 gas at NTP obtained by passing 4 amperes through acidified H_2O for 30 minutes is

A. 0.836L

B. 0.0432L

C. 0.1672L

D. 5.6L

Answer: A

Watch Video Solution

147. If equivalent conductance of 1 M benzoic acid is 12.8 $ohm^{-1}cm^2$ and if the conductance of benzoic ion and H^+ ion are 42 and 288.42 ohm^{-1}

respectively, its degree of dissociation is

A. 0.39

B. 0.039

C. 0.0035

D. 0.00039

Answer: B

View Text Solution

148. If Zn^{2+}/Zn electrode is diluted 100 times, then the charge in reduction potential is

A. increase of 59mV

B. decrease of 59mV

C. increase of 25.5mV

D. decrease of 2.95V

Answer: B

Watch Video Solution

149. When a quantity of electricity is passed through $CuSO_4$ solution 0.16 g of copper gets deposited if the same quantity of electricity is passed through acidullated water, then the volume of H_2 gas liberated at S.T.P. will be (Given at wt. of Cu=64)

A. $4.0cm^3$

B. $56cm^3$

C. $604cm^3$

D. $8.0cm^3$

Answer: B

View Text Solution

150. Which of the following will increase the voltage of the cell represented by the equation

$Cu(s) + 2Ag^{+}(aq) \Leftrightarrow Cu^{2+}(aq) + 2Ag(s)$

A. increase in the dimension of Cu electrode

B. increase in the dimension of Ag electrode

C. increase in the concentration of Cu^{2+} ion

D. incrase in the concentration of Ag^{+} ions

Answer: D

View Text Solution

151. Which of the following statements are correct concerning redox properties?

(i) A metal M for which E° for the half cell reaction $M^{n+} + \text{ne}^{-} \Leftrightarrow M$ is very negative will be a good reducing agent.

(ii) The oxidizing power of the halogen decreases from chlorine to iodine.

(iii) The reducing power of hydrogen halides increases from hydrogen chloride to hydrogen iodide.

A. i,ii and iii

B. i and ii

C. i only

D. ii and iii only

Answer: A

Watch Video Solution

152. The equivalent conductances at infinite dilution of HCl and NaCl are 426.15 and 126.15 mho $cm^2 geq^{-1}$ respectively. It can be said that the mobility of :

A. H^+ ions is much more than that of Cl^- ions

B. Cl^- ions is much more than that of H^+ ions

C. H^+ ions is much more than that of Na^+ ions

D. Na^{+} ions is much more than that of H^{+} ions

Answer: C

Watch Video Solution

153. The molecular conductivity of strong electrolyte

A. increases lineraly with concentration

B. increases linearly with concentration in a linear fashion

C. decreases lineraly with concentration

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

Answer: D

View Text Solution

154. Which one of the following ions has highest limiting molar conductivity?

A. Na^{+}

B. Mg^{2+}

C. K^{+}

D. Ca^{2+}

Answer: D

Watch Video Solution

155. What current is to be passed for 0.25 sec for deposition of certain weight of metal which is equal to its electrochemical equivalent ?

A. 4A

B. 100A

C. 200A

D. 2A

Answer: A

Watch Video Solution

156. In an exper iment 0.04F was passed through 400mL of 1 M solution of NaCl. What would be the pH of the solution after electrolysis?

A. 8

B. 10

C. 13

D. 6

Answer: C

Watch Video Solution

157. When a strip of copper is dipped in a solution of ferrous sulphate.

A. Iron is dpeosited on the copper strip

B. Copper is precipitated

C. Copper dissolves

D. no reaction occurs.

Answer: D

Watch Video Solution

158. If the molar conductance values of Ca^{2+} and Cl^{-} at infinite dilution are respectively $118.88 \times 10^{-4} m^2$ mho mol^{-1} and $77.33 \times 10^{-4} m^2$ mho mol^{-1} then that of $CaCl_2$ is :

(in m^2 mho mol^{-1})

A. 118.88×10^{-4}

B. 154.66×10^{-4}

C. 273.54×10^{-4}

D. 196.21×10^{-4}

Answer: C

Watch Video Solution

159. An alloy of Pb-Ag weighing 1.08 g was dissolved in dilute HNO_3 and the volume made to 100 mL. A silver electrode was depped in the solution and the emf of the cell set-up

$Pt(s), H_2(g) \mid H^+(1M) \parallel Ag^+(aq.) \mid Ag(s)$ was 0.62 V. If E°_{cell} is 0.80V, what is teh precentage of Ag in the alloy ?

(At $25^{\circ} C, RT/F = 0.60$)

A. 25

B. 2.5

C. 10

D. 1

Answer: D

Watch Video Solution

160. $Ag(s)\left|Ag^{+}(aq)(0.01M)\right|\left|Ag^{+}(aq)(0.1M)\right|Ag(s)E^{\circ} \mid Ag(s)Ag^{\circ}_{(aq)} = 0.80$ volt

A. Cell cannot function as anode and cathode are of the same material

B. $E_{\text{cell}} = 0.0591V$

C. $E_{\text{cell}} = 0.80V$

D. $E_{\text{cell}} = 0.0296V$

Answer: B

View Text Solution

161. Which of the following electrolytic solutions has the least specific conductance?

A. 2N

B. 0.002N

C. 0.02N

D. 0.2N

Answer: B

Watch Video Solution

162. The amount of substance liberated when 1 ampere of current is passed for 1 second through an electrolytic solution is called ....

A. Equivalent mass

B. Molecular mass

C. Electrochemcial equivalent

D. Specific equivalent

Answer: C

Watch Video Solution

163. The standard electrode potential for the half cell reactions are

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

$Fe^{2+} + 2e^- \rightarrow Fe, E^\circ = -0.44V$

The EMF of the cell reaction

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

A. $-0.32V$

B. $-1.20V$

C. $+1.20V$

D. $+0.32V$

Answer: D

View Text Solution

164. Calculate Λ_m^{∞} for acetic acid, given,

$\Lambda_m^{\infty}(HCl) = 426\Omega^{-1}cm^2mol^{-1}, \Lambda_m^{\infty}(NaCl) = 126\Omega^{-1}cm^2mol^{-1}$,

$\Lambda_m^{\infty}(CHCOONa) = 91\Omega^{-1}cm^2mol^{-1}$

A. 481.5

B. 390.5

C. 299.5

D. 516.9

Answer: B

Watch Video Solution

165. A gas X at 1 atm is bubbled through a solution containing a mixture of 1M Y and 1MZ ions at $25^{\circ}C$ if the reduction potential of $Z > Y > X$, then

A. Y will oxidise X but not Z

B. Y will oxidise both X and Z

C. Y will oxidise Z but not X

D. Y will reduce both X and Z.

Answer: A

View Text Solution

166. The potential of the cell for the reaction $M(s) + 2H^{+}(1M) \rightarrow H_2(g)(1\text{atm}) + M^{2+}(0.1M)$ is 1.500V the standard reduction potential for M^{2+}/M couple is

A. 0.1470V

B. 1.470V

C. $-1.47V$

D. none of these

Answer: C

View Text Solution

167. One Faraday of electricity is pa ssed through molten Al_2O_3, aqeusous solution of $CuSO_4$ and molten NaCl taken in three different electrolytic cells connected in seris. The mole ratio of Al, Cu,Na deposted at the respective cathode is

A. $2:3:6$

B. $6:2:3$

C. $6:3:2$

D. $1:2:3$

Answer: A

Watch Video Solution

168. How many moles of Pr may be deposited on the cathode when 0.80F of electricity is passed through 1.0M solution of Pt^{4+}?

A. 1.0mol

B. 0.20mol

C. 0.4mol

D. 0.80mol

Answer: B

Watch Video Solution

169. Consider the following four electrodes:

$A = Cu^{2+}(0.0001M)/Cu_{(s)}$

$B = Cu^{2+}(0.1M)/Cu_{(s)}$

$C = Cu^{2+}(0.01M)/Cu_{(s)}$

$D = Cu^{2+}(0.001M)/Cu_{(s)}$

If the standard reduction potential of Cu^{+2}/Cu is $+0.34V$, the reduction potentials (in volts) of the above electrodes follow the order

A. $P > S > R > Q$

B. $S > R > Q > P$

C. $R > \quad > R > P$

D. $Q > R > S > P$

Answer: D

Watch Video Solution

170. Among the following cells Lecianche cell (1), Nickel cadmium cell (II). Lead storage battery (III), Mercury cell (IV), primary cells are

A. I and II

B. I and IV

C. II and III

D. I and IV

Answer: D

Watch Video Solution

171. 9.65C of electric current is passed through fused anhydrous magnesium chloride. The magnesium metal thus obtained is completely converted into Grignard reagen t. the number of m oles of the original reagent obtained of

A. 5×10^{-4}

B. 1×10^{-4}

C. 5×10^{-5}

D. 1×10^{-5}

Answer: C

Watch Video Solution

172. If E_1, E_2 and E_3 are the emf values of the three galvanic cells respectivley

(i)$Zn|Zn^{2+}(1M)||Cu^{2+}(0.1M)|Cu$

(ii) $Zn\left|Zn^{2+}(1M)\right|\left|Cu^{2+}(1M)\right|Cu$

(iii) $Zn\left|Zn^{2+}(0.1)\right|\left|Cu^{2+}(1M)\right|Cu.$

Which one of the following is true.

A. $E_2 > E_3 > E_1$

B. $E_3 > E_2 > E_1$

C. $E_1 > E_2 > E_3$

D. $E_1 > E_3 > E_2.$

Answer: B

Watch Video Solution

173. The standard e.m.f. of a galvanic cell involving 3 moles of electrons in a redox reaction is 0.59V. The equilibrium constnat for the reaction of the cell is

A. 10^{25}

B. 10^{20}

C. 10^{15}

D. 10^{30}

Answer: D

Watch Video Solution

174. A current of 0.4 ampere is passed for 30 minutes through a voltameter containing $CuSO_4$ solution. The weight of Cu dpeosited will be

A. 3.18g

B. 0.318g

C. 0.296g

D. 0.150g

Answer: C

View Text Solution

175. Conductivity of 0.01M NaCl solution is 0.00147 $ohm^{-1}cm^{-1}$. What happen to this conductivity if extra 100m L of H_2O will be added to the above solution?

A. Increase

B. Decreases

C. Remains unchanged

D. First increases and then decreases.

Answer: B

Watch Video Solution

176. When same quantity of electricity is passed for half an hour, the amount of Cu and Cr deposited are respectivley 0.375g and 0.30g. Radio of electrochemical equivalents of Cu and Cr is

A. 0.8

B. 1.25

C. 2.5

D. 1.62.

Answer: B

Watch Video Solution

177. Unit of ionic mobility is :

A. $m^2 \sec^{-1}$ volt

B. ms^{-1}

C. $m\sec^{-1}$ volt

D. $m\sec^{-1}\text{volt}^{-1}$

Answer: A

Watch Video Solution

178. The potential of hydrogen electrode having a pH=10 is

A. 0.59V

B. 0.00V

C. $-0.59V$

D. $-0.059V$

Answer: C

Watch Video Solution

179. In the electrolysis of which solution OH^- ions are discharged in preference to Cl^- ions?

A. Dilute NaCl

B. Very dilute NaCl

C. Fused NaCl

D. Solid NaCl.

Answer: B

Watch Video Solution

180. The compound exhibiting maximum conductance in a fused state is

A. $SrCl_2$

B. $CaCl_2$

C. $MgCl_2$

D. $BeCl_2$.

Answer: D

Watch Video Solution

181. If the half cell reactions are given as

(i) $Fe^{2+}(aq) + 2e^- \rightarrow Fe(s), E^\circ = 0.44V$

(ii) $2H^+(aq) + 1/2O_2(g) + 2e^- \rightarrow H_2O(l), E^\circ = +1.23V$

The E° for the reaction.

A. $+1.67V$

B. $-1.67V$

C. $+0.79V$

D. $-0.79V$

Answer: A

Watch Video Solution

182. The logarithm of the equilibrium constant of the cell reaction corresponding to the cell $X(s)\left|X^{2+}(aq)\right|\left|Y^+\right|Y(s)$ with standard cell potential $E^\circ_{cell} = 1.2V$ is given by

A. 12.5

B. 21.5

C. 40.5

D. 47.2

Answer: C

Watch Video Solution

183. A current is passed through two cells connected in series. The first cell contain $x(NO_3)_2$ (aq) and the second cell contains $y(NO_3)_2(aq)$. The relative atomic masses of x and y are in the ratio of x to that of y?

A. $3:2$

B. $1:2$

C. $1:3$

D. $3:1$

Answer: C

View Text Solution

184. The limiting molar conductivities of HCl, CH_3COONa and NaCl are respectiley 425, 90 and 125 mho cm^2 mol^{-1} and $25^\circ C$. The molar conductivity of 0.1M CH_3COCH solution is 7.8 mho cm^2mol^{+1} at the same temperature is

A. 0.1

B. 0.02

C. 0.15

D. 0.03

Answer: B

Watch Video Solution

185. Standard electrode potential for Sn^{4+}/Sn^{2+} couple is $0.15V$ and that for the Cr^{3+}/Cr couple is $-0.74V$. These two couples in their standard state are connected to make a cell. The cell potential will be

A. $+1.83V$

B. $+1.19V$

C. $0.89V$

D. $0.18V$.

Answer: C

Watch Video Solution

186. A solution contains Fe^{2+}, Fe^{3+} and T^{-} ions. This solution was treated with iodine at $35^{\circ} C. E^{\circ}$ for Fe^{3+}, Fe^{2+} is $0.77V$ and E° for $I_2/2I^{-}$ = 0.536 V. The favourable redox reaction is:

A. I_2 will be reduced to I^{-}

B. There will be no redox reaction

C. I^{-} will be oxidised to I_2

D. Fe^{2+} will be oxidised to Fe^{3+}

Answer: C

Watch Video Solution

187. The reduction potential of hydrogen half cell will be negative if :

A. $P(H_2) = 1\text{atm and}[H^+] = 1.0M$

B. $p(H_2) = 2\text{atm and}[H^+] = 1.0M$

C. $p(H_2) = 2\text{atm and}[H^+] = 2.0M$

D. $p(H_2) = 1\text{atm and}[H^+] = 2.0M.$

Answer: C

Watch Video Solution

188. If E_1, E_2 and E_3 are the emf values of the three galvanic cells respectivley

(i)$Zn|Zn^{2+}(1M)||Cu^{2+}(0.1M)|Cu$

(ii) $Zn|Zn^{2+}(1M)||Cu^{2+}(1M)|Cu$

(iii) $Zn \left| Zn^{2+}(0.1) \right|\left| Cu^{2+}(1M) \right| Cu.$

Which one of the following is true.

A. $E_2 > E_3 > E_1$

B. $E_3 > E_2 > E_1$

C. $E_1 > E_2 > E_2$

D. $E_1 > E_3 > E_2.$

Answer: C

Watch Video Solution

189. Consider the following cell reaction

$2Fe(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{2+}(aq), 2H_2O(l), E^\circ = 1.67V$

At $25\,^\circ C$ $\left| Fe^{2+} \right| = 10^{-3}M, p\left(O_2\right) = 0.1$ atm, pH =3, the cell potential at $25\,^\circ C$ is

A. $1.47V$

B. $1.77V$

C. $1.87V$

D. $1.57V$

Answer: D

Watch Video Solution

190. If the E° for a given reaction has a negative value, then which of the following gives the correct relationship for the of ΔG° and k_{aq}?

A. $\Delta G^\circ > 0, k_{eq} < 1$

B. $\Delta G^\circ > 0, k_{eq} > 1$

C. $\Delta G^\circ < 0, k_{eq} > 1$

D. $\Delta G^\circ < 0, k_{eq} < 1$.

Answer: A

Watch Video Solution

191. Which pair of electrolytes could not be distinguished by the products of electrolysis using inert electrodes.

A. 1M $CuSO_4$ solution, $1MCuCl_2$ solution

B. 1M KCl solution, 1M KI solution

C. 1 M $AgNO_3$ solution $1MCu(NO_3)$ solution

D. 1M $CuBr_2$ solution $1MCuSO_4$ solution.

Answer: A

View Text Solution

192. The electrode potentials for

$Cu^{2+} + e^- \rightarrow Cu^+$ and

$Cu^+ e^- \rightarrow Cu_s$

are $+0.15$V and $+0.50V$ respectively the value of $E^\circ_{\frac{Cu^{2+}}{Cu}}$ will be?

A. 0.150V

B. 0.500V

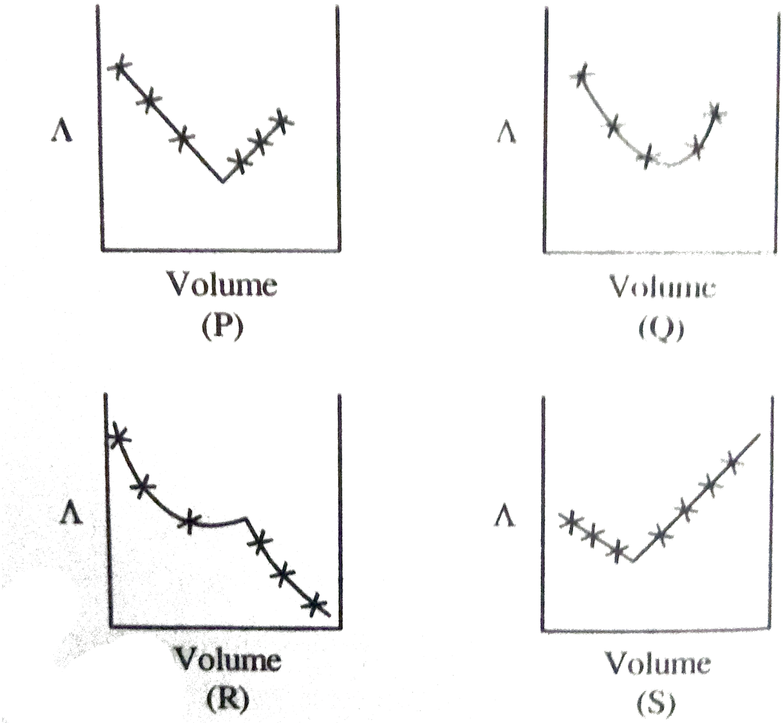
C. 0.325V

D. 0.650V

Answer: C

Watch Video Solution

193. $AgNO_3(aq)$ was added to an aqueous KCl soltuion gradually and conductivity of the solution was measured. The plot of conductance (A) versus the value of $AgNO_3$ is



A. P

B. Q

C. R

D. S

Answer: D

Watch Video Solution

194. Standard reduction potentails of the half reactions are given below:

$F_2(g) + 2e^- \rightarrow 2F^-(aq.),, E^{\ominus} = +2.87$

$Cl_2(g) + 2e^- \rightarrow 2Cl^-(aq.),, E^{\ominus} = +1.36V$

$Br_2(g) + 2e^- \rightarrow 2Br^-(aq.),, E^{\ominus} = +1.09V$

$I_2(s) + 2e^- \rightarrow 2I^-(aq.),, E^{\ominus} = +0.54V$

The strongest oxidizing and reducing agents respectively are:

A. Cl_2 and Br^-

B. Cl_2 and I_2

C. F_2 and I^-

D. Br_2 and Cl^-

Answer: C

Watch Video Solution

195. The standard reduction potential for Zn^{2+}/Zn, Ni^{2+}/Ni and Fe^{2+}/Fe are -0.76, -0.23 and $-0.44V$ respectively. The reaction $X + Y^2 \rightarrow X^{2+} + Y$

will be spontaneous when:

A. $x = Zn, y = Ni$

B. $x = Ni, y = Fe$

C. $x = Mn, y = Zn$

D. $x = Fe, y = Zn.$

Answer: A

Watch Video Solution

196. Given $E^{\circ}_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33V, E^{\circ}_{MnO_4^-/Mn^{2+}} = 1.51V$

Among the following, the strongest reducing agent is

$E^{\circ}_{Cr^{3+}/Cr} = -0.74V^x, E^{\circ}_{MnO_4^-/Mn^{2+}} = 1.51V$

$E^{\circ}_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33V, E^{\circ}_{Cl/Cl^-} = 1.36V$

Based on the data given above strongest oxidising agent will be

A. MnO_4^-

B. Cl^-

C. Cr^{2+}

D. Mn^{2+}

Answer: A

Watch Video Solution

197. A button cell used in watched funcations as follwing

$Zn(s) + Ag_2O(s) + H_2O(l) \Leftrightarrow 2Ag(s) + Zn^{2+}(aq.) + 2OH^-(aq)$

If half cell potentials are

$Zn^{2+}(aq.) + 2e^- \rightarrow Zn(s), E^\circ = -0.76V$

$Ag_2O(s) + H_2O(l) + 2e^- \rightarrow 2Ag(s) + 2OH^-(aq.), , E^\circ = 0.34V$

The cell potential will be

A. 1.10V

B. 0.42V

C. 0.84V

D. 1.3V

Answer: A

Watch Video Solution

198. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl or $pH = 10$ and by passing bydrogen gas around the platinum wire at one atm pressure . The oxidation potential of electrode would be ?

A. 0.059V

B. 0.59V

C. 0.118V

D. 1.18V

Answer: B

Watch Video Solution

SELECTED STRAIGHT OBJECTIVE

1. Local action in an electrochemical action can be prevented by

A. using by pure electrolytes in tw half cells

B. using very pure metal for anode

C. coating zinc anode with mercury

D. using pure graphite for cathode.

Answer: B,C

Watch Video Solution

2. Daniel cell, the EMF of the cell can b e increased b y

A. increasing the concentration of Zn^{2+} ions

B. increasing the concentration of Cu^{2+} ions

C. increasing the concentration of Cu^{2+} ions

D. decreasing the concentration of Zn^{2+} ions.

Answer: B,D

Watch Video Solution

3. Units of conductance are

A. ohm

B. mho

C. siemen

D. ohm^{-1}

Answer: B,C,D

Watch Video Solution

4. When electricity is passed through an electrolyte

A. only cations migrate

B. only anions migrate

C. both cations and anions migrate

D. only the solvent molecules migrate.

Answer: A,C

Watch Video Solution

5. A salt bridge

A. allows the flow of current by completing the electrical circuit.

B. allows easy intermixing of the ions in the two half cells

C. elimination liquid junction potential

D. maintains the electrical neutrility of the two h alf cells.

Answer: A,C,D

Watch Video Solution

6. z On the electrolysis of an aqueous solution of NaF using the gram equivalence of an electrolyte

A. Na is obtained at cathode

B. F_2 is obtained at anode

C. H_2 is obtained at cathode

D. O_2 is obtained at anode.

Answer: C,D

Watch Video Solution

7. A piece of Cu is added to an aqeuous solution of $FeCl_3$

A. No iron will be precipitated from the solution.

B. Copper will not dissolve in the solution.

C. Copper will not dissolve in the solution.

D. Iron will be precipitated from the solution.

Answer: A,C

Watch Video Solution

8. Pick out the wrong statement, An electrochemical cell stops working only when

A. electrode potential of the two half cells becomes equal

B. whole of the metal used as cathode is consumed

C. whole of the metal used as anode is consumed

D. molar concentrations in the two half cells

Answer: B,C,D

Watch Video Solution

9. What is not true about S.H.E.?

A. Temperature is 273K

B. $\left[H^{+}\right] = 1M$

C. Pressure of $H_2 = 1$ atm

D. pH of the solution is 7.

Answer: A,D

Watch Video Solution

10. On the electrolysis of very dilute aqueous solution of $NaOH$ using Pt electrodes

A. H_2 i s evolved at cathode

B. Na is evolved at cathode

C. O_2 is evolved of anod

D. H_2 is evolved at anode.

Answer: A,C

Watch Video Solution

11. An ion is reduced to the element when it absorbs 6×10^{20} electrons. The number of equivalents of the ion is:

A. 0.1

B. 0.01

C. 0.001

D. 0.0001.

Answer: C

Watch Video Solution

12. In the electrolysis of alkaline water, a total of 1 mole of gases in evolved. The amount of water decomposed in

A. 1 mole

B. 2 moles

C. $\frac{1}{3}$ mole

D. $\frac{2}{3}$ mole.

Answer: D

View Text Solution

13. The standard reduction potentials at 298K, for the following half cells are given:

$Zn^{2+}(aq) + 2e^- \Leftrightarrow Zn(s) : E^\circ = -0.762V$

$Cr^{3+}(aq) + 3e^- \Leftrightarrow Cr(s) : E^\circ = -0.740V$

$2H^+(aq) + 2e^- \Leftrightarrow H_2(g), E^\circ = 0.000V$

$Fe^{3+}(aq) + e^- \Leftrightarrow Fe^{2+}(aq), E^\circ = 0.770V$

Which is the stronget reducing agent?

A. Zn(s)

B. Cr(s)

C. $H_2(g)$

D. $Fe^{2+}(aq)$.

Answer: A

Watch Video Solution

14. Faraday's laws of electrolysis are related to

A. Atomic number of cation

B. Atomic number of anion

C. Equivalent mass of the products

D. Speed of cations.

Answer: C

Watch Video Solution

15. The electric charge required for electrode deposition of one gram-equivalent of a substance is :

A. one ampere per second

B. 96500 coulombs per second

C. one ampere for one hour

D. charge on one mole of electrons.

Answer: D

Watch Video Solution

16. The reaction

$$\frac{1}{2}H_2(g) + AgCl(s) \Leftrightarrow H^+(aq) + Cl^-(aq) + Ag(s)$$

occurs in the galvanic cell

A. $Ag|AgCl(s)|KCl(\text{solution})$ | $AgNO_3$(solution)|Ag

B. $Pt\left|H_2(g)\right|HCl$ (solution)|$AgNO_3$(solution)|Ag

C. $Pt \left| H_2(g) \right| HCl$ (solution)$|AgCL(s)|Ag$

D. none of these .

Answer: C

Watch Video Solution

17. When a lead storage battery is discharged:

A. SO_2 is evolved

B. lead sulphate is consumed

C. lead is formed

D. sulphuric acid is consumed.

Answer: D

Watch Video Solution

18. The standard oxidation potential E° for the half cell reactions are

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

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

EMF of the cell reaction

$Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$ will be

A. $-0.35V$

B. $+0.35V$

C. $+1.17V$

D. $0.117V$.

Answer: B

Watch Video Solution

19. The standard reduction potential for Fe^{2+}/Fe and Sn^{2+}/Sn electrodes are -0.44 and -0.14 volt respectively. For the given cell reaction $Fe^{2+} + Sn \rightarrow Fe + Sn^{2+}$, the standard EMF is.

A. $+.030v$

B. $-0.58v$

C. $+0.58v$

D. -0.300

Answer: D

Watch Video Solution

20. A dilute aqueous solution of Na_2SO_4 is electrolyzed using platinum electrodes. The products at the anode and cathode are :

A. O_2, H_2

B. $S_2O_8^{2-}, Na$

C. O_2, Na

D. $S_2O_8^{2-}, H_2$.

Answer: A

Watch Video Solution

21. A standard hydrogen electrode has zero electrode potential because :

A. hydrogen is easier to oxidise

B. this electrode potential is assumed to be zero

C. hydrogen atom h as only on e electron

D. hydrogen is the lightest element.

Answer: B

Watch Video Solution

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

A. 0.184V

B. 0.827V

C. 0.521Vq

D. 0.490V.

Answer: C

Watch Video Solution

23. The standard reduction potential values of three metallic cations, $X, Y,$ and Z are $0.52, -3.03,$ and $-0.18V$, respectively. The order of reducing power of the corresponding metal is

A. $Y > Z > X$

B. $X > Y > Z$

C. $Z > Y > X$

D. $Z > X > Y$.

Answer: A

Watch Video Solution

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

A. Y will oxidise X but not Z

B. Y will oxidise both X and Z

C. Y will oxidise both X and Z

D. Y will reduce both X and Z.

Answer: A

Watch Video Solution

25. For the electrochemical cell, $(M) \mid M^{+}\big) \mid \mid \big(X^{-} \mid X\big)$.

$E^{\circ}\left(M^{+}/M\right) = 0.44V$ and $E^{\circ}\left(X/X^{-}\right) = 0.33V$.

From this data one can deduce that

A. $M + X \rightarrow M^{+} + X^{-}$ is the spontaneous reaction

B. $M^{+} + X^{-} \rightarrow M + X$ is the spontaneous reaction

C. $E_{\text{cell}} = 0.77V$

D. $E_{\text{cell}} = -0.77$V.

Answer: B

Watch Video Solution

26. The correct order of equivalent conductance at infinite dilution of $LiCl$, $NaCl$ and KCl is:

A. $LiCl > NaCl > KCl$

B. $KCl > NaCl > LiCl$

C. $NaCl > KCl > LiCl$

D. $LiCl > KCl > NaCl$.

Answer: B

Watch Video Solution

27. A standard solution of KNO_3 is used to make salt bridge, because

A. velocity of K^+ is greater than that of NO_3^-

B. velocity of NO_3^- is greater than that of K^+

C. Velocities of both K^+ and NO_3^- are neraly the same

D. KNO_3 is highly soluble in water.

Answer: C

Watch Video Solution

28. Standard electrode potential data are useful for understanding the suitability of an oxidant in a redox titration. Some half cell reaction and their standard potentials are given below:

$MnO_4^-(aq) + 8H^+(aq) + 5e^- \rightarrow Mn^{2+}(aq) + 4H_2O(l)E^\circ = 1.51V$

$Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6e^- \rightarrow 2Cr^{3+}(aq) + 7H_2O(l), E^\circ = 1.38V$

$Fe^{3+}(aq) + e^- \rightarrow Fe^{2+}(aq), E^\circ = 0.77V$

$CI_2(g) + 2e^- \rightarrow 2CI^-(aq), E^\circ = 1.40V$

Identify the only correct statement regarding quantitative estimation of aqueous $Fe(NO_3)_2$

A. MnO_4^- can be used in aqeuous HCl

B. $Cr_2O_7^{2-}$ can be used in aqueous HCl

C. MnO_4^- can be used in aqueous H_2SO_4

D. $Cr_2O_7^{2-}$ can be used in aqueous H_2SO_4.

Answer: A

Watch Video Solution

29. In an electrolytic cell, the flow of electrons is form

A. cathode to andoe in solution

B. cathode to anode through external supply

C. cathode to anode through internal supply

D. anode to cathode through internal supply.

Answer: A

Watch Video Solution

30. The emf of the cell,

$$Zn\left|Zn^{2+}(0.01M)\right|\left|Fe^{2+}(0.001M)\right|Fe$$

at 298 K is 0.2905 then the value of equilibrium constant for the cell reaction is:

A. $\frac{0.32}{e^{0.0295}}$

B. $\frac{0.32}{10^{0.0295}}$

C. $\frac{0.26}{10^{0.0295}}$

D. $\frac{0.32}{10^{0.0591}}$

Answer: B

Watch Video Solution

31. The half cell reaction for rusting of iron are:

$$2H^{+} + 2e^{-} + \frac{1}{2}O_2 \rightarrow H_2O(l), E^{\circ} = +1.23V$$

$$Fe^{2+} + 2e^{-} \rightarrow Fe(s), E^{\circ} = -0.44V$$

ΔG° (in KJ) for the reaction is

A. -76

B. -322

C. -161

D. -152.

Answer: B

Watch Video Solution

32. The molar conductivities Λ°_{NaOAc} and Λ°_{HCI} at infinite dilution is watter at $25^{\circ}C$ are 91.0 and $426.2 Scm^{\circ}$ /mol respectively. To calculate Λ^{2}_{HOAc}, the additional value required is:

A. Λ°_{NaOH}

B. Λ°_{NaCl}

C. $\Lambda^{\circ}_{H_2O}$

D. Λ°_{KCl}

Answer: B

Watch Video Solution

33. Given the data at $25^{\circ}C$

$Ag + I^- \rightarrow Agl + e^- \quad E^{\circ} = 0.153V$

$Ar \rightarrow Ag^+ + e^- E^{\circ} = 0.800V$

What is the value of $\log K_{sp}$ for AgI?

A. -37.83

B. -16.13

C. -8.12

D. $+8.612$

Answer: B

Watch Video Solution

34. Resistance of a conductivity cell filled with a solution of an electrolyte of concentration 0.1M is 100Ω. The conductivity of this solution is 1.29 Sm^{-1}. Resistance of the same cell when filled with 0.2M of the same solution is 520Ω. the molar conductivity of $0.02M$ solution of the electrolyte will be

A. $1.24 \times 10^{-4} Sm^2 \text{mol}^{-1}$

B. $12.4 \times 10^{-4} Sm^2 \text{mol}^{-1}$

C. $124 \times 10^{-4} Sm^2 \text{mol}^{-1}$

D. $1240 \times 10^{-4} Sm^2 \text{mol}^{-1}$

Answer: C

View Text Solution

35. A hypothetical electrochemical cell is shown below.

$A\left|A^{+}(xM)\right|\left|B^{+}(yM)\right|B^{+}$

The e.m.g. measured is 0.20V the cell reaction is

A. The cell reaction cannot be predicted

B. $A + B^{+} \rightarrow A^{+} + B$

C. $A^{+} + B \rightarrow A + B^{+}$

D. $A^{+} + e^{-} \rightarrow A : B^{+} + e^{-} \rightarrow B.$

Answer: B

Watch Video Solution

36. If $E^{\circ}_{Fe^{2+}} / Fe = -0.441V$

and $E^{\circ}_{Fe^{3+}} / Fe^{2+} = 0.771V$

The standard EMF of the reaction

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

will be:

A. 1.212V

B. 0.111V

C. 0.330V

D. 1.653V

Answer: A

Watch Video Solution

37. The charge required for the reduction of 1 mol of MnO_4^- to MnO_2 is

A. 1F

B. 3F

C. 5F

D. 6F

Answer: B

Watch Video Solution

38. The products formed when an aqueous solution of $NaBr$ is electrolysed in a cell having inert electrodes are :

A. Na and Br_2

B. Na and O_2

C. H_2, Br_2 and NaOH

D. H_2 and O_2

Answer: C

Watch Video Solution

39. Calculate the equilibrium constant for the reaction $Cu(s) + 2Ag^+(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s), E^\circ_{cell} = 0.46V.$

A. 4×10^{15}

B. 2.4×10^{10}

C. 2.0×10^{10}

D. 4×10^{10}

Answer: A

Watch Video Solution

40. The efficiency of a fuel cell is given by:

A. $\frac{\Delta S}{\Delta G}$

B. $\frac{\Delta R}{\Delta G}$

C. $\frac{\Delta G}{\Delta S}$

D. $\frac{\Delta G}{\Delta H}$

Answer: D

Watch Video Solution

41. The equivalent conductances of two strong electrolytes at infinite dilution in H_2O (where ions move freely through a solution) at $25\,^{\circ}C$ are given below :

$\Lambda^{\circ}_{CH_3COONa} = 91.0Scm^2/\text{equi v.}$

$\Lambda^{\circ}_{HCl} = 426.2Scm^2/\text{equiv.}$ What additional information//quantity one need to calculate Λ° of an aqueous solution of acetic acid ?

A. Λ° of chloroacetic acid $\left(CICH_2COOH\right)$

B. $\Lambda^{\circ}NaCl$

C. $\Lambda^{\circ}CH_3COOK$

D. T he limiting equivalent conductance of $H^+\left(\lambda^{\circ}H^+\right)$

Answer: B

Watch Video Solution

42. The cell , $Zn\left|Zn^{2+}(1M)\right|\,|\;Cu^{2+}(1M)Cu\left(E^{\circ}_{\text{cell}} = 1.\,10V\right)$,

Was allowed to be completely discharfed at $298K$. The relative concentration of $2+$ to Cu^{2+} $\left[\frac{Zn^{2=}}{Cu^{2+}}\right]$ is :

A. 9.65×10^4

B. antilog 24.08

C. 37.3

D. $10^{37.3}$

Answer: D

Watch Video Solution

43. Electrolysis of dilute aqueous NaCl solution was carried out by passing 10 milli ampere current. The time required to liberate 0.01 mol of H_2 gas at the cathode is (1 Faraday=96500 C mol^{-1})

A. 9.65×10^4sec

B. 19.3×10^4 sec

C. 28.95×10^4 sec

D. 38.6×10^4 sec.

Answer: B

Watch Video Solution

44. On the basis of the following E° values, the stongest oxidizing agent is $\left[Fe(CN)_6\right]^{4-} \rightarrow \left[Fe(CN)_6\right]^{3-} + e^-, E^\circ = -0.35V$

$Fe^{2+} \rightarrow Fe^{3+} + e^-, E^\circ = -0.77V$

A. $\left[Fe(CN)_4\right]^-$

B. Fe^{2+}

C. Fe^{3+}

D. $\left[Fe(CN)_6\right]^{3-}$

Answer: C

Watch Video Solution

45. The seqeunce of ionic mobility in the aqueous solution is

A. $K^+ > Na^+ > Rb^+ > Cs^+$

B. $Cs^+ > Rb^+ > K^+ > Na^+$

C. $Rb^+ > K^+ > Cs^+ > Na^+$

D. $Na^+ > K^+ > Rb^+ > Cs^+$

Answer: B

Watch Video Solution

46. Standard free energies of formation (I $kJ/$mol) at $298K$ are -237.2, - 394.4 and -8.2 for $H_2O(1), CO_2(g)$ and pentange (g) , respectively . The value of E°_{cell} for the pentane-oxygen fuel cell is .

A. $1.968V$

B. $2.0968V$

C. 1.0968V

D. 0.0968V

Answer: C

Watch Video Solution

47. Given $E^{\circ}_{Cr^{3+}/Cr} = -0.72V$, and

$E^{\circ}_{Fe^{2+}/Fe} = -0.42V$

The potential for the cell.

$Cr\left|Cr^{3+}(0.1M)\right| \mid Fe^{2+}(0.01M)Fe$ is

A. 0.072V

B. 0.3850V

C. 0.770V

D. 0.270V

Answer: C

Watch Video Solution

48. Given, $E^{o}_{Fe^{3+}/Fe} + 3eCrE^{o} = -0.036V$

$E^{o}_{Fe^{3+}/Fe} = -0.439V$

The value of standard electrode ptoential for the charge,

A. $0.072V$

B. 0.3850V

C. 0.770V

D. 0.270V

Answer: C

Watch Video Solution

49. The equivalent conductance of $M/32$ solution of a weak monobasic acid is 8.0 and at infinite dilution is 400. The dissociation constant of this acid is :

A. 1.25×10^{-4}

B. 1.25×10^{-5}

C. 1.25×10^{-6}

D. 6.25×10^{-4}

Answer: B

Watch Video Solution

50. Consider the following relations for

(i) EMF of the cell

=(Oxidation potential of anode)

-(Reduction potential of cathode)

(iii) EMF of the cell=(Reduction potential of anode) + (Reduction potential of cathode) (iv) EMF of the cell=(Oxidation potential of the anode)-(Oxidation potential of the cathode) which of the following above reactions are correct?

A. iii and i

B. i and ii

C. iii and iv

D. ii and iv.

Answer: D

Watch Video Solution

51. The Gibbs energy for the decomposition of Al_2O_3 at $500^\circ C$ is as follows:

$$\frac{2}{3}Al_2O_3 \rightarrow \frac{4}{3}Al + O_2, \Delta_rG = +966kJmol^{-1}$$

The potential difference needed for electrolytic reeduction of Al_2O_3 at $500^\circ C$ is at least:

A. 2.5V

B. 5.0V

C. 4.5V

D. 3.0V

Answer: A

Watch Video Solution

52. An increase in equivalent conductance of a strong electrolyte with dilution is mainly due to:

A. increase in number of ions

B. increase in the ionic mobility of ions

C. 100% ionisation of the electrolyte at normal dilution

D. increase in both i.e. number of ions and ionic mobility of ions.

Answer: B

Watch Video Solution

53. For the reduction of silver ions with copper metal, the standard cell potential was found to be +0.46V at $25^{\circ}C$ the value of the standard

Gibb's energy , ΔG° will be

A. $-98.0kJ$

B. $89.0kJ$

C. $-89.0J$

D. $44.5kJ$.

Answer: C

Watch Video Solution

54. Which of the following expressions correctly repesents the equivalent conductance at infinte dilution of $Al_2(SO_4)_3$. Given that $\Lambda^\circ_{Al^{3+}}$ and $\Lambda^\circ_{SO_4^{2-}}$ are the equivalent conductance at infinte dilution of the respective ions?

A. $2\lambda^\circ_{Al^{3+}} + 3\lambda^\circ_{SO_4^{2-}}$

B. $\lambda^\circ_{Al^{3+}} + \lambda^\circ_{SO_4^{2-}}$

C. $\lambda^\circ_{Al_3^{3+}} + \lambda^\circ_{SO_4^{2-}}$

D. $\frac{1}{3}\lambda^{\circ}_{Al^{3+}} + \frac{1}{2}\lambda^{\circ}_{SO_4^{2-}}$

Answer: B

Watch Video Solution

55. The reduction potential of hydrogen half cell will be negative if :

A. $p(H_2) = 1\text{atm and}\left[H^+\right] = 1.0M$

B. $p(H_2) = 2\text{atm and}\left[H^+\right] = 1.0M.$

C. $p(H_2) = 2\text{atm and}\left[H^+\right] = 2.0M$

D. $p(H_2) = 1\text{atm and}\left[H^+\right] = 2.0M$

Answer: B

Watch Video Solution

56. If $E^{\ominus}_{cell}$ for a given reaction is negative, which gives the correct relationships for the values of $\Delta G^{\ominus}$ and K_{eq}?

A. $\Delta G^{\circ} < 0, k_{eq} < 1$

B. $\Delta G^{\circ} > 0, k_{eq} < 1$

C. $\Delta G^{\circ} > 0, k_{eq} > 1$

D. $\Delta G^{\circ} < 0, k_{eq} > 1.$

Answer: B

Watch Video Solution

57. Standard electrode potential of three metal X, Y and Z are $-1.2V$, $+0.5V$ and $-3.0V$ respectively. The reducing power of these metals will be:

A. $Z > X > Y$

B. $X > Y > Z$

C. $Y > Z > X$

D. $Y > X > Z.$

Answer: A

Watch Video Solution

58. The electrode potentials for

$Cu^{2+} + e^{-} \rightarrow Cu^{+}$ and

$Cu^{+} e^{-} \rightarrow Cu_{s}$

are $+0.15$V and $+0.50V$ respectively the value of $E^{\circ}_{\frac{Cu^{2+}}{Cu}}$ will be?

A. 0.650V

B. 0.150V

C. 0.500V

D. 0.325V

Answer: D

Watch Video Solution

59. Standard electrode potential for Sn^{4+}/Sn^{2+} couple is $0.15V$ and that for the Cr^{3+}/Cr couple is -$0.74V$. These two couples in their standard state are connected to make a cell. The cell potential will be

A. $+0.18V$

B. $+1.83V$

C. $+1.19V$

D. $+0.89V$

Answer: D

Watch Video Solution

60. A buffer solution is prepared in which the concentration of NH_3 is 0.30M and the concentration of NH_4^+ is 0.20M . If the equilibrium constant k_b for NH_3 equals 1.8×10^{-3} what is the pH of this solution?

A. 11.72

B. 8.73

C. 9.08

D. 9.43.

Answer: D

Watch Video Solution

61. Consider the following cell reaction.

$2Fe(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{2+}(aq) + 2H_2O(l)$,

$E^\circ = 1.67V$

At $\left[Fe^{2+}\right] = 10^{-3}M, P\left(O_2\right) = 0.1$ atm and pH=3, the cell potential at $25^\circ C$ is

A. 1.47V

B. 1.77V

C. 1.87V

D. 1.57V

Answer: D

Watch Video Solution

62. Electrolysis is a phenomenon where a reaction is carried out by passing electricity through the molten electrolyte or the electrolytic solution in water. In electrolysis, electrolyte first decomposes into anions and cations and thereafter anions undergo oxidation at anode and cations undergo reduction at cathode. for example.

XY (molten) $\Leftrightarrow X^{n+} + Y^{n-}$

Oxidation at anode : $Y^{n-} - \text{ne}^- \rightarrow Y$

Reduction at cathode $X^{n+} + \text{ne}^- \rightarrow X$

In order to predict the electrolytic products accurately an array of substances is arranged in decreasing order tendency of oxidation of the substances or increasing order of standard reducton potential in electrochemical series. the standard electrode potentials of some species (elements,or ions) is given as under.

$Cl_2(g) + 2e^- \rightarrow 2Cl^-, E^\circ = 1.360V$

$Na^+ + e^- \rightarrow Na, E^\circ = -2.71V$

$2H_2O + e^- \rightarrow H_2(g) + 2OH^-, E^\circ = -0.83V$

$2H^+ + 2e^- \rightarrow H_2, E^\circ = OV$

When aqueous solution of 100mL of 1M NaCl is electrolysed using Pt electrodes then answer the following question.

What will be the electrolytic products of 100 mL 1M aq. solution?

A. H_2

B. Cl_2

C. Na and Cl_2

D. H_2, Cl_2 and $NaOH$.

Answer: D

View Text Solution

63. Electrolysis is a phenomenon where a reaction is carried out by passing electricity through the molten electrolyte or the electrolytic solution in water. In electrolysis, electrolyte first decomposes into anions and cations and thereafter anions undergo oxidation at anode and cations undergo reduction at cathode. for example.

XY (molten) $\Leftrightarrow X^{n+} + Y^{n-}$

Oxidation at anode : Y^{n-} - $\mathrm{ne}^{-} \rightarrow Y$

Reduction at cathode X^{n+} + $\mathrm{ne}^{-} \rightarrow X$

In order to predict the electrolytic products accurately an array of substances is arranged in decreasing order tendency of oxidation of the substances or increasing order of standard reducton potential in electrochemical series. the standard electrode potentials of some species (elements,or ions) is given as under.

$Cl_2(g) + 2e^{-} \rightarrow 2Cl^{-}, E^{\circ} = 1.360V$

$Na^{+} + e^{-} \rightarrow Na, E^{\circ} = -2.71V$

$2H_2O + e^{-} \rightarrow H_2(g) + 2OH^{-}, E^{\circ} = -0.83V$

$2H^{+} + 2e^{-} \rightarrow H_2, E^{\circ} = OV$

When aqueous solution of 100mL of 1M NaCl is electrolysed using Pt electrodes then answer the following question.

What will b e the pH of the resulting solution upon passage of 0.2F charge

A. 13

B. 13.301

C. 7

D. None

Answer: A

View Text Solution

64. Electrolysis is a phenomenon where a reaction is carried out by passing electricity through the molten electrolyte or the electrolytic solution in water. In electrolysis, electrolyte first decomposes into anions and cations and thereafter anions undergo oxidation at anode and cations undergo reduction at cathode. for example.

XY (molten) $\Leftrightarrow X^{n+} + Y^{n-}$

Oxidation at anode : $Y^{n-} - \text{ne}^- \rightarrow Y$

Reduction at cathode $X^{n+} + \text{ne}^- \rightarrow X$

In order to predict the electrolytic products accurately an array of substances is arranged in decreasing order tendency of oxidation of the substances or increasing order of standard reducton potential in electrochemical series. the standard electrode potentials of some species (elements,or ions) is given as under.

$Cl_2(g) + 2e^- \rightarrow 2Cl^-, E^\circ = 1.360V$

$Na^+ + e^- \rightarrow Na, E^\circ = -2.71V$

$2H_2O + e^- \rightarrow H_2(g) + 2OH^-, E^\circ = -0.83V$

$2H^+ + 2e^- \rightarrow H_2, E^\circ = OV$

When aqueous solution of 100mL of 1M NaCl is electrolysed using Pt electrodes then answer the following question.

What will b e the total volume of the gases obtained at STP when 0.1F charge is passed

A. 3.24 litres

B. 11.2 litres

C. 1.12litres

D. 2.2litres.

Answer: D

View Text Solution

65. Deduce from the following E^{c-} values of half cells, what combination of two half cells would results in a cell with the largest potential?

$I.$	$A + e(-) \rightarrow A^{c-}$	$E^{c-} = -0.24V$
$II.$	$B^{c-} + e^{-} \rightarrow B^{2-}$	$E^{c-} = +1.25V$
$III.$	$C^{c-} + 2e^{-} \rightarrow C^{3-}$	$E^{c-} = -1.25V$
$IV.$	$D + 2e^{c-} \rightarrow D^{2-}$	$E^{c-} = +0.68V$

A. I,II

B. II,III

C. I,II

D. IV,V

Answer: B

Watch Video Solution

66. Consider following half cell reaction and corresponding standard (reduction) electrode potentials.

I. $A + e^{-} \rightarrow A : E^{\circ} = -24V$

II. $B^{-} + e^{-} \rightarrow B^{2-} : E^{\circ} = +1.25V$

III. $C^{-} + 2e^{-} \rightarrow C^{3-} : E^{\circ} = -1.25V$

IV. $D + 2e^{-} \rightarrow D^{2-} : E^{\circ} = +0.68V$

V. $E + 4e^{-} \rightarrow E^{-4} : E^{\circ} = 0.38V.$

Cell with the largest cell potential is

A. $A\left|A^{-}\right|\left|B^{2-}\right|B^{-}$

B. $A\left|A^{-}\right|\left|B^{2-}, B^{-}\right|B$

C. $Pt\left|C^{3-}, C^{-}\right|B^{-}, B^{2-} \mid Pt$

D. $Pt\left|B^{2-}, B^{-}\right|\left|C^{-}, C^{3-}\right|Pt$

Answer: C

Watch Video Solution

67. Consider following half cell reaction and corresponding standard (reduction) electrode potentials.

I. $A + e^- \rightarrow A : E^\circ = -24V$

II. $B^- + e^- \rightarrow B^{2-} : E^\circ = +1.25V$

III. $C^- + 2e^- \rightarrow C^{3-} : E^\circ = -1.25V$

IV. $D + 2e^- \rightarrow D^{2-} : E^\circ = +0.68V$

V. $E + 4e^- \rightarrow E^{-4} : E^\circ = 0.38V.$

If every ion has concentration 1 M in the cell the largest cell potential at 298K is

A. 2.50V

B. 1.49V

C. 1.06V

D. 1.91V.

Answer: A

Watch Video Solution

MATCH-MATRIX

1.

Column I	Column II
(A) Conductor	p conducts electricity in solid state
(B) Electrolyte	q conducts electricity in molten state
(C) Insulator	r conducts electricity at high temperature
(D) Semi conductor	s does not conduct electricity

View Text Solution

2. Match the following columns

Column I	Column II
(A) Oxidation	p Loss of e^-
(B) Reduction	q gain of e^-
(C) Oxidizing agent	r Removal of H
(D) Reduction	s gain of H

Watch Video Solution

3. Match the following columns

Column I	Column II
(A) Anode	p Positive pole
(B) Cathode	q Negative pole
(C) Salt bridge	r Flow of current
(D) *e.m.f.*	s Working of cell

Watch Video Solution

4.

Column I	Column II
(A) $E^{\circ}_{2H^{+}}$	p Zero V
(B) $E^{\circ}_{Cu^{2+}\mid Cu}$	q 1M
(C) $E^{\circ}_{Ag^{+}/Ag}$	r + 0·80
(D) $E^{\circ}\ Zn^{2+}/Zn$	s – 0·76 V

View Text Solution

5. Match the following columns

Column I	Column II
(A) Resistance	(p) $\frac{1}{R}$
(B) Conductance	(q) $\frac{K \times 1000}{C}$
(C) Cell constant	(r) Ohm
(D) Equivalent conductance	(s) ρ/a

Watch Video Solution

6.

Column I	Column II
(A) Can displace copper from copper sulphate	(p) Zinc
(B) Can react with dil HCl to evolve H_2 gas	(q) Iron
(C) Metals lying below H_2 in electrochemical series	(r) copper
(D) Metal less reactive than zinc	(s) silver

View Text Solution

7.

Column I	Column II
(A) Dry cell	(p) Aqueons H_2SO_4
(B) Nickel-cadmium cell	(q) Ammomium chloride
(C) Lead storage cell	(r) Potassium hydroxide
(D) Fuel cell	(s) Zinc chloride.

View Text Solution

ASSERTION AND REASON

1. Assertion: Copper liberates hydrogen from a solution of dilute hydrochloric acid.

Reason: Hydrogen is above copper in the electro- chemical series.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: B

Watch Video Solution

2. Assertion (A): Sodium ions are discharged in preference to hydrogen ions at a mercury cathode.

Reason (R): The nature of cathode can affect the order of discharge of cations.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: C

Watch Video Solution

3. Statement-I: In electrolysis the quantity needed for depositing 1 mole of silver is different from that required for 1 mole of copper.

Because Statement-II: The molecular weights of silver and copper are different.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: D

Watch Video Solution

4. Statement-I: Equivalent conductance of all electrolytes decreases with increasing concentration.

Because Statement-II: Lesser number of ions ate available per gram equivalent at higher concentration.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: B

Watch Video Solution

5. Assertion (A): The Daniell cell becomes dead after sometimes.

Reason (R): The oxidation protential of Zn anode decreases and that of Cu increases.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: A

Watch Video Solution

6. Assertion A :Increase in the concentration of copper half cell in Daniel cell increases the emf of the cell.

Reason R: According to Nernst equation.

$$E_{cell} = E^{0}_{cell} + \frac{0.059}{2}\log.\frac{\left[Cu^{++}\right]}{\left[Zn^{++}\right]}$$

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: A

Watch Video Solution

7. Assertion Electrolytic conductance increases with increase in temperature.

Reason Randommness increases with increase in temperature

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: B

Watch Video Solution

8. Assertion Molar conductance of an electrolyte increases with dilution

Reason Ions move fast in dilute solutions.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: C

Watch Video Solution

9. Assertion In an electrolyte cell, the oxidation takes placeat anode while reduction at cathode.

Reason De-electronation takes place at anode while electronation takes place at cathode.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: A

Watch Video Solution

10. Assertion When the solution pressure of a metal is more than the osmotic pressure of the ions, the cations pass into the solution more rapidly leaving the electrode negatively charged.

Reason When the solution pressure of the metal is less than the osmotic pressure of the ions, the cations migrate from solution and get deposited on the electrodes making it positive ly charged.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: B

View Text Solution

11. Assertion Sodium ions are discharged at the Hg electrode during electrolysis is preference to H^+ ions.

Reason The nature of electrode also affect the order or discharge of cations.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: B

View Text Solution

12. Assertion A dry cell becomes dead after long time even if it has not been used.

Reason The NH_4Cl solwly and gradually corrods the zinc container.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: A

Watch Video Solution

13. (A) Absolute electrode potential can be easily measured by using vacuum tube voltmeter.

(R) Oxidation or reduction cannot take place alone,

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: D

Watch Video Solution

14. Assertion Copper rod turns colourless solution of zinc sulphate to light blue.

Reason Zinc reduces copper (III) ions to Cu.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: D

View Text Solution

15. Assertion In the equation $HCl + H_2O \Leftrightarrow H_3O^+ + Cl^-$

HCl is a strong acid and Cl^- is a weak base while in the equation

$CH_3COOH + H_2O \Leftrightarrow CH_3COO^- + H_3O^+$

CH_3COOU is a weak acid and CH_3 and $CH_3COO^-$is a strong base.

Reason The stronger an acid, the weaker must be its base and vice-versa.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: A

View Text Solution

16. Assertion On passing HCl gas through a saturated solution of common salt, NaCl precipitates out.

Reason The stronger an acid , the weaker must be its base and vice-versa.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: A

Watch Video Solution

17. Assertion Sodium chloride undergoes hydrolysis in its solution in water.

Reason When the ionic product of a salt in a solution exceeds its solubility product at a giv en temperature, the salt precipitates out.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: D

View Text Solution

18. Assertion A: The molar conductance of weak electrolyte is low as compared to that of strong electrolytes at moderate concentrations. Reason R: Weak electrolytes at moderate concentrations dissociate to a much greater extent as compared to strong electrolytes.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: C

Watch Video Solution

19. Assertion The anode is refeeredto as an oxidation electrode while the cathode is referred to as reduction electrode.

Reason When an electric current is passed through a molten electrolyte, the anions move to the anode where they lose electrons and the cations move to the cathode where they gain electrons.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: A

View Text Solution

20. Assertion Zinc and iron decompose steam whereas copper and mercury do not.

Reason A metal can displace hydrogen from water only if its reduction potential is less than that of hydrogen.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false.

Answer: A

View Text Solution

ULTIMATE PREPARATORY PACKAGE

1. $Cu^{2+}(aq.)$ is unstable in solution and under goes simultaneous oxidation and reduction according to the reaction

$2Cu^{+}(aq.) \Leftrightarrow Cu^{2+}(aq.) + Cu(s)$

Choose the correct E° for the above reaction if

$E^{\circ}_{Cu^{2+}}/Cu = 0.34V$ and $E^{\circ}_{Cu^{2+}}/Cu^{+} = 0.15V$

A. $+0.49V$

B. $+0.38V$

C. $-0.19V$

D. $-0.38V$

Answer: B

Watch Video Solution

2. Cell reactiomn is spontaneous when

A. E°_{red} is positive

B. ΔG° is negative

C. ΔG° is positive

D. E°_{red} is negative.

Answer: B

Watch Video Solution

3. What is the potential of a cell containing hydrogen electrodes, the negative one in contact with $10^{-10} MH^{+}$ and positive one in contract with $0.025 MH^{+}$?

A. 0.18V

B. 0.52V

C. 0.38V

D. 0.48V

Answer: B

Watch Video Solution

4. The standard electrode potentials $\left(E^{\circ}\right)$ for Ocl^{-} / Cl^{-} and $Cl^{-} / \frac{1}{2} Cl_2$ respectively are 0.94 V and $-1.36 V$. The E° value for $Ocl^{-} / \frac{1}{2} Cl^{2}$ will be:

A. $-0.42 V$

B. $-2.20V$

C. $0.52V$

D. $1.04V$.

Answer: A

Watch Video Solution

5. A current of 2.0A passed for 5 hours through a molten metal salt deposits 22.2 g of metal (At. Wt. =177). The oxidation state of the metal in the metal salt is

A. $+1$

B. $+2$

C. $+3$

D. $+4$

Answer: C

Watch Video Solution

6. Given standard electode potenitals

$Fe^{2+} + 2e^{-} \rightarrow Fe, E^{\circ} = -0.44V$ ....(1)

$Fe^{3+} + 2e^{-} \rightarrow Fe, E^{\circ} = -0.036V$ ....(2)

The standard electrode pptential E° for

$Fe^{2+} + e \rightarrow Fe^{2+}$ is.

A. $-0.476V$

B. $-0.404V$

C. $+0.404V$

D. $+0.772V$

Answer: D

Watch Video Solution

7. An electrochemical cell is shown below $Pt, H_2(1\text{atm})|HCl(0.1M)|CH_3COOH(0.1M) \mid H_2(1\text{atm})$, The emf of the cell will not be zero, because

A. The pH of 0.1M HCl and 0.1M acetic acid is not the same

B. Acids used in the two compartments are different

C. E.M.F. of a cell depends on the molarities of acids used

D. The temperature is contain.

Answer: A

Watch Video Solution

8. The reduction potential of hydrogen half cell will be negative if :

A. $p(H_2) = 1\text{atm and}\left[H^+\right] = 1M$

B. $p(H_2)$=2 atm and $\left[H^+\right] = 2M$

C. $p(H_2)$=2 atm and $\left[H^+\right] = 1M$

D. $p(H_2)$ = 1 atm and $[H^+] = 2M.$

Answer: C

Watch Video Solution

9. In an electrolytic cell, one litre of a 1 M aqueous solution of MnO_4^- is reduced at the cathode the quantity of electricity required so that the final solution is $0.1 M MnO_4^{2-}$ will be

A. 0.1F

B. 1F

C. 10F

D. 0.01F

Answer: A

Watch Video Solution

10. On electrolysis, which of the following does not give out hydrogen?

A. Acidic water using Pt electrodes

B. Fused NaOH using Pt electrodes

C. Dilute H_2SO_4 using Pt electordes

D. Dilute H_2SO_4 using Cu electordes

Answer: D

View Text Solution

11. The specific conductances of four electrolytes in $ohm^{-1}cm^{-1}$ are given below. Which one offers higher resistance to passage of electric current?

A. 7.0×10^{-4}

B. 9.2×10^{-10}

C. 6.0×10^{-8}

D. 4.0×10^{-9}

Answer: B

Watch Video Solution

12. The value of $\left(E_{H_2O/H_2}^{\circ}\right)$ (1atm) Pt at 298K would b e

A. $+0.207$

B. $-0.414V$

C. $-0.207V$

D. $+0.414V$

Answer: B

Watch Video Solution

Example

1. A cell is set up between copper and silver electrodes as follows:

$Cu(s)ICu^{2+}(aq)IIAg^{+}(aq)Iag(S)$

If the two half cells work under standard conditions, calculate the EMF of the cell

$\left(GivenE^{\circ}\_\left(Cu^{2+}/Cu\right) = +0.34V, E^{\circ}\_\left(Ag^{+}/Ag\right) = +0.80V\right)$

Watch Video Solution

2. Calculate the standard reduction potential of Cd^{2+}/Cd electrode for the cell :

$Zn(s)\left|Zn^{2+}(\text{IM})\right|\left|Cd^{2+}(IM)\right|Cd(s)$

$\left(\text{Given that } E^{\circ}_{cell} = 0.36V \text{ and } E^{\circ}_{Zn^{2+}/Zn} = -0.76V\right)$

Watch Video Solution

3. Calculate e.m.f. of the cell containing nickel and copper electrodes. Given that :

$E^{\circ}_{Ni^{2+}/Ni} = -0.25V, E^{\circ}_{Cu^{2+}/Cu} = +0.34V.$

Watch Video Solution

4. Write each half cell reaction as well as redox reaction for the following elctrochemical cell.

$Al(s)\left|Al^{3+}(IM)\right|\left|Zn^{2+}(IM)\right|Zn(s)$

Watch Video Solution

5. On the basis of the standard electrode potential velues, state whether Ti^{4+} species can be used to oxidise Fe(II) to Fe(III).

$Ti^{4+} + e^- \rightarrow Ti^{3+}, \quad E^{\circ} = +0.1V$

$Fe^{3+} + e^- \rightarrow Fe^{2+}, \quad E^{\circ} = +0.77V$

Watch Video Solution

6. Write the cell reaction that occurs when the following half-cells are combined.

$I_2 + 2e^- \rightarrow 2I^-(IM), \quad E^\circ = 0.54V$

$Br_2 + 2e^- \rightarrow 2Br^-(IM), \quad E^\circ = 1.08V$

Watch Video Solution

7. A cell is prepared by dipping a copper rod in 1M $CuSO_4$ solution and a nickel rod in 1M $NiSO_4$ solution. The standard reduction potentials of copper and nickel electrodes are +0.34 V and -0.25 V respectively.

(i) Which electrode will work as anode and which as cathode ?

(ii) What will be the cell reaction ?

(iii) How is the cell represented ?

(iv) Calculate the emf of the cell.

Watch Video Solution

8. Two half cell reactions of an electrons of an cell are given below :

$MnO_4^-(aq) + 8H^+(aq) + 5e^- \rightarrow Mn^{2+}(aq) + 4H_2O(l), E^\circ = +1.51V$

$Sn^{2+}(aq) \rightarrow Sn^{4+}(aq) + 2e^-, E^\circ = +0.15V.$

Construct a redox equation from the two half cell reactions and predict if this reaction favours the formation of reactants or products as shown in the equation.

Watch Video Solution

9. Calculate the emf of the cells formed by the various combinations of the following standard half cells. Here [M^(n+)]=1 mol L^{-1}, since we are considering standard cells.

(i) $Zn^{2+}(aq)/Zn(s)$

(ii) $Cr^{3+}(aq)/Cr(s)$

(iii) $Cu^{2+}(aq)/Cu(s)$

(IV) $Ni^{2+}(aq)/Ni(s)$

(v) $Co^{2+}(aq)/Co(s)$

(vi) $Ag^+(aq)/Ag(s)$ also calculate the standard potentials of such cells.

View Text Solution

10. Calculate the reduction potential for the following half cell reaction at 298 K.

$Ag^{+}(aq)+e^{-}\rightarrow Ag(s)$

Given that $\left[Ag^{+}\right]=0.1M$ and $E^{\circ}=+0.80V$

Watch Video Solution

11. A zinc rod is dipped in 0.1 M $ZnSO_4$ solution. The salt is 95% dissociated of this dilution at 298 K. Calculate electrode potential.

$\left(E_{Zn^{2+}/Zn}=-0.76V\right)$.

Watch Video Solution

12. Represent the cell in which following reaction takes place :

$Mg(s)+2Ag^{\oplus}(0.0001M)\rightarrow Mg^{2+}(0.130M)+2Ag(s)$ calculate its E_{cell} if $E^{c-}{}_{\cdot cell}=3.17V$.

Watch Video Solution

13. Calculate E°_{cell} for the following reaction at $25^{\circ}C$.

$A + B^{2+}(0.001M) \rightarrow A^{2+}(0.0001M) + B$

(Given. $E_{cell} = 2.6805V, 1F = 96500Cmol^{-1}$

Watch Video Solution

14. Calculate the e.m.f. of the cell in which the following reaction takes place :

$Ni(s) + 2Ag^{+}(0.002M) \rightarrow Ni^{2+}(0.160M) + 2Ag(s)$

Given E°_{cell}=1.05 v

Watch Video Solution

15. The measured e.m.f. at $25^{\circ}C$ for the cell reaction ,

$Zn(S) + Cu^{2+}(1.0M) \rightarrow Cu(s) + Zn^{2+}(0.1M)$ is 1.3 volt, Calculate E° for the cell reaction.

Watch Video Solution

16. The standard reduction potentials of Cu^{2+}/Cu and Ag^{+}/Ag electrodes are 0.337 volt and 0.799 volt respectively. Construct a galvanic cell using these electrols so that its standard e.m.f. is positive. For what concentration of Ag^{+}, will the e.m.f. of the cell at $25^{\circ}C$ be zero if the concentration of Cu^{2+} is 0.01 M.

Watch Video Solution

17. Calculate e.m.f. of the cell, $Zn/Zn^{2+}(aq)(0.01M)$ | $\left|Cd^{2+}(0.1M)\right|Cd$ at 298 K. (Given $E^{\circ}_{Zn^{2+}/Zn} = -0.76V, E_{Cd^{2+}/Cd = -0.40V}$)

Watch Video Solution

18. Calculate the e.m.f. of the cell in which the redox reaction is :

$Mg(s) + 2Ag + (aq) \rightarrow Mg^{2+}(aq) + 2Ag(s)$ when $\left[Mg^{2+}\right] = 0.130$ M and

$\left[Ag^{+}\right] = 1.0 \times 10^{-4}M$. Given $E^{\circ}_{Mg^{2+}/Mg} = -2.37V$ and $E^{\circ}_{Ag^{+}/Ag} = +0.80V$.

Watch Video Solution

19. Calculate the e.m.f of the cell

$Mg(s)/Mg^{2+}(0.1M) \mid \mid Cu^{2+}\left(1.0 \times 10^{-3}M\right)/Cu(s)$

Given $E^{\circ}_{Cu^{2+}/Cu} = +0.34V$ and $E^{\circ}_{Mg^{2+}/Mg} = -2.37V$

Watch Video Solution

20. A voltaic cell is set up at $25^{\circ}C$ with following half cells : $Ag^{+}(0.001M) \mid Ag$ and $Cu^{2+}(0.10M) \mid Cu$ What would be the voltage of this cell ? $\left(E^{\circ}_{cell} = 0.45V\right)$

Watch Video Solution

21. A copper-silver cell is set up. The copper ion concentration in it is 0.10 M. The concentration of silver ions is not known. The cell potential measured is 0.422 V. Determine the concentration of silver ions in the cell.

[Given $E^{\circ}_{Ag^{+}/Ag} = 0.80, E^{\circ}_{Cu^{2+}/Cu} = +0.34V$]

Watch Video Solution

22. Calculate the potential for a half cell reaction containing $0.1MK_2Cr_2O_7, 0.20MCr^{3+}(aq)$ and $1.0 \times 10^{-4}MH^{+}(aq)$. The half cell reaction is :

$Cr_2O_7^{2-}(aq) + 14H^{+}(aq) + 6e^{-} \rightarrow 2Cr^{3+}(aq) + 7H_2O(l)$

The standard electrode potential $\left(E^{\circ}\right) = 1.33V$.

Watch Video Solution

23. A voltaic cell is set up at $25^{\circ}C$ with the following half cells :

Al^{3+}(0.001 M) and Ni^{2+}(0.50 M)

Write the equation for the reaction when the cell generates the electric current. Also determine the cell potential (Given $E^{\circ}_{Ni^{2+}/Ni} = -0.25V, E^{\circ}_{Al^{3+}/Al} = -1.66V$).

Watch Video Solution

24. For the electrochemical cell, $Mg(s)\left|Mg^{2+}(aq, 1M)\right| \mid Cu^{2+}(aq.1M)Cu(s)$, the standard emf of the cell is 2.70 V at 300 K. When the concentration of Mg^{2+} is changed to x M, the cell potential changes to 2.67 V at 300 K. What is the value of x ?

(Given, F/R =11500 K V^{-1},where F is the Faraday constant and R is the gas constant, the value of $\text{In}_{(10)}(10) = 2.30\Big)$.

Watch Video Solution

25. A cell contains two hydrogen electrodes. The negative electrode is in contact with a solution of 10^{-6} M hydrogen ions. The emf of the cell is 0.118 V at $25\,^{\circ}C$ calculate the concentration of hydrogen ions at the positive electrode.

Watch Video Solution

26. Calculate the emf of the cell :

$Pb(s)\left|Pb\left(NO_3\right)_2\left(M_1\right)\right|\left|HCl\left(M_2\right)\right|H_2(g) \mid Pt(s)$

When (i) $M_1 = 0.10M, M_2 = 0.20M$ and $P_{H_2} = 1.00\text{atm}$

(ii) $M_1 = 1.05 \text{ M}, M_2 = 1.0M$ and $P_{H_2} = 1.00 \text{ atm}$

(iii) $M_1 = 1.00M, M_2 = 0.40 \text{ M}$ and $P_{H_2} = 1.00 \text{ atm}$

Watch Video Solution

27. The obseved emf of the cell

$Pt/H_2(g, 1 \text{ atm}) \mid H^+\left(3 \times 10^{-4}M\right) || H^+\left(M_1\right)/H_2(g, 1 \text{ atm})/Pt$

at 298 K is 0.154 V. Calculate the value of M_1.

Watch Video Solution

28. Calculate the equilibrium constant for the reaction at 298 K

$Zn(s) + Cu^{2+}(aq) \leftrightarrow Zn^{2+}(aq) + Cu(s)$

Given $E^\circ_{Zn^{2+}/Zn} = -0.76V$ and $E^\circ_{Cu^{2+}/Cu} = +0.34V$

Watch Video Solution

29. Calculate the equilibrium constant for the cell reaction :

$4Br^{-} + O_2 + 4H^{+} \rightarrow 2Br_2 + 2H_2O$. Given $E^{\circ}_{cell} = 0.16V$

Watch Video Solution

30. Calculate the equilibrium constant for the reaction :

$Fe(s)Cd^{2+}(aq) \leftrightarrow Fe^{2+}(aq) + Cd(s)$

$\left(\text{Given} E^{\circ}_{cd^{2+}/Cd} = -0.40V, E^{\circ}_{Fe^{2+}/Fe} = -0.44V\right)$

Watch Video Solution

31. Calculate equilibrium constant for the reaction at $25^{\circ}C$

$Cu(s) + 2Ag^{+}(aq) \Leftrightarrow Cu^{2+}(aq) + 2Ag(s)$

E° value of the cell is 0.46 V .

Watch Video Solution

32. A cell reaction is given as :

$A(s) + B^{2+}(aq) \leftrightarrow A^2(aq) + B(s)$

Equilibrium constant $\left(K_c\right)$ for the cell is 10. Calculate E°_{cell}.

Watch Video Solution

33. Calculate equilibrium constant for tha disproportionation reaction :

$2Cu^{2+}(aq) \rightarrow Cu(s) + Cu^{2+}(aq) \text{ at } 25^{\circ}C$

$\left(\text{Given } E^{\circ}_{\left(Cu^{+}/Cu\right)} = 0.52V, E^{\circ}_{\left(Cu^{2+}/Cu^{+}\right)} = 0.16V\right)$.

Watch Video Solution

34. The standard electrode potential for Daniell cell is 1.1 V. Calculate the standard Gibbs energy for the reaction.

$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$

Watch Video Solution

35. (a) Calculate ΔG° for the following reaction at $25^{\circ}C$

$$Au(s) + Ca^{2+}(aq1M) \rightarrow Au^{3+}(aq1M) + Ca(s)$$

Given $E^{\circ}_{Au^{3+}/Au} = +1.50V, E^{\circ}_{Ca^{2+}/Ca} = -2.87V$

(b) Predict whether the reaction will be spontaneous or not.

Watch Video Solution

36. Calculate the cell e.m.f. and ΔG for the cell reaction at 298 K for the cell.

$$Zn(s)\left|Zn^{2+}(0.0004M)\right|\left|Cd^{2+}(0.2M)\right|Cd(s)$$

Given

$E^{\circ}_{Zn^{2+}/Zn} = -0.763V, E^{\circ}_{cd^{2+}/cd} = -0.403V$ at $298K, F = 96500C\ \text{mol}^{-1}$.

Watch Video Solution

37. Calculate the e.m.f. of the following cell at $25^{\circ}C$

$$Mg(s)/Mg^{2+}(0.01M)\ |\ \ |\ Sn^{2+}(0.1M)/Sn(s)$$

Given $E^{\circ}_{Mg^{2+}/Mg} = -2.34V, E^{\circ}Sn^{2+}/Sn = -0.136V$

Also calculate the maximum work that can be accomplished by the operation of the cell.

Watch Video Solution

38. Determine the values of equilibrium constant $\left(K_c\right)$ and ΔG° for the reaction

$Ni(s) + 2Ag^+(aq) \rightarrow Ni^{2+}(aq) + 2Ag(s), E^\circ = 1.05V.$ (

Given $1F = 96500\text{C mol}^{-1}$)

Watch Video Solution

39. Given:

(i) $Cu^{2+} + 2e^- \rightarrow Cu, E^\circ = 0.337V$

(ii) $Cu^{2+} + e^- \rightarrow Cu^+, E^\circ = 0.153V$

Electrode potential, E° for the reaction, $Cu^+ + e^- \rightarrow Cu$, will be

Watch Video Solution

40. Calculate ΔG° and log K_c for the following reaction at 298 K :

$2Al(s) + 3Cu^{2+}(aq) \rightarrow 2Al^{3+}(aq) + 3Cu(s)$

Given E°_{cell}=2.02 V

Watch Video Solution

41. Calculate the number of coulombs required to deposit 40.5 g of Al when the electrode reaction is ,

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

Watch Video Solution

42. How many coulombs are required for the reduction of 1 mol of MnO_4^{-} to Mn^{2+}?

Watch Video Solution

43. How many coloumbs are required for the oxidation of 1 mole of $H_2O to O_2$

Watch Video Solution

44. Calculate the time to deposit 1.5 g of silver at cathode when a current of 1.5 A is passed through the solution of $AgNO_3$.

Watch Video Solution

45. An acidic solution of Cu^{2+} ions containing 0.4 g of Cu^{2+} ions is electrolysed until all the copper is deposited. Calculate the valume of oxygen evolved at N.T.P.

Watch Video Solution

46. How many coulombs are required to produce 50.0 g of aluminium from molten Al_2O_3 ?

Watch Video Solution

47. Silver is electro-deposited on a metallic vessel of surface area 900 cm^2 by passing a current of 0.5 ampere for 2 hours. Calculate the thickness of silver deposited, given that its density is 10.5 g cm^{-3}. (At. mass of Ag=108 amu).

Watch Video Solution

48. How many grams of chlorine can be produced by the electrolysis of molten NaCl with a current of 1.0A for 15 min ?

Watch Video Solution

49. What mass of zinc can be produced by the electrolysis of zinc sulphate solution when a steady current of 0.015 ampere is passed for 15 minutes ? Given that atomic mass of zinc is 65.4 amu ?

Watch Video Solution

50. A solution of copper (II) sulphate us electrolysed between copper electrodes by a current of 10 amperes exactly for 1 hour. What changes occur at the electrodes and in the solution ?

Watch Video Solution

51. A current of 3 amperes is passed for 5 hours through a molten metal salt which deposits 31.6 g of metal $\left(\text{molecular mass } = 177 gmol^{-1}\right)$. What is the valency of the metal ?

Watch Video Solution

52. Exactly 0.2 mole electrons are passed through two electrolytic cells in series containing $CuSO_4$ and $ZnSO_4$ respectively. How many grams of each metal will be deposited on the respective cathodes in the two cells ?

Watch Video Solution

53. How many grams of silver could be plated out of a shield by electrolysis of a solution containing Ag^+ ions for a period of 4 hours at a current strength of 8.5 amperes ?

Watch Video Solution

54. (a) Current of 1.5 ampere was passed through an electrolyte containing $AgNO_3$ solution with inert electrodes. The weight of silver deposited was 1.5 g. How long did the current flow ?

(b) Write the reactions taking place at anode and at cathode in the above cell.

(c) Give the reactions taking place at the two electrodes if they are made up of silver.

Watch Video Solution

55. A solution of $M(NO_3)_2$ was electrolysed by passing a current of 2.5 A and 3.06 g of the metal was deposited in 35 minutes. Determine the molar mass of the metal.

Watch Video Solution

56. How many moles of mercury will be produced by electrolysing 1.0 M $Hg(NO_3)_2$ solution by a current of 2.0 A when passed for 3 hours ?

Watch Video Solution

57. Two electrolytic cells containing silver nitrate solution and dilute sulphuric acid solution were connected in series. A steady current of 2.5

amp was passed through them till 1.078 g of silver was deposited. [Ag=107.8 g mol^{-1},1 F=96,500 C]

(i) How much electricity was consumed ?

(ii) What was the weight of oxygen gas liberated ?

Watch Video Solution

58. Calculate the pH of 0.5 of 1.0 M NaCl solution after electrolysis when a current of 5.0 ampere is passed for 965 seconds.

Watch Video Solution

59. The specific conductance of 0.05 N solution of an electrolyte at 298 K is 0.002 S cm^(-1). Calculate the equivalent conductance.

Watch Video Solution

60. A 0.05 M NaOH solution offered a resistance of 31.6 Ω in a conductivity cell at 298 K. If the cell constant of the conductivity cell is 0.367 cm^{-1}, find out the specific and molar conductance of the sodium hydroxide solution.

Watch Video Solution

61. The measured resistance of a conductivity cell containing 7.5×10^{-3} M solution of KCl at 43° C was 1005 ohms. Calculate (a) Specific conductance (b) Molar conductance of the solution. Given cell constant =1.25 cm^{-1}.

Watch Video Solution

62. Resistance of a conductivity cell filled with 0.1 M KCl is 100 ohm. If the resistence 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. Conductivity of 0.1 KCl solution is $1.29 \times 10^{-2}\ \text{ohm}^{-1} cm^{-1}$.

Watch Video Solution

Watch Video Solution

63. Electrolytic conductivity of 0.30 M solution of KCl at 298 K is $3.72 \times 10^2\ \mathrm{S}\ cm^{-1}$. Calculate its molar conductivity.

Watch Video Solution

64. The electrical resistance of a column of $0.05\ \mathrm{mol}\ L^{-1}$ NaOH solution of diameter 1 cm and length 50 cm is $5.55 \times 10^3\ \mathrm{ohm}$ .Calculate its resistivity,conductivity and molar conductivity.

Watch Video Solution

65. $\wedge^{\circ}{}_{m}$ for $CaCl_2$ and $MgSO_4$ from the given data.

$\lambda^{\circ}_{Ca^{2+}} = 119.0Scm^2mol^{-1}$ ltbr. $\lambda^{\circ}_{Cl^{c-}} = 76.3Scm^2mol^{-1}$

$\lambda^{\circ}_{Mg^{2+}} = 106.0Scm^2mol^{-1}$

$\lambda^{\circ}_{SO_4^{2-}} = 160.0cm^2mol^{-1}$

Watch Video Solution

66. Calculate Λ_m^{∞} for acetic acid, given,

$\Lambda_m^{\infty}(HCl) = 426\Omega^{-1}cm^2mol^{-1}, \Lambda_m^{\infty}(NaCl) = 126\Omega^{-1}cm^2mol^{-1}$,

$\Lambda_m^{\infty}(CHCOONa) = 91\Omega^{-1}cm^2mol^{-1}$

Watch Video Solution

67. At 298 K, the specific conductance of 0.1 M acetic acid solution was found to be $0.00163\Omega^{-1}cm^{-1}$. Calculate the degree of dissociation and dissociation constant of the acid if its molar conductance at infinite dilution is $390.7\Omega^{-1}cm^2mol^{-1}$.

Watch Video Solution

68. The conductivity of 0.001 $\text{mol } L^{-1}$ solution of CH_3COOH is 4.95×10^{-5} S cm^{-1}. Calculate its molar conductance and degree of dissociation (alpha).

Given$\lambda^{\circ}\left(H^+\right) = 349.6$ S $cm^2mol^{-1}, \lambda^{\circ}\left(CH_3COO^-\right) = 40.95cm^2mol^{-1}$

Watch Video Solution

69. The molar conductivity of 0.025 M methanoic acid (HCOOH) is $46.15 \text{ S } cm^2 mol^{-1}$. Calculate its degree of dissociation and dissociation constant. Given $\lambda^{\circ}_{(H^+)} = 349.6 \text{ S } cm^2 mol^{-1}$ and $\lambda^{\circ}_{(HCOO^-)} = 54.6 \text{ S } cm^2 mol^{-1}$.

Watch Video Solution

70. The conductance of 0.0015 M aqueous solution of a weak monobasic acid was determined by using a conductivity cell consisting of platinized Pt electrodes. The distance between the electrodes is 120 cm with an area of cross-section of $1 cm^2$. The conductance of this solution was found to be $5 \times 10^{-7} S$. The pH of the solution is 4. Calculate the value of limiting molar conductivity.

Watch Video Solution

71. The specific conductance of a saturated solution of AgCl in water is $1.826 \times 10^{-6} \text{ohm}^{-1} cm^{-1}$ at $25^\circ C$. Calculate its solubility in water at $25^\circ C$.

[Given

$\Lambda_m^\infty\left(Ag^+\right) = 61.92 \text{ ohm}^{-1} cm^2 mol^{-1} \text{and} \Lambda_m^\infty\left(Cl^-\right) = 76.34 \text{ ohm}^{-1} cm^2 mol^{-1}\Big]$

.

Watch Video Solution

72. Standard free energies of formation (I kJ/mol) at $298K$ are -237.2, -394.4 and -8.2 for $H_2O(1), CO_2(g)$ and pentange (g) , respectively . The value of E°_{cell} for the pentane-oxygen fuel cell is .

Watch Video Solution

73. In the button cell, widely used in watches, the following reaction takes place

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

Determine E° and ΔG° for the reaction.

(Given : $E^\circ_{Ag^+/Ag} = +0.80V, E^\circ_{Zn^{2+}/Zn} = -0.76V$

Watch Video Solution

74. A fuel cell is supplied 1 mole of H_2 gas and 10 moles O_2gas. If the fuel cell is operated at 96.5 mA currecnt, how long will it deliver power?

Watch Video Solution

IN-TEXT QUESTIONS

1. How would you determine the standard reduction potential of the system $Mg^{2+}|Mg$?

Watch Video Solution

2. Can you store $CuSO_4$ solution in Zn pot ?

Watch Video Solution

3. Consult the table of standard electrode potential and suggest three substances that can oxidize Fe^{2+} ions under suitable conditions.

Watch Video Solution

4. Calculate the potential of hydrogen electrode in contact with a solution whose $pH = 10$.

Watch Video Solution

5. Calculate the e.m.f. of the cell in which the following reaction takes place :

$Ni(s) + 2Ag^{+}(0.002M) \rightarrow Ni^{2+}(0.160M) + 2Ag(s)$

Given E°_{cell}=1.05 v

Watch Video Solution

6. The cell in which the following reaction occurs

$2Fe^{3+}(aq) + 2I^{-}(aq) \rightarrow 2Fe^{2+}(aq) + 2I_2$ has $E^{\circ}_{cell} = 0.236V$ at $298K$.

Calculate standard Gibbs energy and equilibrium constant for the reaction.

Watch Video Solution

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

Watch Video Solution

8. Suggest a way to determine $\wedge_{m^{\circ}}$ value of water.

Watch Video Solution

9. The molar conductivity of 0.025 M methanoic acid (HCOOH) is $46.15\ \text{S}\ cm^2 mol^{-1}$. Calculate its degree of dissociation and dissociation constant. Given $\lambda^{\circ}\left(H^{+}\right) = 349.6 \ S \ cm^2 mol^{-1}$ and $\lambda^{\circ}\left(HCOO^{-}\right) = 54.6 \ S \ cm^2 mol^{-1}$.

Watch Video Solution

10. If a current of $0.5A$ flows through a metallic wire for 2 hours, then how many electrons would flow through the wire ?

Watch Video Solution

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

Watch Video Solution

12. Consider the reaction :

$$Cr_2O_7^{2-} + 14H^{+} + 6e^{-} \rightarrow 2Cr^{3+} + 7H_2O$$

What is the quantity of electricity in coulombs needed to reduce 1 mole of $Cr_2O_7^{2-}$ ions ?

Watch Video Solution

13. Write the CHMemistry of reCHMarging of lead storage battery highlighting all the materials that are involved during reCHMarging.

Watch Video Solution

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

Watch Video Solution

15. Explain how rusting of iron is envisaged as setting up of an electroCHMemical cell.

Watch Video Solution

N.C.E.R.T. EXERCISE

1. Arrange the following metals in the order in whiCHM they displace eaCHM other from the solution of their salts. $Al, Cu, Fe, Mg,$ and Zn.

Watch Video Solution

2. Given standard electrode potentials

$K^{\oplus} \mid K = -2.93V, Ag^{\oplus} \mid Ag = 0.80V,$

$Hg^{2+} \mid Hg = 0.79V$

$Mg^{2+} \Big| Mg = -2.37V, Cr^{3} \Big| Cr = -0.74V$

Arrange these metals in their increasing order of reducing power.

Watch Video Solution

3. Depict the galvanic in which the reaction :

$Zn(s) + 2Ag^{+}(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$ takes place.

Further show :

$a.$ Which of the electrode is negatively Charged ?

b. The carriers of the current in the cell.

c. Individual reaction at each electrode.

Watch Video Solution

4. Calculate the standard cell potentials of the galvanic cells in which the following reactions take place.

(a) $2Cr(s) + 3Cd^{2+} \rightarrow 2Cd^{3+}(aq) + 3Cd(s)$

Given $E^{\circ}_{Cr^{3+}/Cr} = -0.74\ \text{V}, E^{\circ}_{Cd^{2+}/Cd} = -0.40\ \text{V}$

(b) $Fe^{2+}(aq) + Ag^{+}(aq) \rightarrow Fe^{3+}(aq) + Ag(s)$

Gievn $E^{\circ}_{Ag^{+}/Ag} = 0.80\ \text{V}, E^{\circ}_{Fe^{3+}/Fe^{2+}} = 0.77\ \text{V}$

Also calculate ΔG° and equilibrium constant for the reaction.

Watch Video Solution

5. Write the Nernst equation and EMF of the following cells at $298K$:

a. $Mg(s)\left|Mg^{2+}(0.001M)\right|\left|Cu^{2+}(0.0001M)\right|Cu(s)$

b. $Fe(s)\left|Fe^{2+}(0.001M)\right|H^{\oplus}(1M)\left|H_2(g)(1bar)\right|Pt(s)$

c. $Sn(s)\left|Sn^{2+}(0.050M)\right|\left|H^{\oplus}(0.020M)\right|H_2(g)(1bar) \mid Pt(s)$

d. $Pt(s)\left|Br_2(1)\right|Br^{c-}(0.010M)\left|\right|H^{\oplus}(0.030M)\left|H_2(g)(1bar)\right|Pt(s)$

Watch Video Solution

6. In the button cell, widely used in watches, the following reaction takes place

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

Determine E° and ΔG° for the reaction.

(Given : $E^\circ_{Ag^+/Ag} = +0.80V, E^\circ_{Zn^{2+}/Zn} = -0.76V$

Watch Video Solution

7. Define conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration.

Watch Video Solution

8. The conductivity of 0.20 M solution of KCl at 298 K is 0.0248 S cm^{-1} .

Calculate its molar conductivity.

Watch Video Solution

9. The resistance of a conductivity cell contaning $0.001MKCl$ solution at $298K$ is 1500Ω. What is the cell constant if conductivity of $0.001MKCl$ solution at $298K$ is $0.146 \times 10^{-3}Scm^{-3}Scm^{-1}$.

Watch Video Solution

10. The conductivity of sodium Chloride at $298K$ has been determine at different concentrations and the results are given below :

$Concentration(M)$:	0.001	0.010	0.020	0.050	0.100
$10^2 \times k\left(Sm^{-1}\right)$:	1.237	11.85	23.15	55.53	$1.06.74$

Calculate $\wedge_m$ for all concentrations and draw a plot between $\wedge_m$ and $c^{1/2}$. Find the value of $\wedge_m^\circ$.

Watch Video Solution

11. The conductivity of $0.00241M$ acetic acid is $7.896 \times 10^{-5} Scm^{-1}$. Calculate its molar conductivity. If Λ_m° for acetic acid is $390.5 Scm^2 mol^{-1}$, what is its dissociation constant ?

Watch Video Solution

12. How much Charge is required for the following reductions :

a. $1 mol of Al^{3+} \rightarrow Al$

b. $1 mol of Cu^{2+} \rightarrow Cu$

c. $1 mol of MnO_4^-$ to Mn^{2+} ?

Watch Video Solution

13. How much electricity in terms of Faraday is required to produce.

a. $20.0g$ fo Ca from molten $CaCl_2$

b. $40g$ of Al from molten Al_2O_3

Watch Video Solution

Watch Video Solution

14. How much electricity is required in coulomb for the oxidation of :

(a) 1 mol of H_2O to O_2,

(b) 1 mole of FeO to Fe_2O_3 ?

Watch Video Solution

15. A solution of $Ni(NO_3)_2$ is electrolyzed between platium electrodes using a current of $5A$ for $20min$. What mass of Ni is deposited at the cathode ?

Watch Video Solution

16. Three electrolytic cells A, B and C containing solutions of zinc sulphate, silver nitrate and copper sulphate, respectively are connected in series. A steady current of 1.5 ampere was passed through them until 1.45 g of silver were deposited at the cathode of cell B. How long did the current flow? What mass of copper and what mass of zinc were deposited in the concerned cells? (Atomic masses of Ag = 108, Zn = 65.4, Cu = 63.5)

Watch Video Solution

17. Using the standard electrode potentials given in Table, predict if the reaction between the following is feasible:

$a. Fe^{3+}(aq)$ and $I^{c-}(aq)$

$b.\ Ag^{\oplus}(aq)$ and $Cu(s)$

$c.\ Fe^{3+}(aq)$ and $Br^{c-}(aq)$

$d.\ Ag(s)$ and $Fe^{3+}(aq)$

$e. Br_2(aq)$ and $Fe^{2+}(aq)$.

Watch Video Solution

18. Predict the products of electrolysis in each of the following :

$a.$ An aqueous solution of $AgNO_3$ with silver electrodes.

$b.$ An aqueous solution of $AgNO_3$ with platinum electrodes,

$c.$ A dilute solution of H_2SO_4 with platinum electrodes.

$d.$ An aqueous solution of $CuCl_2$ with platinum electrodes.

Watch Video Solution

Short Answer Type Questions

1. Can absolute electrode potential of an electrode be measured?

Watch Video Solution

2. Can E°_{cell} or $\Delta_r G^{\circ}$ for cell reaction ever be equal to zero?

Watch Video Solution

3. Under what condition is $E^{\circ}_{\text{cell}} = 0$ or $\Delta_r G = 0$?

Watch Video Solution

4. What does the negative sign in the expression $E^{\circ}_{Zn^{2+}/Zn} = -0.76V$ mean?

Watch Video Solution

5. Aqueous copper sulphate solution and aqueous silver nitrate solution are electrolysed by 1 ampere current for 10 minutes in separate electrolytic cells. Will the mass of copper and silver deposited on the cathode be same of different? Explain your answer.

Watch Video Solution

6. Depict the galvanic cell in which the cell reaction is

$Cu + 2Ag^{+} \rightarrow 2Ag + Cu^{2+}$

Watch Video Solution

7. Value of standard electrode potential for the oxidation of Cl^- ions is more positive than that of water, even then in the electrolysis of aqueous sodium chloride, why is Cl^- oxidsied at anode instead of water?

Watch Video Solution

8. What is electrode potential?

Watch Video Solution

9. Consider the following diagram in which an electrochemical cell is coupled to an electrolytic cell. What will be the polarity of electrodes 'A' and 'B' in the electrolytic cell ?

View Text Solution

10. Why is alternating current used for measuring resistance of an electrolytic solution ?

Watch Video Solution

11. A galvanic cell has electrical potential of 1.1 V . If an opposing potential of 1.1 V is applied to this cell, what will happen to the cell reaction and current flowing through the cell ?

Watch Video Solution

12. How will the pH of brine (aq NaCl solution) be affected when it is electrolysed.

Watch Video Solution

13. Unlike dry cell, the mercury cell has a constant cell has a constant cell potential throughout its useful life, why?

Watch Video Solution

14. Solutions of two electrolytes A and B are diluted. The Λ_m of 'B' increases 1.5 times while that of A increases 25 times. Which of the two is a strong electrolyte? Justify your answer.

Watch Video Solution

15. When acidulated water (dil. H_2SO_4 solution) is electrolysed, with pH of the solution be affected? Justify your answer.

Watch Video Solution

16. In an aqueous solution how does specific conductivity of electrolytes change with additon of water?

Watch Video Solution

17. Which reference electrode is used to measure the electrode potnetial of other electrodes?

Watch Video Solution

18. Consider a cell given below.

$$Cu\left|Cu^{2+}\right|Cl^{-} \mid Cl_2. Pt$$

Write the reactions that occur at anode and cathode.

Watch Video Solution

19. Write the Nernst equation for the cell reaction in the Daniel cell. How will the E_{cell} be affected when concentration of Zn^{+} ions is increased?

Watch Video Solution

20. What advantage do the fuel cells have over primary and secondary batteries?

Watch Video Solution

21. Write the cell reaction of a lead storage battery when it is discharged. How does the density of the electrolyte change when the battery is discharged ?

Watch Video Solution

22. Why on dilution the Λ_m of CH_3COOH increases drastically, while that of CH_3COONa increases gradually?

Watch Video Solution

LONG ANSWER TYPE QUESTIONS

1. Consider the figure below and answer the following questions :

(i) Cell 'A' has $E_{cell} = 2 \text{ V}$ and Cell B has $E_{cell} = 1.1 \text{ V}$ which of the two cells 'A' or 'B' will act as an electrolytic cell. Which electrode reactions will occur in this cell ?

(ii) If cell 'A' has $E_{cell} = 0.5 \text{ V}$ and cell 'B' has $E_{cell} = 1.1 \text{ V}$ then what will be the reactions at anode and cathode ?

View Text Solution

2. Consider the figure and answer the questions (i) to (vi) given below :

(i) Redraw the diagram to show the direction of electron flow.

(ii) Is silver plate the anode or cathode ?

(iii) What will happen if salt bridge is removed ?

(iv) When will the cell stop functioning ?

(v) How will concentration of Zn^{2+} ions and Ag^{+} ions be affected when the cell functions ?

How will the concentration of Zn^{2+} ions and Ag^{+} ions be affected after the cell becomes 'dead' ?

View Text Solution

3. What is the relationship between Gibbs free energy of the cell reaction in a galvanic cell and the emf of the cell ? When will the maximum work be obtained froma galvanic cell ?

Watch Video Solution

ADDITIONAL IMPORTANT QUESTIONS

1. Blue colour of $CuSO_4$ solution is discharge slowly when an iron rod is dipped into it. Why?

Watch Video Solution

2. Explain why,iron sheets are coated with zinc.

Watch Video Solution

3. Check the feasibility of the following redox reaction with the help of electrochemical series

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

Watch Video Solution

4. Solutions of two electrolytes 'A' and 'B' are diluted. It is found that Λ_m value of 'B' increases 2 times while that of 'A' increases20 times. Which of the two is a strong electrolyte ?

Watch Video Solution

5. A galvanic cell has $E^\circ_{cell} = 1.5 \text{ V}$. If an opposing potential of 1.5 V is applied to cell, what will happen to the cell reaction and current flowing through the cell ?

View Text Solution

6. What will happen when chloride is passed through an aqueous solution of potassium bromide ?

Watch Video Solution

7. What is the souce of electrical energy in a galvanic cell ?

Watch Video Solution

8. How can the electrode potentail of an electrode be increased ?

Watch Video Solution

9. Knowing that :

$$Cu^{2+}(aq) + 2e^{-} \rightarrow Cu(s), \quad E^{\circ} = +0.34 \text{ V}$$

$$2Ag^{+}(aq) + 2^{-} \rightarrow 2Ag(s), \quad E^{\circ} = +0.80 \text{ V}$$

reason out whether, 1M silver nitrate solution can be stored in copper vessel or 1M copper sulphate solution in silver vessel.

Watch Video Solution

10. In an electrochemical cell (Cu-Ag), why are solutions containing Cu^{2+} and Ag^{+} ions kept in separate containers ?

Watch Video Solution

11. What is the difference between cell potential and standard cell potential ?

Watch Video Solution

12. Write half cell reactions and balanced chemical equations for the following galvanic cells.

(a) $Zn(s)\left|Zn^{2+}(aq)\right|\left|Cr^{3+}(aq)\right|Cr(s).$

(b)

$Pb(s), \left|PbSO_4(s)\right|HSO_4^-(aq), H^+(aq) \mid \left|H^+(aq), HSO_4^-(aq)\right|PbO_2(s), PbSO_4(s)$

.

(c) $Mg(s)\left|Mg^{2+}(aq)\right|\left|Sn^{2+}(aq)\right|Sn(s).$

View Text Solution

13. Write the cell reaction if the Nernst equation is given by the relation

$$E_{cell} = E^{\circ}_{cell} - \frac{RT}{2F}\text{In}\frac{\left[Pb^{2+}\right]}{\left[H^{+}\right]^2}.$$

Watch Video Solution

14. The ionic conductance of alkali metal cations increases with increase in atomic mass from lithi to caesium. Explain.

Watch Video Solution

15. Iron does not rust even if zinc coating on its surface is broken but the same is not true when coating is of tin.

Watch Video Solution

16. Rusting of iron becomes quicker in saline medium. Explain.

View Text Solution

17. Why molbilities of $H^{\oplus}$ ions in ice is greater as compared to liquid water.

Watch Video Solution

18. Given that, $Co^{3+} + e^- \rightarrow Co^{2+} E^\circ = +1.82V$

$2H_2O \rightarrow O_2 + 4H^+ + 4e^-, E^\circ = -1.23V.$

Explain why Co^{3+} is not stable in aqueous solutions.

Watch Video Solution

19. What would happen if the protective tin coating over an iron bucket is broken in some places ?

Watch Video Solution

20. Explain why zinc dissolves in dilute HCl to liberate H_2(g) but from concentrated H_2SO_4, the gas evolved is SO_2.

Watch Video Solution

21. There iron sheets have been coated separately with three metals (A,B and C) whose standard electrode potentials are given below.

Metal	A	B	C	$Iron$
	-0.46 V	-0.66 V	-0.20 V	-0.44 V

Identify in which case rusting will take place faster when coating is damaged.

Watch Video Solution

22. Why cannot aluminium metal be produced by the electrolysis of aqueous solution of aluminium salt ?

Watch Video Solution

23. Tarnished silver contains Ag2S. Can this tarnish be removed by placing the tarnished ware in an aluminium pan containing an inert electrolyte solution such as NaCl ? Given that the standard reduction potentials for the half reactions are :

$Ag2S(s) + 2e^- \rightarrow 2Ag(s), + S^2(aq), E^\circ = -0.71 \text{ V}.$

$Al^{3+}(aq) + 3e^- \rightarrow Al(s), E^\circ = -1.66 \text{ V}.$

Watch Video Solution

24. The following chemical reaction occurring in an electrochemical cell :

$Mg(s) + 2Ag^+(0.0001M) \rightarrow Mg^{2+}(0.10M) + 2Ag(s)$

Given $E^\circ_{Mg^{2+}/Mg} = -2.36 \text{ V}, E^\circ_{Ag^+/Ag} = +0.81 \text{ V}$

For the cell, calculate/write :

(i) E° value for the electrode $2Ag^+/2Ag$

(ii) Standard cell potential $\left(E^\circ\right)$

(iii) Cell potential (E)

(iv) Give the symbolic representation of the above cell

(v) Will the above cell reaction be spontaneous ?

Watch Video Solution

25. An electrochemical cell stops working after sometime. Explain.

Watch Video Solution

QUESTIONS FROM BOARD EXAMINATIONS

1. On passing one Faraday of charge, one gram mole of the substance is deposited on the cathode. Comment.

Watch Video Solution

2. Dilution of an electrolyte helps in increasing its electrical conductivity. But it has an adverse effect as well. Discuss.

Watch Video Solution

3. In the electrolysis of a solution containing H^{+} and Cu^{2+} ions, at the cathode H^{+} ions are liberated in preference to Cu^{2+} ions. Is the statement correct ?

Watch Video Solution

4. On electrolysis, how many coulimbs will be required for the reduction of one mode of Al^{3+} to Al ?

Watch Video Solution

5. After sometime, the voltage of an electrochemical cell becomes zero. Comment on the statement.

Watch Video Solution

6. What is over voltage ?

Watch Video Solution

7. Why is not possible to determine Λ_m^{∞} for weak electrolytes by extrapolation ?

Watch Video Solution

8. Which out of 0.1 M HCl and 0.1 M NaCl, do you expect to have greater Λ_m^{∞} and why ?

Watch Video Solution

9. How many moles of copper will be deposited from a solution of $CuSO_4$ by passing 24125 C of electricity ?

Watch Video Solution

10. Write an expression to co-relate molar conductivity of the electroyte to the degree of dissociation.

Watch Video Solution

11. Which allotropic form of carbon is used for making eletrodes ?

Watch Video Solution

12. Which metals can be used in the cathodic protection of Fe against rusting.

Watch Video Solution

13. Name the electrodes used in a fuel cell.

Watch Video Solution

14. Name the electrolyte used in fuel cell and mercury cell.

Watch Video Solution

15. Why equilibrium constant is related to E_{cell}^{c-} but not to E_{cell} ?

Watch Video Solution

16. State the factors which influence the value of cell potential in the following cell.

$Mg \left| Mg^{2+}(aq) \right|\left| Ag^{+}(aq) \right| Ag(s)$

Watch Video Solution

17. Write the cell reaction which occurs in lead storage battery when it is in use.

Watch Video Solution

18. How does the molar conductance of an electrolyte vary with dilution ?

Watch Video Solution

19. Which is evolved at cathode when an aqueous solution of NaCl is electrolysed ?

Watch Video Solution

20. Can we store copper sulphate solution in zinc vessel ?

Watch Video Solution

21. How is Λ_m^{∞} of weak electroytes calculated according to Kohlrausch's law ?

Watch Video Solution

22. Why does alkaline medium inhibit the rusting of iron ?

Watch Video Solution

23. Why does not iron rust even if zinc coating is broken in a galvanised iron pipe ?

Watch Video Solution

24. Write equation for the reaction between free energy change and standard cell potential.

Watch Video Solution

25. Write Nernst equation for the following cell reaction :

$Zn(s)\left|Zn^{2+}(aq)\right|\left|Cu^{2+}(aq)\right|Cu(s)$

Watch Video Solution

26. Two metals A and B have reduction potential values of -0.25 v and +0.80 V respectiely. Which of these will liberate hydrogen gas from dilute H_2SO_4?

Watch Video Solution

27. Predict the products of electrolysis of a solution of H_2SO_4 using platinum electrodes.

Watch Video Solution

28. Write the cell reactions which occur in lead storage battery when (i) it is in use (ii) not in use.

Watch Video Solution

29. Express the reaction between conductivity of a solution.

View Text Solution

30. Write the chemical formula of rust.

Watch Video Solution

31. Can a nicked spon be used to stir a solution of copper sulphate ? Support your answer with reaon.

(Given : $E^{\circ}_{Ni^{2+}/Ni} = -0.25\ V, E^{\circ}_{Cu^{2+}/Cu} = 0.34\ V$)

Watch Video Solution

32. Find E°_{cell} for the cell :

$Zn|Zn^{2+}(1M)||Ag^{+}(1M)|Ag$

[Given that : $E^{\circ}_{Zn/Zn^{2+}} = 0.76\ V, E^{\circ}_{Ag^{+}/Ag} = 0.80\ V.$

Watch Video Solution

33. Express the relation among cell constant , resistance of the solution in the cell and conductivity of the solution . How is molar conductivity of a solution related to its conductivity ?

Watch Video Solution

34. Given that standard electrode potentials $\left(E^{\circ}\right)$ of metals are :

$K^{+}/K = -2.93\ \text{V}, Ag^{+}/Ag = 0.80\ \text{V}, Cu^{2+}/Cu = 0.34\ \text{V}, Mg^{2+}/Mg = -2.37$

$Sn^{2+}(aq) \rightarrow Sn^{4+}(aq) + 2e^{-}, E^{\circ} = -0.15\ \text{V}$

Construct the redox reaction equation from the two half-reactions and calculate the cell potential from the standard potentials and predict if the reaction is reactant or product favoured.

Watch Video Solution

35. Two half-reactions of an electrochemical cell are given below :

$$MnO_4^-(aq) + 8H^+(aq) + 5e^- \rightarrow Mn^{2+}(aq) + 4H_2O(l), E^\circ = +1.51 \text{ V}$$

$$Sn^{2+}(aq) \rightarrow Sn^{4+}(aq) + 2e^-, E^\circ = -0.15 \text{ V}$$

Construct the redox equation from the two half cell reactions and predict if the reaction favours formation of reactant or product shown in the equation.

Watch Video Solution

36. Write an expression for molar conductivity of acetic acid at infinite dilution according to Kohlrausch's law.

Watch Video Solution

37. Write the anode and cathode reactions and the overall reaction occurring in a lead storage battery.

Watch Video Solution

38. Write down the half cell reactions and cell reaction for Daniell cell.

$$Zn(s)\left|Zn^{2+}(aq)(1M)\right| \mid Cu^{2+}(aq)\frac{1M}{C}u(s)$$

Watch Video Solution

39. What type of a battery is lead storage battery? Write the anode and the cathode reactions and the overall reactions occurring in a lead storage battery.

Watch Video Solution

40. Express the relation between.conductivity and molar conductivity of a solution held in a cell.

Watch Video Solution

41. Write the product obtained at anode on electrolysis of concentrated sulphate sulphuric acid and using platinum electrodes.

$$H_2SO_4 \overset{(aq)}{\rightarrow} 2H^+_{(aq)} + SO_4^{2-}(aq)$$

Watch Video Solution

42. (i) For a weak electrolyte, molar conductance in dilute solution increases sharply as its concentration in solution is decreased. Give reason.

Watch Video Solution

43. Calculate the charge in coloumbs required for oxidation of 2 moles of water to oxygen ? (Given 1 F=96,500 C mol^{-1})

Watch Video Solution

44. Zinc/silver oxide cell is used in hearing aids and electric watches. The following reactions occur :

$Zn(s) \rightarrow Zn^{2+}(aq) + 2e^-, E^\circ_{Zn^{2+}/Zn} = -0.76V$

$Ag_2O + H_2O + 2e^- \rightarrow 2Ag + 2OH^-, E^\circ_{Ag^+/Ag} = 0.344 \text{ V}$

Calculate (i) Standard potential of the cell (ii) Standard Gibbs energy.

Watch Video Solution

45. Give reason :

(i) Rusting of iron pipe can be prevented by joining it with a piece of magnesium.

(ii) Conductivity of an electrolyte of an electrolyte solution decreases with the decreases in concentration.

Watch Video Solution

46. What are the reactions occuring at the cathode and anode of a Lechlanche cell ?

Watch Video Solution

47. Express relation in cell constant, resistance of solution in the cell and conductivity of the solution.

Watch Video Solution

48. Define molar conductivity of a solution and explain how molar conductivity changes with change in concentration of a solution for a weak and a strong electrolyte.

Watch Video Solution

49. Explain the terms specific conductivity and molar conductivity.

Watch Video Solution

50. State the law that helps to determine limiting molar conductivity of a weak electrolyte.

Watch Video Solution

51. Calculate limiting molar conductivity of $CaSO_4$ given that limiting molar conductivity of calcium and sulphate ions are 119.0 and $160.0 \text{ S } cm^2 mol^{-1}$ respectively.

Watch Video Solution

52. Write Faraday's Laws of electrolysis.

Watch Video Solution

53. Why does iron gain weight as a result of rusting ?

Watch Video Solution

54. State Kohlrausch's Law for the independent migration of ions. Mention the applications of the Law.

Watch Video Solution

55. Explain Dry cell with a labelled diagram.

View Text Solution

56. Name the type of cell which was used in Apollo space programme for providing electrical power.

Watch Video Solution

57. What is corrosion ? What are the factors which influence corrosion ?

View Text Solution

58. (a) Define electrode potential.

View Text Solution

59. Difference Between Potential Difference And Emf

Watch Video Solution

60. In the cell , $Cr(s)\left|Cr^{3+}(aq)\right|\left|Cd^{2+}(aq)\right|Cd(s).$, write down the anodic and cathodic reactions and also overall reaction.

Watch Video Solution

61. What is a fuel cell ? Write its one advantage over other ordinary cells.

Watch Video Solution

62. Define limiting molar conductivity. Why does conductivity of an electrolyte decrease with discrease in concentration.

Watch Video Solution

63. Following reactions occur at cathode during electrolysis of aqueous silver chloride solution :

$Ag^{+}(aq) + e^{-} \rightarrow Ag(s), E^{\circ} = +0.80 \text{ V}$

$H^{+}(aq) + e^{-} \rightarrow 1/2H_2(g), E^{\circ} = 0.00 \text{ V}$

On the basis of standard reduction potential (E° value), which reaction is feasible at cathode and why ?

Watch Video Solution

64. Why does the cell potential of mercury cell remain constant throughout its life ?

Watch Video Solution

65. What do you understand by standard e.m.f. of a cell ? Derive a relationship between standard emf of a cell and equilibrium constant.

Watch Video Solution

66. (a) Write Faraday's second law of electrolysis.

(b) Draw a labelled diagram of standard hydrogen electrode.

Watch Video Solution

67. What is a secondary battery ? Write the mechanism of lead storage battery with the help of chemical equation.

View Text Solution

68. Calculate E°_{cell} for the following reaction at 298 K:

$2AI(s) + 3Cu^{2+}(0.01M) \rightarrow 2A1^{3+}(0.01M) + 3Cu(s)$

Given: $E_{cell} = 1.98V$

(b) Using the E° values A and B, predict which is better for coating the surface of iron

$\left[E^{\circ}\left(Fe^{2+}/Fe\right) = -0.44V\right]$ to prevent corrosion and why?

Given: $E^{\circ}\left(A^{2+}/A\right) = 2.37V : E^{\circ}\left(B^{2+}/B\right) = 0.14V$

Watch Video Solution

69. What type of battery is dry cell ? Write overall reaction occurring in dry cell.

Watch Video Solution

70. From the given cells :

Answer the following :

(i) Which cell is used in hearing aids?

(ii) Which cell was used in Apollo Space Programme?

(iii) Which cell is used in automobiles and inverters?

(iv) Which cell does not have long life?

Watch Video Solution

71. (a) Discuss the electrochemical theory of corroison

(b) For the reaction

$Ni(s) + 2Ag^{+}(1M) \rightarrow Ni^{2+}(1M) + 2Ag(s)$

Which species gets reduced ?

View Text Solution

72. In which of the following reactions, oxidation and reduction take place ?

(i) $Zn \rightarrow Zn^{2+} + 2e^{-}$ (ii) $Sn^{4+} + 2e^{-} \rightarrow Sn^{2+}$

Watch Video Solution

73. (a) Solutions of two electrolytes 'A' and 'B' are diluted. The limiting molar conductivity of 'B' increases 1.5 times while that of 'A' increases 25 times. Which of the two is a strong electrolyte ? Justify your answer.

(b) The products of electrolysis of aqueous NaCl at the respective electrodes are :

Cathode : H_2, Anode : Cl_2 and not O_2. Explain.

View Text Solution

74. Write the name of the cell which is generally used in inverters. Write the reactions taking place at the anode and the cathode of this cell.

Watch Video Solution

75. What will happen to the value of emf of the following cell if the concentration of the electrolyte in the anode compartment is increased ?

$Zn\left|Zn^{2+}(0.1M)\right| \mid Cu^{2+}(0.1M)Cu.$

Watch Video Solution

Watch Video Solution

76. Calculate the maximum work that can be obtained from the daniell call given below,

$Zn(s)\left|Zn^{2+}(aq)\right|\left|Cu^{2+}(aq)\right|Cu(s)$. Given that $E^{\circ}_{Zn^{2+}/Zn} = -0.76V$ and $E^{\circ}_{Cu^{2+}/Cu} = +0.34V$.

Watch Video Solution

77. Write the cell reactions for the following cells :

(a) $Fe\left|Fe^{2+}\right|\left|H_2SO_4\right|H_2(Pt)$

(b) $(Pt)H_2|HCl| \mid Cl_2(Pt)$

Watch Video Solution

78. Draw a neat and labelled diagram for $H_2 - O_2$ fuel cell. Write the reaction which occurs at cathode of the cell.

Watch Video Solution

79. (a) Explain electrochemical series.

(b) Can we store 1M $CuSO_4$ solution in zinc vessel or not, why ?

Watch Video Solution

80. Standard Electrode Potential

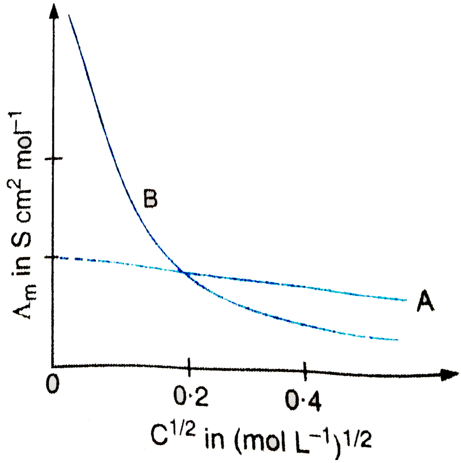
Watch Video Solution

81. What is Battery ? Give one example each of primary battery and secondary battery.

Watch Video Solution

HOTS

1. The curves obtained when molar conductivity λ_m (along Y-axis) is plotted against the square root of concentration $C^{1/2}$ (along X-axis) for two electrolytes 'A' and 'B' are shown.



(a) What can you say about the nature of the two electrolytes ?

(b) How do you account for the increase in molar conductivity Λ_m for the electrolytes A and B on dilution ?

View Text Solution

2. The figure shows two electrolytic cells connected in series

(a) How much electricity is required for the reduction of 1 mole of Ag^+ ions to Ag ?

(b) If three Faradays of electricity are passed through these cells, what is the ratio of the cations (Ag^+ and Cu^{2+}) deposited at the cathodes ?

View Text Solution

3. In the dry cell

(a) Which substance acts as anode and which as cathode ?

(b) Which electrolyte is used in the cell ?

(c) What is the cell potential of the cell ?

(d) Why does the cell voltage not change during operation ?

View Text Solution

4. Two platinum electrides are dipped in an aqueous solution of copper sulphate blue in colour. A current is passed through it.

(a) What will happen on the two electrodes ?

(b) What will happen to the colour of the solution ?

(c) Predict the nature of the solution left in the electrolytic cell.

View Text Solution

5. For the redox reaction :

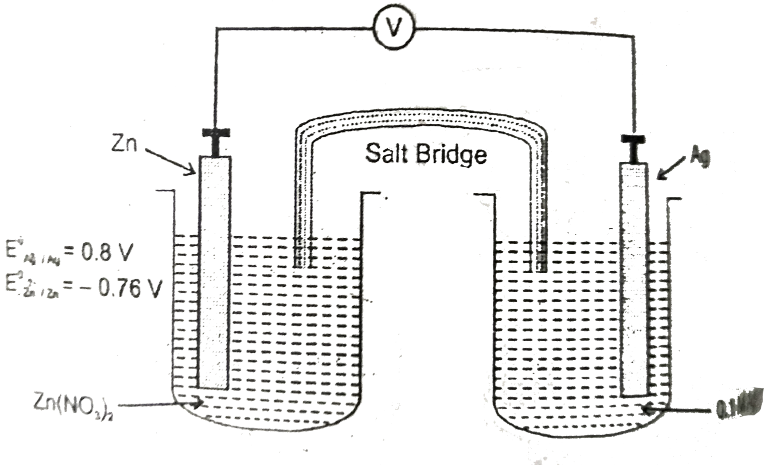
$Zn(s) + Cu^{2+}(aq) \Leftrightarrow Zn^{2+}(aq) + Cu(s)$

Reaction quotient (Q) $= \dfrac{\left[Zn^{2+}(aq)\right]}{\left[Cu^{2+}(aq)\right]} = 0.01$. What will be the value of E_{cell} ?

Given that OA=1.10 V.

Watch Video Solution

6.



Consider the following electrochemical cell.

(a). Write a balanced net ionic equation for the spontaneous reaction that take place in the cell.

(b). Calculate the standard cell potential E^0 for the cell reaction.

(c). If the cell emf is $1.6V$ what is the concentration of Zn^{2+}?

(d). How will the cell potential be affected if KI is added to Ag^+ half-cell?

Watch Video Solution

7. Magnesium metal is produced commercially by the isolation of $MgCl_2$ from sea water followed by electrolysis of molten salt

$MgCl_2 \rightarrow Mg + Cl_2$

(a) What mass of Mg can be produced if a current of 430 amperes is passed for 1.0 hour ?

(b) If a current of 500 amperes is used, how many hours will be required to convert all the 1000 kg of $MgCl_2$ into Mg metal ?

Watch Video Solution

8. (a) In a cell reaction, equilibrium constant L is less than one. Is E° for the cell positive or negative ?

(b) What will be the value of K if $E^{\circ}_{cell} = 0$?

Watch Video Solution

9. A silver oxide-zinc cell maintains a fairly constant voltage during discharge (1.50V). The button form of the cell is used in hearing aids. The half-reactions involved are :

$Zn(s) + 2OH^{-}(aq) \rightarrow Zn(OH)_2(s) + 2e^{-}$

$Ag_2O(s) + H_2O(l) + 2e^- \rightarrow 2Ag(s) + 2OH^-(aq)$

Will change in $\left[OH^-\right]$ affect E_{cell} ?

Watch Video Solution

10. A constant current of 30 amperes ispassed through an aqueous solution of NaCl for 1 hour. How many grams of NaOH will be formed in the reaction ? Also find out the volume of Cl_2 evolved at S.T.P.

View Text Solution

11. Calculate the value of equilibrium constant for the reaction taking place between Cu(II) and Sn (II) ions in aqueous solution at 298 K.

Given : $E^{\circ}_{cu^{2+}/cu} = 0.34 \text{ V}, E^{\circ}_{Sn^{2+}/Sn^{4+}} = -0.154 \text{ V}.$

Watch Video Solution

12. The K_{sp} for AgCl at 298 K is 1.0×10^{-10}. Calculate E for Ag^+/Ag electrode immersed in 1.0 M KCl solution.

Given : $E^\circ Ag^+/Ag = 0.799$ V.

Watch Video Solution

13. The reduction potentials of Cu^{2+}/Cu and Ag^+/Ag electrodes are 0.34V and 0.80 v respectively. For what concentration of Ag^+ ions will the EMF of the cell at $25^\circ C$ is zero ? Given that the concentration of Cu^{2+} is 0.01 M.

Watch Video Solution

14. The standard reduction potential for the half-cell, $NO^-_{3(aq.)} + 2H^+_{(aq.)} + e^- \rightarrow NO_{2(g)} + 2H_2O$ is $0.78V$.

(i) Calculate the reduction potential in 8M H^+.

(ii) What will be the reduction potential of the half-cell in a neutral solution. Assume all the other species to be at unit concentration

Watch Video Solution

15. The standard reduction potential of the Ag^{+}/Ag electrode at 298 K is 0.799 V. Given that K_{sp} for AgI $= 8.7 \times 10^{-17}$, evaluate the potential of Ag^{+}/Ag electrode in a saturated solution of AgI.

Watch Video Solution

16. How many grams of silver could be plated out on a serving tray be electrolysis of solution containing silver in $+1$ oxidation state for a period of 8.0 hour at a current of 8.46 ampere? What is the area of the tray if the thickness of the silver plating is $0.00254cm$? Density of silver is $10.5g/cm^{3}$.

Watch Video Solution

17. A 100 W and 110 V incandescent lamp is connected in series with an electrolytic cell containing $CdSO_4$ solution. What mass of cadmium will be deposited at the cathode after 4 hours of electrolysis ?

[Atomic mass of Cd=112.2]

Watch Video Solution

PROBLEMS FOR PRACTIVE

1. Which reaction occurs at cathode in a galvanic cell ?

Watch Video Solution

2. Can a half cell work independently ?

Watch Video Solution

3. What is the direction of flow of electrons in the following cell ?

$Zn \left| Zn^{2+} \right| | Ag^{+} | Ag$

Watch Video Solution

4. Can 1M $FeSO_4$ solution be stored in nickel vessel ?

Watch Video Solution

5. Predict whether the following redox reaction is feasible under the standard conditions or not.

$Sn^{2+}(aq) + Cu(s) \rightarrow Sn(s) + Cu^{2+}(aq)$

Given : $E^{\circ}_{Sn^{2+}/Sn} = -0.136\ \text{V and}\ E_{Cu^{2+}/Cu} = +0.34\ \text{V}$

Watch Video Solution

6. Can 1 M $ZnSO_4$ be stored in a vessel made up of copper ?

Given : $E^{\circ}_{Zn^{2+}/Zn} = -0.76\ \text{and}\ E^{\circ}_{Cu^{2+}/Cu} = +0.34\ \text{V?}$

Watch Video Solution

7. What is the cell potential of the following cell ?

$$Zn(s)\left|Zn^{2+}(1.0M)\right|\left|Pb^{2+}(1.0M)\right|Pb(s)$$

Given : $E^{\circ}_{Pb^{2+}/Pb} = -0.12\ \text{V}$ and $E^{\circ}_{Zn^{2+}/Zn} = -0.76\ \text{V}$

Watch Video Solution

8. A galvanic cell consists of a metallic zinc plate immersed in 0.1 M $Zn(NO_3)_2$ solution and metallic plate of lead in 0.02M $Pb(NO_3)_2$ solution. Calculate the emf of the cell.

Write the chemical equation for the electrode reactions and represent the cell.

$$\left(\text{Given}: E^{\circ} Zn^{2+} ZN = 0.76V, \quad E^{\circ} Pb^{2+}/Pb = -0.13V\right)$$

Watch Video Solution

9. Calculate the e.m.f. of the cell,

$$Mg/Mg^{2+}(0.1M) \mid \mid Ag^{+}\left(1.0 \times 10^{-3}M\right)/Ag$$

The values of $E^{\circ}_{Mg^{2+}/Mg}$ and $E^{\circ}_{Ag^{+}/Ag}$ are -2.37 V and +0.80 V respectively.

Watch Video Solution

10. Calculate the e.m.f. of the cell,

$Mg(s)/Mg^{+}(0.1M) \mid \mid Ag^{+}\left(1 \times 10^{-4}M\right)/Ag(s)$

$E^{\circ}_{Ag^{+}/Ag} = +0.8 \text{ V}, E^{\circ}_{Mg^{2+}/Mg} = -2.37 \text{ V}$

What will be the effect on e.m.f. if concentration of Ag^{+} is increased to $1 \times 10^{-3}M$?

Watch Video Solution

11. Calculate the emf of the cell.

$Mg(s)\left|Mg^{2+}(0.2M)\right|\left|Ag^{+}\left(1 \times 10^{-3}\right)\right|Ag$

$E^{\circ}_{Ag^{+}/Ag} = +0.8$ volt, $E^{\circ}_{Mg^{2+}/Mg} = -2.37$ volt

What will be the effect on emf If concentration of Mg^{2+} ion is decreased to $0.1M$?

Watch Video Solution

12. Calculate the cell potential for the cell,

$Ni(s)/Ni^{2+}(0.1M) \mid \mid Ag^{+}(0.1M)/Ag(s)$

$\Big[\text{Given, } E^{\circ}_{Ag^{+}/Ag} = +0.80 \text{ V}, E^{\circ}_{Ni^{2+}/Ni} = -0.25 \text{ V}, R = 8.314JK^{-1}mol^{-1}, F =$

Watch Video Solution

13. (a) Calculate the potential of Zn^{2+}/Zn electrode in which zinc ion activity is 0.001 M. $mol^{-1}, = 96500Cmol^{-1}, E^{\circ}_{Zn^{2+}/Zn} = -0.76 \text{ V} \Big)$

(b) Calculate the electrode potential of copper electrode dipped in a 0.1 M solution of copper sulphate at 298 K, assuming $CuSO_4$ to be completely ionised. The standard reduction potential of copper , $E^{\circ}_{Cu^{2+}/Cu} = 0.34 \text{ V}$ at 298 K.

Watch Video Solution

14. Calculate the e.m.f. of the cell,

$Zn(s)/Zn^{2+}(0.1M) \,|\, |\, Pb^{2+}(0.02M)/Pb(s)$

$E^{\circ}_{Zn^{2+}/Zn} = -0.76\text{ V}$ and $E^{\circ}_{Pb^{2+}/Pb} = -0.13\text{ V}$

Watch Video Solution

15. Calculate the standard electrode potential of the Ni^{2+}/Ni electrode , if the cell potential potential of the cell,

$Ni/N^{2+}(0.01M)/Cu is 0.59\text{ V}$. Given$E^{\circ}_{Cu^{2+}/Cu} = +0.34\text{ V}$

Watch Video Solution

16. Calculate the e.m.f. of the cell,

$Cr/Cr^{3+}(0.1M) \,|\, |\, Fe^{2+}(0.01M)/Fe$

Given: $E^{\circ}_{Cr^{3+}/Cr} = -0.75\text{ V}$, $E^{\circ}_{Fe^{2+}/Fe} = -0.45\text{ V}$

Cell reaction : $2Cr(s) + 3Fe^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Fe(s)$

$$\left\{\text{Hint. } E_{cell} = E^{\circ}_{cell} - \frac{0.0591V}{6}\log\frac{\left[Cr^{3+}\right]^2}{\left[Fe^{2+}\right]^3}\right.$$

Watch Video Solution

17. Calculate equilibrium constant for the reaction :

$$Mg(s)\left|Mg^{2+}(0.001M)\right|\left|Cu^{2+}(0.0001M)\right|Cu(s)$$

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

Watch Video Solution

18. Calculate the emf for the following cell at 298 K.

$$Cd/Cd^{2+}(0.1M) \mid \mid Ag^{+}(0.1M)/Ag$$

Given$E^{\circ}_{Cd^{2+}/Cd} = -0.40 \text{ V}, E^{\circ}_{Ag^{+}/Ag} = 0.80 \text{ V}$

Watch Video Solution

19. Standard electrode potentials are given as,

$E^{\circ}_{Cu^{2+}/Cd} = 0.34 \text{ V} \quad \text{and } E^{\circ}_{Ag^{+}/Ag} = 0.80 \text{ V}$

Calculate the cell potential, E for cell containing 0.100 M Ag^{+} and 4.00 M Cu^{2+} at $25^{\circ}C$.

Watch Video Solution

20. Calculate the potential of the following cell reaction at 298 K

$Sn^{4+}(1.50M) + Zn(s) \rightarrow Sn^{2+}(0.50M) + Zn^{2+}(2.0M)$

The standard potential, E° of the cell is 0.89 V. Whether the potential of the cell will increase or decrease if the concentration of Sn^{4+} is increased in the cell.

Watch Video Solution

21. A voltaic cell is set up at $25^{\circ}C$with the following half cells :

Al^{3+}(0.001 M) and Ni^{2+}(0.50 M)

Write the equation for the reaction when the cell generates the electric current. Also determine the cell potential (Given $E^{\circ}_{Ni^{2+}/Ni} = -0.25V, E^{\circ}_{Al^{3+}/Al} = -1.66V\big)$.

Watch Video Solution

22. At what concetration of Ag^{2+} ions, will the electrode have a potential of 0.0 V?

Watch Video Solution

23. At what pH of HCl solution, will hydrogen gas electrode show electrode potential of -0.118 V ? H_2 gas is bubbled at 298 K and 1 atm pressure.

Watch Video Solution

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

$Zn | Zn^{2+}$(0.001 M) || $H^{+}(0.01M) | H_2$(1 bar) | Pt(s). Given that

$E^{\circ}_{\left(Zn^{2+}/Zn\right)} = -0.76V, E^{\circ}_{\left(H^{+}/H_2\right)} = 0.00 \text{ V}$

Watch Video Solution

25. Given that $E^{\circ}\left(Zn^{2+}/Zn\right) = 0.76V, E^{\circ}\left(H^{+}/H_2\right) = 0.00 \text{ V}$. What is the value of electrode potential of Mg^{+}/Mg electrode when it is dipped in a solution in which concentration of Mg^{+} is 0.01 M ? (Given $E^{\circ}_{\left(Mg^{2+}/Mg\right)} = -2.36 \text{ V}$

Watch Video Solution

26. Calculate e.m.f. of the following cell at 298 K,

$2Cr(s) + 3Fe^{2+}(0.1M) \rightarrow 2Cr^{3+}(0.01M) + 3Fe(s)$

$\left(\text{Given}: E^{\circ}_{\left(Cr^{3+}/Cr\right)} = -0.74 \text{ V}, E^{\circ}_{\left(Fe^{2+}/Fe\right)} = -0.44 \text{ V}\right)$

Watch Video Solution

27. Calculate the following cell reaction cell at 298 K.

$2Ag^{+} + Cd \rightarrow 2Ag + Cd^{2+}$

E° for Ag^{+}/Ag and Cd^{2+}/Cd are 0.80 V and -0.40 V respectively.

E° for Ag^{+}/Ag and Cd^{2+}/Cd are 0.80 V and -0.40 V respectively.

(i) Write the cell representation.

(ii) What will be the emf of the cell if the concentration of Cd^{2+} is 0.1 M ?

(iii) Will the cell work spontaneously for the condition given above ?

Watch Video Solution

28. Calculate emf of the following cell reaction at 2968 K :

$Ni(s)/Ni^{2+}(0.01M) \mid \mid Cu^{2+}(0.1M)/Cu(s)$

[Given $E^{\circ}_{Ni^{2+}/Ni} = -0.25 \text{ V}, E^{\circ}_{Cu^{2+}/Cu} = +0.34 \text{ V}$]

Write the overall cell reaction.

Watch Video Solution

29. Calculate equilibrium constant for the reaction at $25\,^{\circ}C$

$Cu(s) + 2Ag^{+}(aq) \Leftrightarrow Cu^{2+}(aq) + 2Ag(s)$

E° value of the cell is 0.46 V .

Watch Video Solution

30. Calculate equilibrium constant for the reaction :

$Mg(s)\left|Mg^{2+}(0.001M)\right|\left|Cu^{2+}(0.0001M)\right|Cu(s)$

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

Watch Video Solution

31. Calculate the value of equilibrium constant for the reaction :

$2Fe^{3+} + 2I^{-} \rightarrow 2Fe^{2+} + I_2$

Given that $E^{\circ}_{cell} = 0.235\ \text{V}$

Watch Video Solution

32. Calculate equilibrium constant for the reaction :

$Zn + Cd^{2+} \Leftrightarrow Zn^{2+} + Cd,$

(Given $E^{\circ}_{cell} = 0.36\text{V}$)

Watch Video Solution

33. Calculate the standard free energy change for the reaction :

$Zn(s)\left|Zn^{2+}(1M)\right|\left|Cu^{2+}(1M)\right|Cu(s)$

Given $E^{\circ}_{cell} = 1.10 \text{ V}$.

Watch Video Solution

34. Calculate the maximum possible electrical work that can be obtined from the cell under the standard conditions at 298 K

$Zn\left|Zn^{2+}(aq)\right|\left|Ni^{2+}(aq)\right|Ni(s)$

Given $E^{\circ}_{Zn^{2+}(aq)\left|Zn(s)\right.} = -0.76 \text{ V}$, $E^{\circ}_{Ni^{2+}(aq)\left|Ni(s)\right.} = -0.25 \text{ V}$

View Text Solution

35. The value of ΔG° in the Daniell cell has been found to be -212.3 kJ at $25^{\circ} C$. Calculate equilibrium constant for the reaction.

Watch Video Solution

36. For the equilibrium reaction:

$2H_2(g) + O_2(g) \Leftrightarrow 2H_2O(l) at 298K$

$\Delta G^{\Theta} = -474.78 kJ mol^{-1}$. Calculate log K for it.

$\left(R = 8.314 JK^{-1} mol^{-1}\right)$.

Watch Video Solution

37. Calculate $\Delta_r G^{\circ}$ for the reaction :

$Mg(s) + Cu^{2+}(aq) \rightarrow Mg^{2+}(aq) + Cu(s)$

[Given $E^{\circ}_{cell} = +2.71 \text{ V}$, $1F = 96500 \text{ C}$]

Watch Video Solution

38. Calculate E°_{cell} and ΔG° for the following reaction at $25^{\circ}C$.

$A^{2+} + B^{+} \rightarrow A^{3+} + B$

(Given $K_c = 10^{10}, 1F = 96500 \text{ C mol}^{-1}$)

Watch Video Solution

39. Calculate emf and ΔG for the following reaction at 298 K

$Mg(s) \mid Mg^{2+}(0.01M) \parallel Ag^{+}(0.0001M) \mid Ag(s)$

Given $E^{\circ}_{\left(Mg^{2+}/Mg\right)} = -2.37 \text{ V}, E^{\circ}_{\left(Ag^{+}/Ag\right)} = +0.80 \text{ V}$

Watch Video Solution

40. The cell in which the following reaction occurs

$2Fe^{3+}(aq) + 2I^{-}(aq) \rightarrow 2Fe^{2+}(aq) + 2I_2$ has $E^{\circ}_{cell} = 0.236V$ at $298K$.

Calculate standard Gibbs energy and equilibrium constant for the reaction.

Watch Video Solution

41. For the reaction ,

$2AgCl(s) + H_2(g)(1 \text{ atm}) \rightarrow 2Ag(s) + 2H^+(0.1M) + 2Cl^-(0.1M), \Delta G^\circ = -43600$

.

Calculate e.m.f. of the cell.

Watch Video Solution

42. A lamp draws a current of 2.0 A. Find the charge in coulombs used by the lamp.

Watch Video Solution

43. How many electrons per second pass through a cross-section of copper wire carrying 10^{-16} A current ?

Watch Video Solution

44. How many coulombs are required for the following reductions ?

(i) 1 mol of Al^{3+} to Al.

(ii) 1 mol of Cu^{2+} to Cu.

Watch Video Solution

45. How many coulombs are required for the oxidation of 1 mol of FeO to Fe_2O_3 ?

(Hint. $Fe^{2+} \rightarrow Fe^{3+} + e^-$)

Watch Video Solution

46. How much electric charge is required to produce 20.0 g of calcium from molten $CaCl_2$?

Watch Video Solution

47. How many coulombs are required for the reduction.12.55 g of nitrobenzene to aniline in acidic medium.

Watch Video Solution

48. Calculate the mass of hydrogen evolved by passing a current of 0.5 ampere for 40 minutes through acidulated water.

Watch Video Solution

49. To deposit 1 mol of aluminium from molten Al_2O_3. What is the amount of electricity (in coulombs) required ?

Watch Video Solution

50. Calculate the number of coulombs required to deposit 40.5 g of Al when the electrode reaction is ,

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

Watch Video Solution

51. Calculate the number of coulombs required to deposit 5.4 g of Al when the electrode reaction is

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

(Given , atomic mass of Al =27 g $mol^{-1}, F = 96500 C mol^{-1}$)

Watch Video Solution

52. Silver is electro-deposited on a metallic vessel of surface area 800 cm^2 by passing a current of 0.2 ampere for 3 hours. Calculate the thickness of silver deposited given that its density is 10.47 g cm^{-3}. (At mass of Ag =107.92).

Watch Video Solution

53. Exactly 0.4 faraday of charge is passed through three electrolytic cells connected in series, first containing $AgNO_3$, second $CuSO_4$ while third containing $FeCl_3$ solution. How many grams of each metal will be deposited assuming only cathodic reaction in each cell ?

Watch Video Solution

54. How many amperes would be needed to produce 60.0 g of magnesium during the electrolysis of molten $MgCl_2$ in 2 hours ?

Watch Video Solution

55. How many copper will be deposited at cathode of an electrolytic cell containing Cu^{2+} ions by passing 2 ampere of current for 60 minutes.

Watch Video Solution

56. How much charge in faraday is required for the reduction of 1 mole of Cu^{2+} ions to Cu ?

Watch Video Solution

57. Calculate the time to deposit 1.27 g of copper at cathode when a current of 2A was passed through the solution of $CuSO_4$.

$\left(\text{Molar mass of } Cu = 63.5 g mol^{-1}, 1F = 96500 C mol^{-1}\right)$.

Watch Video Solution

58. How many moles of copper will be deposited by passing 24125 coulombs of electric current through $CuSO_4$ solution.

Watch Video Solution

59. Calculate the mass of Ag deposited at cathode when a current of 2 ampere was passed through a solution for 15 minutes.

Watch Video Solution

60. A cell with $N/50$ KCl solution offered a resistance of 550 ohm at 298 K. The specific conductance of $N/50$ KCl at 298 K is 0.002768 $ohm^{-1}cm^{-1}$. When this cell is filled with $N/10 ZnSO_4$ solution, it offered a resistance of 72.18 ohm at 298 K. Find the cell constant and molar conductance of $ZnSO_4$ solution at 298 K.

Watch Video Solution

61. The specific conductivity of $N/50$ KCl solution at 298 K is 2.768×10^{-3} mho per cm. The resistance of this solutions at 298 K when measured in a particular cell is 250.2 ohm. The resistance of $M/100 CuSO_4$ solution at 298 K measured with the same cell was 8331 ohm. Calculate the molar conductivity of copper sulphate solution.

Watch Video Solution

62. Calculate the specific resistance of a 0.02 N solution of an electrolyte having equivalent conductance 103 $ohm^{-1}cm^2(geq.)^{-1}$.

View Text Solution

63. The resistance of a decinormal solution of an electrolyte in a conductivity cell was found to be 245 Ω. Calculate the equivalent conductance of the solution if the electrodes in the cell were 2 cm part and each had an area of 3.5 sq. cm.

Watch Video Solution

64. The conductivity of 0.20 M solution of KCl at 298 K is 0.0248 S cm^{-1}. Calculate its molar conductivity.

Watch Video Solution

65. The specific conductivity of a solution containing $1.0g$ of anhydrous $BaCI_2$ in $200cm^3$ of the solution has been found to be $0.0058Scm^{-1}$. Calculate the molar and equivalent conductivity of the solution. Molecular wt. of $BaCI_2 = 208$[mu implies λ_m]

Watch Video Solution

66. Select the equivalent conductivity of $1.0MH_2SO_4$, if its conductivity is $0.26ohm^{-1}cm^{-1}$:

Watch Video Solution

67. At $25^\circ C$, the resistance of $0.01NNaCl$ solution is $200ohm$. If cell constant of the conductivity cell is unity, then the equivalent conductance of the solution is:

Watch Video Solution

68. Electorlytic specific conductance of 0.25 mol L^{-1} solution of CKI at $25^{\circ}C$ is $2.56 \times 10^{-2} ohm^{-1} cm^{-1}$. Calculate its molar conductance.

Watch Video Solution

69. Which of the following solutions has larger molar conductance ?

(a) 0.08 M solution having conductivity equal to $2.0 \times 10^{-2} ohm^{-1} cm^{-1}$.

(b) 0.10 M solution having resitivity equal to 58 ohm cm.

Watch Video Solution

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

Watch Video Solution

71. When a certain conductance cell was finlled with 0.1 mol L^{-1} KCl solution, it had a resistance of 85 ohm at 298K. When the same cell was filled with an aqueous solution of 0.052 mol L^{-1} of an electrolyte, the resistance was 96 ohm. Calcualte the molar conductance of the electrolyte at this concentration. (Specific conductance of 0.1 mol L^{-1} KCl solution is 1.29xx10^(-2)ohm^(-1)cm^(-1))`.

Watch Video Solution

72. The resistance of 0.5 M solution of and electrolyte enclosed enclosed between two platinuim electrodes 1.56 cm apart and having an are of $2.0cm^3$ was found to be 30 cm. Calculate the molar conductivity of the electrolyte/.

Watch Video Solution

73. Molar conductivity of a 1.5 m solustion of an electrolyte is found to be 138.9 S cm^2mol^{-1}. Calculate the conductivity of this solution.

Watch Video Solution

74. The resistance of conductivity cell containing 0.001 M KCI solution at 298 K is 1500 ohm. What is the cell constant if the conductivity of 0.001 M KCI solution at 298 K is $0.146 \times 10^{-3} Scm^{-1}$

Watch Video Solution

75. The conductivity of 0.001 mol L^{-1} solution of CH_3COOH is $3.905 \times 10^{-5} Scm^{-1}$. Calculate its molar conductivity and degree of dissociation (α).

$\left(\text{Given}: \lambda^{\circ}_{\left(H^+\right)} = 349.65 Scm^2 mol^{-1} \text{ and } \lambda^{\circ}\left(CH_3COO^-\right) = 40.9 Dcm^2 mol^{-1}\right)$

Watch Video Solution

76. At 291 K the moler conductace values at infinie dilution of NH_4CI, NaOH and NaCI are 129.1, 217.4 are 108.3 S $cm^2 mol^{-1}$ respectively. Calculate the molar conductane of NH_4OH at infinite dilution.

Watch Video Solution

77. Calculte molar conductance at infinite dilution for acetic acid, given

$A_m^{\infty} HCI = 425 ohm^{-1} cm^{-1}, A_m^{\infty} NaCI = 188 ohm^{-1} cm^{-1}, A_m^{\infty} CH_3COOHNa = 96 oh$

Watch Video Solution

78. The molar conductance of $CH_3COOHNa$ HCl and NaCl at infinite dilutions are 91.0, 426.0 and 126.0 $ohm^{-1} cm^{-1}$ respectively. Calculate the molar conductence of acetic acid at infinie dilution.

Watch Video Solution

79. The value A^{∞} for HCl, NaCl and CH_3COONa are 426.5 and 91.0 $ohm^{-1} cm^{-1} mol^{-1}$ respectively. Calculate the value of A^{∞} for acetic acid.

Watch Video Solution

80. The molar conductance of ammonium hydroxide solution of concentration 0.1 M, 0.01M and 0.001 M are 3.6, 11.3 and $34.0 ohm^{-1}cm^{-2}mol^{-1}$ respectively. Calculate the degree of dissociation of NH_4OH at these concentrations. Molar conductance at infinite dilution for NH_4OH is 271.1 $ohm^{-1}cm^{-1}mol^{-1}$.

Watch Video Solution

81. Molar conductivities at infinite dilution (at 298 K) of NH_4CI, NaOH and NaCl are 129.8, 217.4 and 108.9 $\Omega^{-1}cm^{-1}mol^{-1}$ respcetively. If the molar conductivity of a centimolar solution of NH_4OH is 9.33 $\Omega^{-1}cm^{-1}$, what is percentage dissociation of NA_4OH at this concentation ? Also calculte the dissociation constant for NH_4OH.

Watch Video Solution

82. At 298 K, The specific conductivity of a saturated solution of silver chloride in water is $2.30 \times 10^{-5} Scm^{-1}$. Calculate its solubility in gL^{-1} at 298 K. Given $\lambda_m^{\circ}\left(Ag^{+}\right)$ and $\lambda_m^{\circ}\left(Cl^{-}\right)$ are 61.9 and 76.3 S $cm^2 mol^{-1}$ respectively.

Watch Video Solution

83. The conductivity of 0.20 mol L^{-1} solution of KCl is $2.48 \times 10^{-2} Scm^{-1}$. Calculate its molar conductivity and degree of dissociation (α). Given

$\lambda^{\circ}_{\left(K^{+}\right)} = 73.5 Scm^{-2} mol^{-1}$ and $\lambda^{\circ}_{\left(CI^{-}\right)} = 76.5 mol^{-1}$

$\lambda^{\circ}_{\left(K^{+}\right)} = 73.5 Scm^{-2} mol^{-1}$ and $\lambda^{\circ}_{\left(CI^{-}\right)} = 76.5 mol^{-1}$

Watch Video Solution

84. The conductivity of 0.20 mol L^{-1} solution of KCl is $2.48 \times 10^{-2} Scm^{-1}$. Calculate its molar conductivity and degree of dissociation (α). Given

$\lambda^{\circ}_{\left(K^{+}\right)} = 73.5 Scm^{-2} mol^{-1}$ and $\lambda^{\circ}_{\left(CI^{-}\right)} = 76.5 mol^{-1}$

$\lambda^{\circ}_{\left(K^{+}\right)} = 73.5 Scm^{-2} mol^{-1}$ and $\lambda^{\circ}_{\left(CI^{-}\right)} = 76.5 mol^{-1}$

Watch Video Solution

ADDITIONAL NUMERICAL PROBLEMS FOR PRACTICE

1. How many grams of nickel are deposited by a current of 100 milliampere in 20 minutes in the electrolysis of aqueous nickel sulphate solution ? (Given atomic mass of Ni =58.7 amu.)

View Text Solution

2. What is the volume of O_{20} liberated at anode at STP in the electrolysis of $CdSO_4$ solution when a current of $2A$ is passed for $8min$?

Watch Video Solution

3. Molten aluminim chloride is electrolysed with a current of 0.5 ampere to produce 27.0 g of aluminium.

(a) How many gram equivalents of aluminium were producted ?

(b) How long did the electrolysis take place ?

(c) How many litres of chlorine were evolved at S.T.P. ?

View Text Solution

4. How many electrons flow when a current of 5 amperes is passed through a solution for 193 seconds ?

View Text Solution

5. 0.02 g equivalent of Ag was deposited in an electrolysis experiment. Find the quantity of charge passed. If the same charge is passed through a gold solution, 1.314 g of gold is deposited. Find the oxidation state of gold (Given atomic mass of Au =197 amu)

View Text Solution

6. Calculate conductance of 1 M $AgNO_3$ solution at 298 K if the inter electrode distance is 5 cm and the area of each electrode is $2cm^2$. The equivalent conductance of the solution $L_E = 94.3 \text{ S } cm^2 \equiv^{-1}$

View Text Solution

7. Calculate Λ_m^∞ for AgCl given that :

$\Lambda_m^\infty AgNO_3 = 133.4 \text{ ohm}^{-1} cm^2 \text{equiv}^{-1}$

$\Lambda_m^\infty KCl = 149.9 \text{ ohm}^{-1} cm^2 \text{equiv}^{-1}$

$\Lambda_m^\infty KNO_3 = 145.1 \text{ ohm}^{-1} cm^2 \text{equiv}^{-1}$

View Text Solution

8. The molar conductance of ammonium hydroxide solution of concentration 0.1 M, 0.01M and 0.001 M are 3.6, 11.3 and $34.0 ohm^{-1} cm^2 mol^{-1}$ respectively. Calculate the degree of dissociation of NH_4OH at these concentrations. Molar conductance at infinite dilution for Nh_4OH is 271.1 $ohm^{-1} cm^2 mol^{-1}$.

Watch Video Solution

9. For the cell reaction $Ni(s)\left|NI^{2+}(aq)\right|\left|Ag^{+}(aq)\right|Ag(s)$, calculate the equilibrium constant at $25^{\circ}C$. How much maximum work would be obtained for the operation of this cell ? (Given $E^{\circ}_{Ni^{2+}/Ni} = -0.25 \text{ V}$ and $E^{\circ}_{Ag^{+}/Ag} = 0.80 \text{ V}$)

View Text Solution

10. Calculate the potential of the following cell reaction at 258 K

$Sn^{4+}(1.50M) + Zn(s) \rightarrow Sn^{2+}(0.5M) + Zn^{2+}(2.0M)$

Standard potential of the cell is 0.89 v. s

View Text Solution

11. The E° values corresponding to the following reduction electrode process are :

(i) $Cu^{+}/Cu = +0.52\text{V}$, (ii) $Cu^{2+}/Cu^{+} = +0.16\ \text{V}$

Formulate the galvanic cell for their combination. What will be the standard cell potential for it ? Calculate ΔG for the cell reaction. ($F = 96500\ \text{C}\ mol^{-1}$)

View Text Solution

12. When a current of 0.75 A is passed through a $CuSO_4$ solution for 25 minutes, 0.369 g of copper is deposited at the cathode. Calculate the atomic mass of copper.

View Text Solution

MULTIPLE CHOICE QUESTIONS(TYPE-I)

1. Which cell will measure standard electrode potential of copper electrode?

A. $Pt(s)\left|H_2(g, 0.1\ \text{bar})\right|H^{+}(aq., 1M) \mid \left|Cu^{2+}(aq., 1M)\right|Cu$

B. $Pt(s)\left|H_2(g, 1 \text{ bar})\right|H^+(aq., 1M) \mid \left|Cu^{2+}(aq., 2M)\right|Cu$

C. $Pt(s)\left|H_2(g, 1 \text{ bar})\right|H^+(aq., 1M) \mid \left|Cu^{2+}(aq., 1M)\right|Cu$

D. $Pt(s)\left|H_2(g, 1 \text{ bar})\right|H^+(aq., 0.1 \text{ M}) \mid \left|Cu^{2+}(aq., 1M)\right|Cu$

Answer: C

Watch Video Solution

2. Electrode potential for Mg electrode varies according to the equation

$$E_{Mg^{2+} \mid Mg} = E^{\ominus}_{Mg^{2+} \mid Mg} - \frac{0.059}{2}\log\frac{1}{\left[Mg^{2+}\right]}$$

The graph of $E_{Mg^{2+} \mid Mg} vs \log\left[Mg^{2+}\right]$ is

A.

B.

C.

D.

Answer: B

Watch Video Solution

3. Which of the following statement is correct ?

A. E_{cell} and $\Delta_r G$ of cell reaction both are extensive properties.

B. E_{cell} and $\Delta_r G$ of cell reaction both are intensive proporties.

C. E_{cell} is an intensive property while $\Delta_r G$ of cell reaction is an extensive property.

D. E_{cell} is an intensive property while $\Delta_r G$ of cell reaction is an intensive property.

Answer: C

View Text Solution

4. The difference between the electrode potentials of two electrons when no current is drawn through the cell is called:

A. Cell potential

B. Cell emf

C. Potential difference

D. Cell voltage

Answer: B

Watch Video Solution

5. Which of the following statement is not correct about an inert electrode in a cell?

A. It does not participate in the cell reaction.

B. It provides surface either for oxidation or for reduction reaction.

C. It is provides surface for conduction of electrons.

D. It provides surface for redox reaction.

Answer: D

Watch Video Solution

6. An electrochemical cell an behave like an electrolytic cell when

A. $E_{cell} = 0$

B. $E_{cell} > E_{\text{ext}}$

C. $E_{\text{ext}} > E_{cell}$

D. $E_{cell} > E_{\text{ext}}$

Answer: C

Watch Video Solution

7. Which of the statements about solution of electrolytes is not correct?

A. Conductivity of solution depends upon size of ions.

B. Conductivity of solution depends upon viscosity of solution.

C. Conductivity of solution does not depend upon solvation of ions present in solution.

D. Conductivity of solution increases with temperature.

Answer: C

Watch Video Solution

8. Using the data given below:

$E^{\circ}_{Cr_2O_7^{2-} | Cr^{3+}} = 1.33V E^{\circ}_{Cl_2 | Cl^-} = 1.36V$

$E^{\circ}_{MnO_4^- | Mn^{2+}} = 1.51V E_{Cr^{3+} | Cr} = -0.74V$

Mark the strongest reducing agent.

A. Cl^-

B. Cr

C. Cl^{3+}

D. Mn^{2+}

Answer: B

Watch Video Solution

9. Use the data in Q.8 and find out which of the following is the strongest oxidising agent.

A. Cl^{-}

B. Mn^{2+}

C. MnO_4^{-}

D. Cr^{3+}

Answer: C

View Text Solution

10. Using the data given below:

$E^{\circ}_{Cr_2O_7^{2-} \mid Cr^{3+}} = 1.33 V E^{\circ}_{Cl_2 \mid Cl^{-}} = 1.36 V$

$E^{\circ}_{MnO_4^- | Mn^{2+}} = 1.51V E_{Cr^{3+} | Cr} = -0.74V$

In which option the order of reducing power is correct?

A. $Cr^{3+} < Cl^- < Mn^{2+} < Cr$

B. $Mn^{2+} < Cl^- < Cr^{3+} < Cr$

C. $Cr^{3+} < Cl^- < Cr_2O_7^{2-} < MnO_4^-$

D. $Mn^{2+} < Cr^{3+} < Cl^- < Cr$

Answer: B

Watch Video Solution

11. Use the data given in Q.8 and find out the most stable ion in its reduced form.

A. Cl^-

B. Cl^{3+}

C. Cr

D. Mn^{2+}

Answer: D

Watch Video Solution

12. Use the data given in Q.8 and find out the most stable ion in its reduced form.

A. Cr^{3+}

B. MnO_4^-

C. $Cr_2O_7^{2-}$

D. Mn^{2+}

Answer: A

Watch Video Solution

13. The quantity of charge required to obtain one mole of aluminium from $Al_2 0_3$ is

A. 1F

B. 6F

C. 3F

D. 2F

Answer: C

Watch Video Solution

14. The cell constant of a conductivity cell

A. changes with change of electrolyte

B. changes with change of concentration of electrolyte

C. changes with temperature of electrolyte

D. remains constant for a cell.

Answer: D

Watch Video Solution

15. While charging the lead storage battery:

A. $PbSO_4$ anode is reduced to Pb.

B. $PbSO_4$ cathode is reduced to Pb.

C. $PbSO_4$ cathode is oxidised to Pb.

D. $PbSO_4$ anode is oxidised to PbO_2

Answer: A

Watch Video Solution

16. $\Lambda^{\circ}_{(m)}\left(NH_4OH\right)$ is equal to

A. $\Lambda^{\circ}_{(m)}\left(NH_4OH\right) + \Lambda^{\circ}_{(m)}\left(NH_4OH\right) - \Lambda^{\circ}_{(HCl)}$

B. $\Lambda^{\circ}_{(m)}\left(NH_4Cl\right) + \Lambda^{\circ}_{(m)(NaOH)} - \Lambda^{\circ}_{(NaCl)}$

C. $\Lambda^{\circ}_{(m)}\left(NH_4Cl\right) + \Lambda^{\circ}_{(m)(NaCl)} - \Lambda^{\circ}_{(NaOH)}$

D. $\Lambda^{\circ}_{(m)(NaOH)} + \Lambda^{\circ}_{(m)(NaCl)} - \Lambda^{\circ}_{\left(NH_4Cl\right)}$

Answer: B

Watch Video Solution

17. In the electrolysis of aqueous sodium chloride solution which of the hall cell reaction will occur at anode?

A. $Na^{+}(aq) + e^{-} \rightarrow Na(s), E^{Ï´}_{cell} = 2.71 \text{ V}$

B. $2H_2O(l) \rightarrow O_2(g) + 4H^{+}(aq) + 4e^{-}, E^{Ï´}_{cell} = 1.23 \text{ V}$

C. $H^{+}(aq) + e^{-} \rightarrow \frac{1}{2}H_2(g), E^{Ï´}_{cell} = 0.00 \text{ V}$

D. $Cl^{-}(aq) \rightarrow \frac{1}{2}Cl_2(g) + e^{-}, E^{\circ}_{cell} = 1.36 \text{ V}$

Answer: B

Watch Video Solution

18. The positive value of the standard electrode potential of Cu^{2+}/Cu indicates that.......

A. this redox couple is a stronger reducing agent than the H^{+}/H_2 couple.

B. this redox couple is a stronger oxidising agent than H^{+}/H_2.

C. Cu can displace H_2 from acid.

D. Cu cannot displace H_2 from acid.

Answer: B::D

Watch Video Solution

MULTIPLE CHOICE QUESTIONS(TYPE-II)

1. Potential for some half cell reactions are given below. On the basis of these mark the correct answer.

(i) $H^+(aq) + e^- \rightarrow \left(\frac{1}{2}\right)H^2(g)\ E^\circ_{cell} = 0.00V$

(ii) $2H_2O(l) \rightarrow O_2(g) + 4H^+(aq) + 4e^-, E_{cell} = 1.23V$

(iii) $2SO_4^{2-}(aq) \rightarrow S_2O_8^{2-}(aq) + 2e^-, E^\circ_{cell} = 1.96V$

A. In dilute sulphuric acid solution, hydrogen will be reduced at cathode.

B. In concentration sulphuric acid solution, water will be oxidised at anode.

C. In dilute sulphuric acid solution, water will be oxidised at anode.

D. In dilute sulphate acid solution, SO_4^{2-} ion will be oxidised to tetrathionate ion at anode.

Answer: A::C

Watch Video Solution

2. $E^\circ_{\text{cell}} = 1.1V$ for Daniel cell. Which of the following expressions are correct description of state of equilibrium in this cell?

A. $1.1 = K_c$

B. $\frac{2.303RT}{2F}\log K_c = 1.1$

C. $\log K_c = \frac{2.2}{0.059}$

D. $\log K_c = 1.1$

Answer: B::C

Watch Video Solution

3. Conductivity of an electrolytic solution depends on:

A. nature of electrolyte

B. concentration of electrolyte

C. power of AC source

D. distance between the electrodes.

Answer: A::B

Watch Video Solution

4. $\Lambda_m^\circ H_2O$ is equal to

A. $\Lambda^\circ_{m\circ(HCl)} + \Lambda_m(NaOH)\circ \;^\circ - \Lambda^\circ_{m\left(N\circ aCl\right)}$

B. $\Lambda_{m\circ}\left(HNO_3\right) + \Lambda_{m\circ}\left(NaNO_3\right) - \Lambda_{m\circ}(NaOH)$

C. $\Lambda_{m\circ}\left(HNO_3\right) + \Lambda_{m\circ}(NaOH) - \Lambda_{m\circ}\left(NaNO_3\right)$

D. $\Lambda^\circ_m\left(NH_4OH\right) + \Lambda^\circ_m(HCl) - \Lambda^\circ_m\left(NH_4Cl\right)$

Answer: A::D

Watch Video Solution

5. What will happen during the electrolysis of aqueous solution of $CuSO_4$ by using platinum electrodes ?

A. Copper will deposit at cathode

B. Copper will deposit at anode

C. Oxygen will be released at anode

D. Copper will dissolve at anode.

Answer: A::C

Watch Video Solution

6. What will happen during the electrolysis of aqu eous solution of $CuSO_4$ in the presence of Cu electrodes?

A. Copper will deposit at cathode

B. Copper will deposit at anode

C. Oxygen will be released at anode

D. Copper will deposit at anode

Answer: A::B

Watch Video Solution

7. Conductivity k, is equal to

A. $\frac{1}{R}\frac{l}{A}$

B. $\frac{G^*}{R}$

C. Λ_m

D. $\frac{l}{A}$

Answer: A::B

Watch Video Solution

8. Molar conductivity of inic solution depends on ....

A. temperature

B. distance between electrodes

C. concentration of electrolytes in solution

D. surface area of electrodes.

Answer: A::C

Watch Video Solution

9. For the given cell, $Mg \mid Mg^{2+} \mid\mid Cu^{2+} \mid Cu$

A. Mg is cathode

B. Cu is cathode

C. The cell reaction is

$$Mg + Cu^{2+} \rightarrow Mg^{2+} + Cu$$

D. Cu is the oxidising agent.

Answer: B::C

Watch Video Solution

10. Match the terms given in Column I with the units given in Column II.

View Text Solution

MATCHING TYPE QUESTIONS

1. Match the terms given in Column I with the items given in Column II.

View Text Solution

2. Match the items of Column I and Column II.

View Text Solution

3. Match the items of Column I and Column II.

View Text Solution

4. Match the items of Column I and Column II.

View Text Solution

5. Match the items of Column I and Column II on the basis of data given below :

$E^{\text{Ï ´}}_{F_2/F^-} = 2.87\ \text{V}\ , E^{\text{Ï ´}}_{Li^+/Li} = 3.5\ \text{V}\ , E^{\text{Ï ´}}_{Au^{3+}/Au} = 1.4\ \text{V}\ , E^{\text{Ï ´}}_{Br_2/Br^-} = 1.09\ \text{V}$

View Text Solution

ASSERTION-REASON TYPE QUESTIONS

1. Assertion(A) Cu is less reactive than hydrogen.

Reason(R) $E^{\oplus}_{Cu^{2+}/Cu}$ is negative.

A. Both assertion and reaction are true and the reason is correct explanation for assertion

B. Both assertion and reason are true and reason is not correct explanation for assertion

C.) Assertion is true but the reason is False.

D. Both assertion and reason are false.

Answer: C

Watch Video Solution

2. Assertion (A) E_{cell} should have a positive value for the cell to function,

Reason(R) $E_{\text{cathode}} < E_{\text{anode}}$

A. Both assertion and reaction are true and the reason is correct explanation for assertion

B. Both assertion and reason are true and reason is not correct explanation for assertion

C.) Assertion is true but the reason is False.

D. Both assertion and reason are false.

Answer: C

Watch Video Solution

3. Assertion : Conductivity of all electrolytes decreases on dilution.

Reason : On dilution number of ions per unit volume decreases.

A. Both assertion and reaction are true and the reason is correct explanation for assertion

B. Both assertion and reason are true and reason is not correct explanation for assertion

C.) Assertion is true but the reason is False.

D. Both assertion and reason are false.

Answer: A

View Text Solution

4. Assertion : Λ_m for weak electrolytes shows a sharp increase when the electrolytic solution is diluted.

Reason : For weak electrolytes degree of dissociation increases with dilution of solution.

A. Both assertion and reaction are true and the reason is correct explanation for assertion

B. Both assertion and reason are true and reason is not correct explanation for assertion

C.) Assertion is true but the reason is False.

D. Both assertion and reason are false.

Answer: A

View Text Solution

5. Assertion : Mercury cell does not give steady potential.

Reason : In the cell reaction, ions are not involved in solution.

A. Both assertion and reaction are true and the reason is correct explanation for assertion

B. Both assertion and reason are true and reason is not correct explanation for assertion

C.) Assertion is true but the reason is False.

D. Both assertion and reason are false.

Answer: D

View Text Solution

6. Assertion : Electrolysis of NaCl solution gives chlorine at anode instead of O_2.

Reason : Formation of oxygen at anode requires overvoltage.

A. Both assertion and reaction are true and the reason is correct explanation for assertion

B. Both assertion and reason are true and reason is not correct explanation for assertion

C.) Assertion is true but the reason is False.

D. Both assertion and reason are false.

Answer: A

View Text Solution

7. Assertion : For measuring resistance of an ionic solution an AC source is used.

Reason : Concentration of ionic solution will change if DC source is used.

A. Both assertion and reaction are true and the reason is correct explanation for assertion

B. Both assertion and reason are true and reason is not correct explanation for assertion

C.) Assertion is true but the reason is False.

D. Both assertion and reason are false.

Answer: A

Watch Video Solution

8. Assertion : Current stops flowing when $E_{cell} = 0$.

Reason : Equilibrium of the cell reaction is attained.

A. Both assertion and reaction are true and the reason is correct explanation for assertion

B. Both assertion and reason are true and reason is not correct explanation for assertion

C.) Assertion is true but the reason is False.

D. Both assertion and reason are false.

Answer: A

Watch Video Solution

9. Assertion : $E_{Ag^+/Ag}$ increases with in concentration of Ag^+ ions.

Reason : $E_{Ag^+/Ag}$ has a positive value.

A. Both assertion and reaction are true and the reason is correct explanation for assertion

B. Both assertion and reason are true and reason is not correct explanation for assertion

C.) Assertion is true but the reason is False.

D. Both assertion and reason are false.

Answer: B

View Text Solution

10. Assertion : Copper sulphate can be stored in zinc vessel.

Reason : Zinc is less reactive than copper.

A. Both assertion and reaction are true and the reason is correct explanation for assertion

B. Both assertion and reason are true and reason is not correct explanation for assertion

C.) Assertion is true but the reason is False.

D. Both assertion and reason are false.

Answer: D

Watch Video Solution

11. Assertion (A): At the end of electrolysis using Pt electrodes, an aqueous solution of $CuSO_4$ turns colourless.

Reason (R): $CuSO_4$ chnages to $Cu(OH)_2$ during electrolysis.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: C

Watch Video Solution

12. Statement-I: Molar conductivity of a weak electrolyte at infinite dilution cannot be determined experimenttally.

Because Statement-II: Kohlrausch law help to find the moar conductivity of a weak electrolyte at infinite dilution.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: B

Watch Video Solution

13. Assertion : Neither pure H_2SO_4 nor pure $HClO_4$ conduct electric current but a mixture of two does.

Reason : Both are strong acids.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: B

View Text Solution

14. Assertion: Copper liberates hydrogen from a solution of dilute hydrochloric acid.

Reason: Hydrogen is above copper in the electro- chemical series.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: D

Watch Video Solution

15. Assertion(A): $Na^{\oplus}$ ions are discharged in preference to $H^{\oplus}$ ions at Hg cathode.

Reason (R): The nature of the cathode can affect the order of discharge of ions.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: A

Watch Video Solution

16. Statement-I: In electrolysis the quantity needed for depositing 1 mole of silver is different from that required for 1 mole of copper.

Because Statement-II: The molecular weights of silver and copper are different.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: C

Watch Video Solution

17. STATEMENT-1: 1 coulomb charge deposits 1 g-equivalent of a substance.

STATEMENT-2: 1 faraday is charge is charge on 1 mole of electrons.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: C

Watch Video Solution

18. Assertion : If E° value for reaction $Ag^{+} + e^{-} \rightarrow Ag$ is 0.80 V, then the value of reverse reaction will be 1.60 V.

Reason : If concentration of Ag^{+} ions is doubled, the electrode potential will be also doubled.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: D

View Text Solution

19. Assertion (A): $\left(H_2 + O_2\right)$ fuel cell gives a constant voltages throughout its life.

Reason (R): In this fuel cell, H_2 reacts with $\overset{c-}{OhH}$ ions, yet the over all $\left[\overset{c-}{OH}\right]$ does not change.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: A

Watch Video Solution

20. Assertion (A): The presence of CO_2 in the air accelerates corrosion.

Reason (R): CO_2 is a poisonous gas.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: C

Watch Video Solution

21. Assertion : Copper does not get corroded in the acidic medium.

Reason : Free energy for this process is positive.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: A

View Text Solution

22. (A) The cell constant of a cell depends upon the nature of the material of the electrodes.

(R) The observed conductance of a solution depends upon the nature of the material of the electrodes.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: D

Watch Video Solution

23. Assertion (A): Galvanized iron does not rust.

Reason (R): Zn has a more negative electrode potential than Fe.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: A

Watch Video Solution

24. Assertion (A): For a Daniell cell :

$Zn\left|Zn^{2+}\right|\left|Cu^{2+}\right|Cu$ with $E_{cell} = 1.1V$, the application of opposite potential greater than $1.1V$ results into the flow of electron from cathod to anode.

Reason (R): Zn is deposited at anode and Cu is dissolved at cathode

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: B

Watch Video Solution

25. The questions consist of two atatements each, printed as Assertion and Reason. While answering these questions you are required to choose any one of the following four responses :

Assertion : If standard reduction potential for the reaction $Ag^{+} + e^{-} \rightarrow Ag$ is 0.80 volt, then for the reaction $2Ag^{+} + 2e^{-} \rightarrow 2Ag$, it will be $1, 60$ volt .

Reason : If concentration of Ag^{+} ions is doubled , the standard electrode potential is also doubled.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: D

Watch Video Solution

26. Assertion (A): In a Daniell cell, if the concentration of Cu^{2+} and Zn^{2+} ions are doubled, the EMF of the cell will be doubled.

Reason (R): If the concentration of ions in contact with metals is doubled, the electrode potential is doubled.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: C

Watch Video Solution

27. These question consist of two statements each, printed as Assertion and Reason. While answering these questions you are required to choose any one of the following four responses :

Assertion : For a cell reaction $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$, at the equilibrium, voltmeter gives zero reading.

Reason : At the equilibrium, there is no change in the concentration of Cu^{2+} and Zn^{2+} .

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: A

Watch Video Solution

28. Assertion : The Daniell cell becomes dead after sometime.

Reason : Reduction potential of Zinc increases while that of copper decreases.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: A

View Text Solution

29. Assertion : Molar conductance of an electrolyte increases upon dilution.

Reason : Ions move faster in dilute solution.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: B

View Text Solution

30. Statement-I: If an aqueous solution of $NaCI$ is electrolysed, the product obtained at the cathode is H_2 gas and no Na.

Because Statement-II: Gases are liberated faster than the metals.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: C

Watch Video Solution

31. Assertion : $\Lambda^{\circ}_{NaCl} = \lambda^{\circ}_{Na^{+}} + \lambda^{\circ}_{Cl^{-}}$

Reason : This is according to Kohlrausch's Law of independent migration of ions.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: A

View Text Solution

32. Assertion : Electrolysis of molten $PbBr_2$ using platinum electrodes produces Br_2 at anode.

Reason : Br_2 is obtained in gaseous state at room temperature.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: C

View Text Solution

33. Assertion (A): A saturated solution of KCl is used in making salt bridge.

Reason (R): Ionic mobilities of $K^{\oplus}$ and Cl^{c-} are comparable.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: A

Watch Video Solution

34. Assertion : The molar conductance of weak electrolytes at infinite dilution is equal to sum of the molar conductances of cation and anion.

Reason : Kohlrausch's law is applicable to both strong and weak electrolytes.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: C

View Text Solution

35. Assertion : $\Delta G^{\circ} = -nFE^{\circ}_{cell}$.

Reason : E°_{cell} should be positive for an electrochemical cell.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: C

View Text Solution

36. Statement-I: $H_2 + O_2$ fuel cell gives a constant voltage throughout its life.

Because Statement-II: In this fuel cell, H_2 reacts with OH^- ions yet the overall concentration of OH^- ions does not change.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: A

Watch Video Solution

37. Statement-1: Zinc displaces copper from copper sulphate solution.

Statement-2: The E°_{298} of Zn is -0.76 volts and that of Cu is +0.34 volts.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: A

Watch Video Solution

38. Assertion : Electrolysis of NaCl (aq) produces Na metal.

Reason : Na^+ ion is obtained at cathode.

A. If both assertion and reason are correct and reason is correct explanation for assertion.

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. If assertion and reason both are incorrect.

Answer: D

View Text Solution

ASSIGNMENT (GALVANIC CELLS)

1. What iis electrochemical series ? How does it help in predicting whether a particular redox reaction is feasible in a given direaction or not.

Watch Video Solution

2. The E° value of Zn is -0.76 V while that of Cu is +0.34 V. Do these values help in locating the relative positions of the electrodes in the electrochemical series ?

Watch Video Solution

3. What is Nernst equation ? What is the significance of each term in the equation ?

Watch Video Solution

4. How can Nernst equation be applied in calculating the equilibrium constant for any cell reaction ?

Watch Video Solution

5. The correct relationship between Gibb's free energy change and the EMF of a cell is

Watch Video Solution

6. An electrochemical cell stops working after sometime. Explain.

Watch Video Solution

7. Write Nernst equation for the electrode reaction :

$M^{n+}(aq) + \text{ne}^{-}(aq) \rightarrow M(s)$

Watch Video Solution

8. Write the Nernst equation for the reaction :

$2Cr(s) + 3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd(s)$

Watch Video Solution

9. ELECTROMOTIVE FORCE AND POTENTIAL DIFFERENCE

Watch Video Solution

10. (a) What do you mean by Electrolytic cell?

(b) An electrochemical cell is made of nickel and copper electrodes with their standard reduction potentials -0.25 V and +0.34 V respectively. Select the anode and cathode. Represent the cell and find e.m.f. of the cell.

Watch Video Solution

11. For a standard cell

$$Zn(s)\left|Zn^{2+}(1M)\right|\left|Cu^{2+}(1M)\right|Cu(s)$$

Write the electrode reaction and cell reaction. Also find the e.m.f. of cell if ?

$E^{\circ}_{Zn^{2+} \mid Zn} = -0.76 \text{ V},$

$E^{\circ}_{Cu^{2+} \mid Cu} = +0.34 \text{ V}.$

Watch Video Solution

12. (a) Standard reduction potentials of zinc and copper electrodes are -0.76 V and 0.34 V respectively.Which electrode will undergo oxidation and which lelctrode reduction?

`(b) Can we store copper suphate in zinc vessel? Give expalnation support of your answer.

Watch Video Solution

13. DIFFERENCE BETWEEN POTENTIAL DIFFERENCE AND EMF

Watch Video Solution

14. Write the equation showing the relationship between standard free energy and standard cell potential.

Watch Video Solution

15. Write Nernst equation for the reaction :

$$Zn(s)\left|Zn^{2+}(aq)\right| \mid Cu^{2+}(aq)Cu(s)$$

View Text Solution

16. What is a galvanic cell ? Draw its labelled diagram and explain the function of the salt bridge ?

Watch Video Solution

17. Depict the galvanic cell in which the reaction

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

takes place. Further indicate what are the carriers of current inside and outside the cell. State the reaction are each electrode.

Watch Video Solution

18. Write a note on Normal Hydrogen Electrode (N.H.E.).

Watch Video Solution

19. Write down the half- cell reactions and cell reaction for Daniell cell.

Watch Video Solution

20. Define electrode potential.

Watch Video Solution

21. What do you understand by standard e.m.f. of a cell ? Derive a relationship between standard emf of a cell and equilibrium constant.

Watch Video Solution

1. What is the effect of decreasing concentration on the molar conductivity of weak electrolyte ?

View Text Solution

2. Why is it not possible to determine Λ_m^{∞} for weak electrolytes graphically ? Explain.

Watch Video Solution

3. Predict the products of electrolysis obtained at the electrodes in each case by using platinum electrodes :

(i) An aqueous solution of $AgNO_3$ using platinum electrodes

(ii) An aqueous solution of $CuSo_4$ using attackable electrodes.

View Text Solution

4. What products do we get at cathode and anode during the electrolysis of molten and aqueous NaCl ?

View Text Solution

5. Predict the products of electrolysis of a solution of H_2SO_4 using platinum electrodes.

Watch Video Solution

6. Express the relation between.conductivity and molar conductivity of a solution held in a cell.

Watch Video Solution

7. What is meant by 'limiting molar conductivity ?

View Text Solution

8. (i) For a weak electrolyte, molar conductance in dilute solution increases sharply as its concentration in solution is decreased. Give reason.

Watch Video Solution

9. Define molar conductivity of a solution and explain how molar conductivity changes with change in concentration of a solution for a weak and a strong electrolyte.

Watch Video Solution

10. Write Faraday's Laws of electrolysis.

Watch Video Solution

11. For the reaction : $Ni(s) + 2Ag^{+}(1M) \rightarrow Ni^{2+}(1M) + 2Ag(s)$

which species gets reduced ?

View Text Solution

TYPE OF CELLS AND CORROSION

1. What is corrosion ? Discuss the theory of corrosion.

View Text Solution

2. Rusting of Fe is quicker in saline water than in ordinary water. Why ?

Watch Video Solution

3. Corrosion is essentially an electrochemical phenomenon. Explain the reactions occurring during corrosion of iron kept in an open atmosphere.

Watch Video Solution

4. Why does iron gain weight as a result of rusting ?

View Text Solution

5. Explain dry cell with a labelled diagram.

View Text Solution

6. Name the type of cell which was used in Apollo space programme for providing electrical power.

View Text Solution

7. What is corrosion ? What are the factors which influence corrosion ?

View Text Solution

8. Why does the cell potential of mercury cell remain constant throughout its life ?

Watch Video Solution

9. What type of battery is dry cell ? Write overall reaction occurring in dry cell.

Watch Video Solution

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

Watch Video Solution

MCQB (NEET/AIPMT & OTHER MEDICAL ENTRANCE EXAMINATIONS) Select the correct answer

1. Cell reactiomn is spontaneous when

A. E°_{red} is positive

B. ΔG° is negative

C. ΔG° is positive

D. E°_{red} is negative

Answer: B

Watch Video Solution

2. Best way to protect rusting of iron is bt :

A. making iron cathode

B. putting it in saline water

C. both of these

D. none of these.

Answer: A

View Text Solution

3. As lead storage battery is charged :

A. lead dioxide dissolves

B. sulphuric acid is regenerated

C. lead metal gets coated with lead sulphate

D. The concentration of sulphuric acid decreases.

Answer: B

View Text Solution

4. The e.m.f. of the cell :

$$Ni\left|Ni^{2+}(1.0\ \text{M})\right|\left|Au^{3+}(1.0\ \text{M})\right|Au$$

$\left(E^{\circ} = -0.25\ \text{V for } Ni^{2+}/Ni, E^{\circ} = 1.5\ \text{V for } Au^{3+}/Au\right)$ is

A. 1.25 V

B. -1.25 v

C. 1.75 V

D. 2.0 V

Answer: C

View Text Solution

5. When a piece of copper wire is immersed in a solution of aqueous silver nitrate, the solution becomes blue. This is a consequence of :

A. oxidation of silver

B. oxidation of copper

C. formation of copper complex

D. reduction of copper

Answer: B

View Text Solution

6. On the basis of information available from the reaction

$\frac{4}{3}Al + O_2 \rightarrow \frac{2}{3}Al_2O_3, \Delta G = -827kJmol^{-1}$ of O_2, the minimum emf required to carry out of the electrolysis of Al_2O_3 is $\left(F = 96,500Cmol^{-1}\right)$

A. $2.14\ \text{V}$

B. $4.28\ \text{V}$

C. $6.42\ \text{V}$

D. $8.56\ \text{V}$

Answer: B

Watch Video Solution

7. Which of the following reaction is reaction is used to make a fuel cell .

A. $Cd(s) + NiO_2(s) + 2H_2O(l) \rightarrow Cd(OH)_2(s) + Ni(OH)_2(s)$

B. $Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \rightarrow 2PbSO_4(s) + 2H_2O(l)$

C. $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

D. $2Fe(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{2+}(aq) + 2H_2O(l)$

Answer: C

Watch Video Solution

8. When dilute H_2SO_4 is electrolyzed between Pt electrodes, the gas liberated at the anode will be..............................

A. H_2

B. SO_4^{2-}

C. SO_2

D. O_2

Answer: D

Watch Video Solution

9. If $E^{\circ}_{Fe^{2+}/Fe} = -0.441V$

and $E^{\circ}_{Fe^{3+}/Fe^{2+}} = 0.771V$

The standard EMF of the reaction

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

will be:

A. $1.653\ \text{V}$

B. $1.212\ \text{V}$

C. $0.111\ \text{V}$

D. $0.330\ \text{V}$.

Answer: B

Watch Video Solution

10. A hypothetical electrochemical cell shown below

$\overset{\oplus}{A}\ |(xM)|\Big|B^{+}(yM)\Big|\ \overset{\oplus}{B}$

The e.m.f. measured is $+0.20\ \mathrm{V}$. The cell reaction is :

A. $A^{+}+e^{-}\rightarrow A, B^{+}+e^{-}\rightarrow B$

B. The cell reaction cannot be predicted

C. $A^{+}+B^{+}\rightarrow A^{+}+B$

D. $A^{+}+B^{+}\rightarrow A+B^{+}$

Answer: C

View Text Solution

11. If the half-cell reaction $A=E^{-}\rightarrow A^{-}$ has a large negative reduction potential, it follows that .

A. A is readily oxidised

B. A is readily reduced

C. A^{-} is readily oxidised

D. A^{-} is readily reduced.

Answer: C

Watch Video Solution

12. The standard oxidation potential of Zn and Ag in water at $25^{\circ}C$ are :

$Zn(s) \rightarrow Zn^{2+}(aq) + 2e^{-}, E^{\circ} = +0.76 \text{ V}$

$Ag(s) \rightarrow Ag^{+}(aq) + e^{-}, E^{\circ} = -0.80 \text{ V}$.

Which of the following reaction will initially take place ?

A. $Zn^{2+}(aq) + Ag^{+}(aq) \rightarrow Zn(s) + Ag(s)$

B. $Zn(s) + 2Ag(s) \rightarrow 2Zn^{2+}(aq) + Ag^{+}(aq)$

C. $Zn(s) + 2Ag^{+}(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$

D. $Zn^{2+}(aq) + 2Ag(s) \rightarrow 2A^{+}(aq) + Zn(s)$

Answer: C

View Text Solution

13. The correct order of mobility of alkali metal ions in aqueous solution is

A. $K^+ > Rb^+ > Na^+ > Li^+$

B. $Rb^+ > K^+ > Na^+ > Li^+$

C. $Li^+ > Na^+ > K^+ > Rb^+$

D. $Na^+ > K^+ > Na^+ > Li^+$

Answer: B

Watch Video Solution

14. $KMnO_4$ is a strong oxidising agent in acidic medium. To provide acidic medium H_2SO_4 is used instead of HCl. This is because

A. H_2SO_4 is a stronger oxidising agent than HCl

B. HCl is oxidised by $KMnO_4$ to Cl_2

C. H_2SO_4 is dibasic acid

D. Rate of reaction is faster in the presence of H_2SO_4

Answer: B

Watch Video Solution

15. The equivalent conductance of solution is ....

[If cell constant is $1.25cm^{-1}$ and resistance of $N/10$ solution is $2.5 \times 10^3\Omega$

].

A. $2.5 \text{ ohm}^{-1}cm^2 \text{ equiv}^{-1}$

B. $0.5 \text{ ohm}^{-1}cm^2 \text{ equiv}^{-1}$

C. $2.5 \text{ ohm}^{-1}cm^{-2}\text{equiv}^{-1}$

D. $5.0 \text{ ohm}^{-1}cm^{-2}\text{equiv}^{-1}$

Answer: B

Watch Video Solution

16. Kohlrausch's law states that at:

A. Infinite dilution, each ion makes a definite contribution to the molar conductance of the electrolyte whatever may be the nature of the other ion of the electrolyte

B. Infinite dilution, each ion makes a definite contribution to the equivalent conductance of the electrolyte whatever may be the nature of the other ion

C. Finite dilution, each ion makes definite contribution to the equivalent conductance of an electrolyte whatever be the nature of the other ion of the electrolyte

D. Infinite dilution, each ion makes definite contribution to the equivalent conductance of the electrolyte depending upon the nature of the other ion of the electrolyte.

Answer: A

Watch Video Solution

17. Al_2O_3 is reduced by electrolysis at low potentials and high current. If 4.0×10^4 amperes of currernt is passed through molten Al_2O_3 for 6 hours, what mass of aluminium is produced? (Assume 100 % current efficiency, At. Mass of $Al = 27u$)

A. $8.1 \times 10^4 g$

B. $2.4 \times 10^5 g$

C. $1.3 \times 10^4 g$

D. $9.0 \times 10^3 g$.

Answer: A

Watch Video Solution

18. The equivalent conductance of $M/32$ solution of a weak monobasic acid is 8.0 and at infinite dilution is 400. The dissociation constant of this acid is :

A. 1.25×10^{-6}

B. 6.25×10^{-4}

C. 1.25×10^{-4}

D. 1.25×10^{-5}

Answer: D

Watch Video Solution

19. For the reduction of silver ions with copper metal, the standard cell potential was foound to be $+0.46V$ at $25^{\circ}C$. The value of standard Gibbs energy, ΔG° will be $\left(F = 96,500Cmol^{-1}\right)$:

A. -89 kJ

B. -89.0 J

C. -44 kJ

D. -98.0 kJ

Answer: A

Watch Video Solution

20. An increase in equivalent conductance of a strong electrolyte with dilution is mainly due to:

A. increase in ionic mobility of ions

B. (100% ionisation of electrolyte at normal dilution

C. increase in both the number of ions and ionic mobility of ions

D. increase in number for ions.

Answer: A

Watch Video Solution

21. At $18^{\circ} C$, the conductance of H^{+} ions and CH_3COO^{-} ions at infinite dilution are 315 and 35 mho $cm^2 eq^{-1}$ respectively. The equivalent conductance of CH_3COOH at infinite dilution is ($mhocm^2 \text{ equiv}^{-1}$)

A. 280

B. 350

C. 30

D. j315

Answer: B

View Text Solution

22. Two half cell reactions are given as :

(i) $Fe^{2+}_{aq} + 2e^- \rightarrow Fe_{(s)}, E^\circ = -0.44 \text{ V}$

(ii) $2H^+_{(aq)} + \frac{1}{2}O_2(g) + 2e^- \rightarrow H_2O(l), E^\circ = +1.23 \text{ V}$

The E° for the reaction

$Fe_s + 2H^+ + \frac{1}{2}O_2(g) \rightarrow Fe^{2+}_{aq} + H_2O_l$ is

A. $+1.67 \text{ V}$

B. -1.67 V

C. $+0.79 \text{ V}$

D. -0.79 V

Answer: A

View Text Solution

23. Which pair of electrolytes could not be distinguished by the products of electrolysis using inert electrodes ?

A. 1 M $CuSO_4$ solution, 1 M $CuCl_2$ solution

B. 1 M KCl solution, 1 M KCl solution

C. 1 M $AgNO_3$ solution, 1 M NaCl solution

D. 1 M KCl solution, 1 M NaCl solution

Answer: D

View Text Solution

24. A current is passed through two cells connected in series. The first cell contians $X\left(NO_2\right)_2$(aq). The relative atomic masses of X and Y are in the ratio 1:2. What is the ratio of the liberated mass of X to that of Y ?

A. $3:2$

B. $1:2$

C. $1:2$

D. $3:3$

Answer: C

View Text Solution

25. Standard electrode potential for Sn^{4+}/Sn^{2+} couple is $0.15V$ and that for the Cr^{3+}/Cr couple is -$0.74V$. These two couples in their standard state are connected to make a cell. The cell potential will be

A. $+1.19\ \text{V}$

B. $+0.89 \text{ V}$

C. $+0.18 \text{ V}$

D. $+1.83 \text{ V}$

Answer: B

Watch Video Solution

26. Standard electrode potential of three metal X, Y and Z are $-1.2V, +0.5V$ and $-3.0V$ respectively. The reducing power of these metals will be:

A. $Y > Z > X$

B. $Y > X > Z$

C. $Z > X > Y$

D. $X > Y > Z$

Answer: C

Watch Video Solution

27. A solution contains Fe^{2+}, Fe^{3+} and I^- ions. The solution was treated with iodine at $35^\circ C. E^\circ$ for Fe^{3+}/Fe^{2+} is $+0.77\ \text{V}$ and E^0 for $I_2/2I^-$ is $+0.536\ \text{V}$. The favourable redox reaction is :

A. I_2 will be reduced to I^-

B. These will be no redox reaction

C. I_2 will be oxidised to I_2

D. Fe^{2+} will be oxidised to Fe^{3+}

Answer: C

View Text Solution

28. Standard reduction potentials for the half reactions are given below :

$F_2(g) + 2e^- \rightarrow 2F^-(aq), E^\circ = +2.85\ \text{V}$

$Cl_2(g) + 2e^- \rightarrow 2Cl^-(aq), E^\circ = +1.36\ \text{V}$

$Br_2(g) + 2e^- \rightarrow 2Br^-(aq), E^\circ = +1.06\ \text{V}$

$I_2(g) + 2e^- \rightarrow 2I^-(aq), E^\circ = +0.53\ \text{V}$

The strongest oxidising and reducing agents respectivity are :

A. F_2 and I^-

B. Br_2 and Cl^-

C. Cl_2 and Br^-

D. Cl_2 and I_2.

Answer: A

View Text Solution

29. Limiting molar conductivity of NH_4OH [i.e., $\Lambda_m^\circ(NH_4OH)$] is equal to:

A. $\Lambda^\circ_{m(NH_4Cl)} + \Lambda^\circ_{m(NaCl)} - \Lambda^\circ_{m(NaOH)}$

B. $\Lambda^\circ_{m(NaOH)} + \Lambda^\circ_{m(NaCl)} - \Lambda^\circ_{m(NaHCl)}$

C. $\Lambda^\circ_{m(NH_4OH)} + \Lambda^\circ_{m(NH_4Cl)} - \Lambda^\circ_{m(HCl)}$

D. $\Lambda E_{m}^{\circ}\left(NH_4Cl\right) + \Lambda_{m(NaOH)}^{\circ} - \Lambda_{m(NaCl)}^{\circ}$

Answer: D

Watch Video Solution

30. At $25^{\circ}C$ molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is $9.54 ohm^{-1} cm^2 mol^{-1}$ and at infinte dilution its molar conductance is $238 ohm^{-1} cm^2 mol^{-1}$ The degree of ionisation of ammonium hydroxide at the same concentration and termperature is

A. $40.8\ \%$

B. $2.08\ \%$

C. $20.8\ \%$

D. $4.008\ \%$

Answer: D

Watch Video Solution

31. A button cell used in watches functions as following

$$Zn(s) + Ag_2O(s) + H_2O(l) \Leftrightarrow 2Ag(s) + Zn^{2+}(aq.) + 2OH^-(aq)$$

If half cell potentials are

$$Zn^{2+}(aq.) + 2e^- \rightarrow Zn(s), E^\circ = -0.76V$$

$$Ag_2O(s) + H_2O(l) + 2e^- \rightarrow 2Ag(s) + 2OH^-(aq.), E^\circ = 0.34V$$

The cell potential will be

A. 1.34 V

B. 1.10 V

C. 0.42 V

D. 0.84 V

Answer: B

Watch Video Solution

32. Given the reaction for the distance of a cobalt-cadmium battery

$$Co(OH)_3 + Cd + H_2O \rightarrow Co(OH)_2 + Cd(OH)_2$$

Which species is oxidised during the discharge of the battery ?

A. Co^{3+}

B. Co^{2+}

C. Cd

D. Cd^{2+}

Answer: C

View Text Solution

33. When $0.1 mol MnO_4^{2-}$ is oxidized the quantity of electricity required to completely oxidize MnO_4^{2-} to MnO_4^- is

A. $2 \times 96500C$

B. 9650 C

C. 96.50 C

D. 96500C

Answer: B

Watch Video Solution

34. Which of the following processes does not involve oxidation of iron ?

A. Formation of $Fe(CO)_5$ from Fe

B. Liberation of H_2 from steam by iron at high temperature

C. Rusting of iron sheets

D. Decolourisation of blue $CuSO_4$ solution by iron.

Answer: A

View Text Solution

35. The conductivity of 0.01 mol L^{-1}KCl solution is 1.41×10^{-3} S cm^{-1}. What is the molar conductivity $(Scm^2 mol^{-1})$?

A. 14.1

B. 1.41

C. 1410

D. 141

Answer: D

View Text Solution

36. The pressure of H_2 required to make the potential of H_2- electrode zero in pure water at $298K$ is

A. $10^{4} atm$

B. $10^{-14} atm$

C. $10^{12} atm$

D. $10^{-10} atm$

Answer: B

Watch Video Solution

37. The molar conductivity of a $0.5 mol / dm^3$ solution of $AgNO_3$ with electrolytic conductivity of $5.76 \times 10^{-3} S cm^{-1}$ at $298K$ is

A. $28.8 S cm^2 / mol$

B. $2.88 \text{ S } cm^2 / mol$

C. $11.52 \text{ S } cm^2 / mol$

D. $0.086 \text{ S } cm^2 / mol$

Answer: C

Watch Video Solution

38. Given the standard electrode potentials $F_2 / F^- = +2.85 \text{ V}$, $Cl_2 / Cl^- = +1.36 \text{ V}$, $Br_2 / Br^- = +1.06 \text{ V}$ and $I_2 / I^- = +0.34 \text{ V}$. The stronger oxidising and reducing agents respectively are :

A. F_2 and I^-

B. Br_2 and Cl^-

C. Cl_2 and Br^-

D. Cl_2 and I_2

Answer: A

View Text Solution

39. The emf of a Daniell cell at $298K$ is E_1

$Zn\left|ZnSO_4(0.01M)\right|\left|CuSO_4(1.0M)\right|Cu$

When the concentration of $ZNSO_4$ is $1.0M$ and that of $CuSO_4$ is $0.01M$, the *emf* changed to E_2. What is the relationship between E_1 and $E(2)$?

A. $E_1 < E_2$

B. $E_1 > E_2$

C. $E_2 = 0 \neq E_1$

D. $E_1 = E_2$

Answer: B

Watch Video Solution

40. Celll equation : $A = 2B^{+} \rightarrow A^{2+} + 2B$

$A^{2+} + 2e \rightarrow A$

$E^{\circ} = +0.34V$ and $\log_{10}K = 15.6$ at $300K$ for cell reactions Find E° for

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

Given $\left[\frac{2.303RT}{nF} = 0.059\right]$ at $300K$.

A. 0.81 V

B. 1.26 V

C. -0.54 V

D. $+0.94$ V

Answer: A

Watch Video Solution

41. Time taken to completely decompose 36 g of water by passing 3 A current is

A. 35.8 hr

B. 40 hr

C. 51.8 hr

D. 22.5 hr

Answer: A

View Text Solution

MCQB (NEET/AIPMT & OTHER MEDICAL ENTRANCE EXAMINATIONS) Select the correct answer (N.E.E.T. Special)

1. If 0.5 amp current is passed through acidified silver nitrate solution for 100 minutes the mass of silver deposited on cathode, is (eq. wt. of silver nitrate=108) :

A. 2.3523 g

B. 3.3575 g

C. 5.3578 g

D. 6.3575 g

Answer: B

View Text Solution

2. $4.5g$ of aluminium (at mass $27u$) is deposited at cathode from Al^{3+} solution by a certain quantity of electric charge. The volume of hydrogen gas produced at STP from H^{+} ions in solution by the same quantity of electric charge will be:

A. 44.8 L

B. 22.4 L

C. 11.2 L

D. 5.6 L

Answer: D

Watch Video Solution

3. The electrode pptenticals for

$Cu^{2+}(aq) + e^{-} \rightarrow Cu^{+}(aq)$

and $Cu^{+}(aq) + e^{-} \rightarrow Cu(s)$

are $+0.15V$ and $+0.50V$ repectively. The value of $E^{\circ}_{cu^{2+}/Cu}$ will be.

A. 0.500 V

B. 0.325 V

C. 0.650 V

D. 0.150 V

Answer: B

Watch Video Solution

4. A cell is containing two H electrodes. The negative electrode is in contact with a solution of $10^{-6} M H^{+}$ ion. The e.m.f. of the cell is 0.118 volt at $25^{\circ} C$. Calculate $\left[H^{+}\right]$ at positive electrode.

A. 10^{-4} M

B. 10^{-6} M

C. 10^{-2} M

D. 10^{-8} M

Answer: A

Watch Video Solution

5. Given below are the half-cell reactions :

$Mn^{2+} + 2e^{-} \rightarrow Mn, E^{\circ} = -1.18V$

$2\left(Mn^{3+} + e^{-} \rightarrow Mn^{2+}\right), E^{\circ} = +1.51V$

The E° for $3Mn^{2+} \rightarrow Mn + 2Mn^{3+}$ will be :

A. $-0.33\ V$, the reaction will occur

B. $-2.69\ V$, the reaction will not occur

C. $-2.69\ V$, the reaction will occur

D. $-0.33\ V$, the reaction will not occur

Answer: B

Watch Video Solution

6. Based on the data given below, the correcy order of reducing power is:

$$Fe^{3+}_{(aq.)} + e \rightarrow Fe^{2+}_{(aq.)}, E^{\circ} = +0.77V$$

$$Al^{3+}_{(aq.)} + 3e \rightarrow Al_{(s)}, E^{\circ} = -1.66V$$

$$Br_{2(aq.)} + 2e \rightarrow 2Br^{-}_{(aq.)}, E^{\circ} = +1.08V$$

A. $Br^{-} < Fe^{2+} < Al$

B. $Fe^{2+} < Al < Br^{-}$

C. $Al < Br^{-} < Fe^{2+}$

D. $Al < Fe^{2+} < Br^{-}$

Answer: A

Watch Video Solution

7. An electric current is passed through two electrolytic cells connected in series one containing aqueous $AgNO_3$ solution while the other containing aqueous H_2SO_4. The volume of oxygen that would be liberated at $25^\circ C$ and 750 mm pressure from H_2SO_4 if 1 mole of Ag^+ ions are deposited from $AgNO_3$ solution.

A. 6.2 L

B. 7.2 L

C. 8.0 L

D. 10.0 L

Answer: A

View Text Solution

8. Corrosion of iron is essentially an electrochemical phenomenon where the cell reactions are

A. Fe is oxidised to Fe^{2+} and dissolved oxygen in water is reduced to OH^-

B. (b) Fe is oxidised to Fe^{3+} and H_2O is reduced to O_2^{2-}

C. Fe is oxidised to Fe^{2+} and H_2O is reduced to O_2^-

D. Fe is oxidised to Fe^{2+} and H_2O is reduced to O_2

Answer: A

View Text Solution

JEE(MAIN) & OTHER ENGINEERING ENTRANCE EXAMINATIONS

1. A galvanic cell is composed of two hydrogen electrodes one of which is a standard one. In which of the following solutions should the other electrode be immersed to get maximum emf ?

A. 0.1 M HCl

B. $0.1 M CH_3COOH$

C. $0.1 M H_3PO_4$

D. $0.1 M H_2SO_4$

Answer: C

View Text Solution

2. For a cell reaction involving a two-electron change, the standard e.m.f. of the cell is found to be $0.295V$ at $25\ ^\circ C$. The equilibrium constant of the reaction at $25\ ^\circ C$ will be:

A. 29.5×10^{-2}

B. 10

C. 1×10^{10}

D. 1×10^{-10}

Answer: C

Watch Video Solution

3. Standard reduction electrode potenitals of three metals A, B and C are $= 0.5V$, $-3.0V$, and $-1.2V$ respectively. The reducing power of these metals are :

A. $A > B > C$

B. $C > B > A$

C. $A > C > B$

D. $B > C > A$

Answer: D

Watch Video Solution

4. When, during electrolysis of a solution of $AgNO_3 9650$ colombs of charge pass through the electroplating path, the mass of silver deposited on the cathode will be:

A. 10.0 g

B. 21.6 g

C. 108 g

D. 1.08 g

Answer: A

Watch Video Solution

5. In a hydrogen-oxygen fuel cell, combustion of hydrogen occurs to :

A. produce high purity water

B. create potential difference between two electrodes

C. generate heat

D. remove adsorbed oxygen from electron surface.

Answer: B

Watch Video Solution

6. The limiting molar conductivities Λ° for $NaCL, KBr$ and KCI are $126, 152$ and $150 Scm^2, ol^{-1}$ respectively . The Λ° fro $NaBrScm^2\text{mol}^{-1}$ is :

A. $278 \text{ S } cm^2 mol^{-1}$

B. $176 \text{ S } cm^2 mol^{-1}$

C. $128 \text{ S } cm^2 mol^{-1}$

D. $302 \text{ S } cm^2 mol^{-1}$

Answer: C

Watch Video Solution

7. For a spontaneous reaction ΔG°, Equilibrium constant (K) and E_{cell} will be respectively.

A. $-ve > 1 > +ve$

B. $+ve > 1 > -ve$

C. $-ve < 1 < -ve$

D. $-ve > 1 > -ve.$

Answer: A

View Text Solution

8. Given $l/a = 0.5cm^{-1}, R = 50\text{ohm}, N = 1.0.$ The equivalent conductance of the electrolytic cell is .

A. $10 \text{ ohm}^{-1}cm^2\left(gm \text{ equiv}^{-1}\right)$

B. $20 \text{ ohm}^{-1}cm^2\left(gm \text{ equiv}^{-1}\right)$

C. $300 \text{ ohm}^{-1}cm^2\left(gm \text{ equiv}^{-1}\right)$

D. $100 \ \text{ohm}^{-1} cm^2 \left(gm\text{equiv}^{-1}\right)$

Answer: A

Watch Video Solution

9. Aluminium oxide may be electrolysed at $100\,^{\circ}C$ to furnish aluminium metal (atomic mass=27 amu). The cathodic reaction is :

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

To prepare 5.12 kg of aluminium metal by this reaction would require :

A. 549×10^{7} C of electricity

B. 1.83×10^{7} C of electricity

C. 5.49×10^{7} C of electricity

D. 5.49×10^{10} C of electricity

Answer: C

View Text Solution

10. The highest electrical conductivity of the following solutions is of :

A. 0.1 M acetic acid

B. 0.1 M chloroacetic acid

C. 0.1 M fluoroacetic acid

D. 0.1 M difluroacetic acid

Answer: D

View Text Solution

11. Given the data at $25\ ^{\circ}C$.

$Ag + I^{-} \rightarrow AgI + e^{-}, E^{\circ} = -0.152\ \text{V}$

$Ag \rightarrow Ag^{+} + e^{-}, E^{\circ} = -0.800\ \text{V}$.

The value of log K_{sp} for AgI is :

A. -8.12

B. 8.612

C. -37.83

D. -16.13

Answer: D

View Text Solution

12. The equivalent conductances of two strong electrolytes at infinite dilution in H_2O (where ions move freely through a solution) at $25\,^\circ C$ are given below :

$\Lambda^\circ_{CH_3COONa} = 91.0 Scm^2/\text{equi v.}$

$\Lambda^\circ_{HCl} = 426.2 Scm^2/\text{equiv.}$ What additional information//quantity one need to calculate Λ° of an aqueous solution of acetic acid ?

A. Λ° of chloroacetic ($ClCH_2COOH$)

B. Λ° of NaCl

C. Λ° of CH_3COOK

D. the limiting equivalent conductance of H^+ ions.

Answer: B

Watch Video Solution

13. The cell , $Zn\left|Zn^{2+}(1M)\right| \mid Cu^{2+}(1M)Cu\left(E^{\circ}_{\text{cell}} = 1.10V\right)$,

Was allowed to be completely discharfed at $298K$. The relative

concentration of $2+$ to $Cu^{2+}\left[\frac{Zn^{2=}}{Cu^{2+}}\right]$ is :

A. 9.65×10^{4}

B. Antilog 24.08

C. 37.7

D. $10^{37.3}$

Answer: D

Watch Video Solution

14. Given $E^{\circ}_{Cr^{3+}/cr} = -0.72V, E^{\circ}_{Fe^{2+}/Fe} = -0.42V$. The potential for the cell

$Cr\left|Cr^{3+}(0.1M)\right|\left|FE^{2+}(0.01M)\right|$ Fe is .

A. -0.26 V

B. 0.26 V

C. 0.339 V

D. -0.339 V .

Answer: B

Watch Video Solution

15. Given,
$$E^{o}_{Fe^{3+}/Fe} + 3eCrE^{o} = -0.036V$$
$$E^{o}_{Fe^{3+}/Fe} = -0.439V$$

The value of standard electrode ptoential for the charge,

A. -0.072 V

B. $0.385 \ \mathrm{V}$

C. $0.770 \ \mathrm{V}$

D. $-0.270 \ \mathrm{V}$

Answer: C

Watch Video Solution

16. One Faraday of electricity is passed through molten Al_2O_3, aqueous solution of $CuSO_4$ and molten NaCl taken in three different electrolytic cells connected in series . The mole ratio of Al , Cu and Na deposited at the respective cathode is :

A. $2:3:6$

B. $6:2:3$

C. $6:3:2$

D. $1:2:3$

Answer: A

View Text Solution

17. The Gibbs energy for the decomposition of Al_2O_3 at $500\,^\circ C$ is as follows:

$$\frac{2}{3}Al_2O_3 \rightarrow \frac{4}{3}Al + O_2, \Delta_rG = +966kJmol^{-1}$$

The potential difference needed for electrolytic reeduction of Al_2O_3 at $500\,^\circ C$ is at least:

A. $5.0V$

B. $4.5V$

C. $3.0\ V$

D. $2.5\ V$

Answer: D

Watch Video Solution

18. The potential of a hydrogen electrode at pH=10 is :

A. $+0.59 \text{ V}$

B. 0.00 V

C. -0.59 V

D. -0.059 V

Answer: C

View Text Solution

19. The conductivity of 0.01 M NaCl solution is `0.00147" ohm"^(-1)cm^(-1). What happens to the conductivity if extra 100 mL is added to the above solution.

A. Remains same

B. First increases and then decreases

C. Increases

D. Decreases.

Answer: D

View Text Solution

20. 9.65 C of electric current is passed through fused anhydrous magnesium chloride. The magnesium metal thus obtained is completely converted into a Grignard reagent. The number of moles of Grignard reagent formed is :

A. 5×10^{-4}

B. 1×10^{-4}

C. $5XX10^{-5}$

D. 1×10^{-5}

Answer: C

View Text Solution

21. The reduction potential of hydrogen half cell will be negative if :

A. $p\left(H_2\right) = 1 \text{ atm and}\left[H^+\right] = 2.0M$

B. $p\left(H_2\right) = 1 \text{ atm and}\left[H^+\right] = 1.0M$

C. $p\left(H_2\right) = 2 \text{ atm and}\left[H^+\right] = 1.0M$

D. $p\left(H_2\right) = 2 \text{ atm and}\left[H^+\right] = 2.0M$

Answer: C

View Text Solution

22. The incrorrect expression amoung the following is

A. $\dfrac{\Delta G \text{ system}}{\Delta S \text{ total}} = -T$

B. In spontaneous process $W_{\text{reversible}} = nRT\ln\dfrac{V_f}{V_i}$

C. $\ln K = \dfrac{\Delta H^\circ - T\Delta S^\circ}{RT}$

D. $K = e^{\Delta G^\circ / RT}$

Answer: C

View Text Solution

23. The standard reduction potential for $Zn^{2+}/Zn, Ni^{2+}/Ni$ and Fe^{2+}/Fe are -0.76,-0.23 and $-0.44\ \text{V}$ respectively. The reaction $X + Y^{2+} \rightarrow X^2 + Y$ will be spontaneous when :

A. X=Ni, Y=Fe

B. X=Ni , Y=Zn

C. X=Fe , Y=Zn

D. X=Zn , Y=Ni

Answer: D

View Text Solution

24. A current of 9.65 amperes is passed through excess of fused $AlCl_3$ for 5 hours. How many litres of chlorine will be liberated at S.T.P. ? (1F=96500C)

A. 2.016 L

B. 1.008L

C. 11.2 L

D. 20.16 L

Answer: D

View Text Solution

25. A conductivity cell has been calibrited with 0.01 M electrolyte solution ($k = 1.25 \times 10^{-3} \text{ S } cm^{-1}$) in the cell and the measured resistance is 800 ohms at $25\,^{\circ}C$. The cell constant will be :

A. $1.02cm^{-1}$

B. $0.102 cm^{-1}$

C. $1.00 cm^{-1}$

D. $0.5 cm^{-1}$

Answer: C

View Text Solution

26. The emf of a galvanic cell constituted with the electrodes $Zn^{2+}/Zn\left(E^{\circ} = -0.76\ \text{V}\right)$ and $Fe^{2+}/Fe\left(E^{\circ} = -0.41\ \text{V}\right)$ is :

A. $-0.35\ \text{V}$

B. $+1.17\ \text{V}$

C. $+0.35\ \text{V}$

D. $-1.17\ \text{V}$

Answer: C

View Text Solution

27. The net reaction during the discharge of nickel-cadmium battery is :

A. $2Ni(OH)_3 + Cd + H_2O \rightarrow 2Ni(OH)_2 + Cd(OH)_2$

B. $2Ni_2O_3 + Cd + O_2 \rightarrow 2Ni(OH)_3 + Cd(OH)_2$

C. $2Ni(OH)_3 + Cd \rightarrow CdO + 2Ni(OH)_2 + H_2O$

D. $2Ni(OH)_2 + Cd + O_2 \rightarrow 2Ni(OH)_2 + CdO$

Answer: A

View Text Solution

28. The quantity electricity needed separately for the electrolysis of 1 M solution of $ZnSO_4$, $AlCl_3$ and $AgNO_3$ completely is in the ratio of :

A. $2:3:1$

B. $2:1:1$

C. $2:1:3$

D. $2:2:1$

Answer: A

View Text Solution

29. Resistance of $0.2M$ solution of an electrolyte is $50ohm$. The specific conductance of the solution is $1.4Sm^{-1}$. The resistance of $0.5M$ solution of the same electrolyte is 280Ω. The molar conductivity of $0.5M$ solution of the electrolyte in Sm^2mol^{-1} id

A. 5×10^2

B. 5×10^{-4}

C. 5×10^{-3}

D. 5×10^3

Answer: B

Watch Video Solution

30. The equivalent conductance of NaCl at concentration C and at infinite dilution are λ_C and λ_∞, respectively. The correct relationship between λ_C and λ_∞ is given as (where, the constant B is positive)

A. $\lambda_C = \lambda_\infty + (B)\sqrt{C}$

B. $\lambda_C = \lambda_\infty + (B)C$

C. $\lambda_C = \lambda_\infty - (B)C$

D. $\lambda_C = \lambda_\infty - (B)\sqrt{C}$

Answer: D

Watch Video Solution

31. When $CuSO_4$ is electrolysed, using Pt electrodes

A. Copper is liberated at cathode and sulphur at anode

B. Copper is liberated at cathode and oxygen at anode

C. Sulphur is liberated at cathode and oxygen at anode

D. Oxygen is liberated at cathode and copper at anode

Answer: B

Watch Video Solution

32. What pressure of H_2 would be required to make emf of hydrogen electrode zero in pure water at $25^{\circ}C$?

A. $10^{-7} atm$

B. $10^{-14} atm$

C. 1 atm

D. 0.5 atm

Answer: C

View Text Solution

33. How many coulombs of electricity are required for the oxidation of one mole of water to dioxygen ?

A. $1.93 \times 10^4 C$

B. $19.3 \times 10^5 C$

C. 9.65×10^4 C

D. 1.93×10^5 C

Answer: D

View Text Solution

34. Two faradays of electricity are passed through a solution of $CuSO_4$ .The mass of copper deposited at the cathode is (atomic mass of Cu=63.5 g)

A. 2 g

B. 127 g

C. 0 g

D. 63.5 g

Answer: D

View Text Solution

35. How many moles of platinum will be deposited on the cathode when 0.60 F of electricity is passed through a 1.0 M solution of Pt^{4+} ?

A. 0.60 mol

B. 0.15 mol

C. 0.30 mol

D. 0.45 mol

Answer: B

View Text Solution

36. Which of the following is not used to determine cell constant ?

A. 10^{-2} M KCl

B. 10^{-1}M KCl

C. 1 M KCl

D. Saturated KCl

Answer: D

View Text Solution

37. Two electrolytic cells containing molten solutions of Nickel chloride and Aluminium chloride are connected in series.If same amount of electric current is passed through them, what will be the weight of Nickel obtained when 18 gm of Aluminium is obtained ? ($Al - 27 \text{ gm/mole}, Ni - 58.5 \text{ gm/mole}^{-1}$)

A. 58.5 g

B. 29.25 g

C. 117 g

D. 5.85 g

Answer: A

View Text Solution

38. Galvanization is applying a coating of :

A. Pb

B. Cr

C. Cu

D. Zn

Answer: D

Watch Video Solution

39. The standard reduction potential for $Zn^{2+}/Zn, Ni^{2+}/Ni$ and Fe^{2+}/Fe are -0.76,-0.23 and -0.44 V respectively. The reaction $X + Y^{2+} \rightarrow X^{2} + Y$ will have more negative ΔG value when X and Y are

A. X=Ni, Y=Fe

B. X=Ni , Y=Zn

C. X=Fe , Y=Zn

D. X=Zn , Y=Ni

Answer: D

View Text Solution

40. A secondary cell is one :

A. Can be recharged

B. Can be recharged by passing current through it in the same direction

C. Can be recharged by passing current through it in the opposite direction

D. Cannot be recharged.

Answer: C

Watch Video Solution

41. The ionization constant of a weak acid is 1.6×10^{-5} and the molar conducitvity at infinite dilutionis 380×10^{-4} S $m^2 mol^{-1}$. If the cell constant is $0.01 m^{-1}$, then the conductance of 0.01 M solution is :

A. 1.52×10^{-5} S

B. 1.52 S

C. 1.52×10^{-3} S

D. 1.52×10^{-4} S

Answer: D

View Text Solution

42. The metal which can be used to obtain metallic copper from aqueous $CuSO_4$ is :

A. Na

B. Ag

C. Hg

D. Fe

Answer: D

View Text Solution

43. In the electrolysis of aqueous sodium chloride solution, which of the half cell reaction will occur at anode ?

A. $Cl^-_{(aq)} \rightarrow \frac{1}{2}Cl_2 + e^-, \quad E^{\circ}_{cell} = 1.36 \text{ volts}$

B. $2H_2O_{(l)} \rightarrow O_2 + 4H^+ + 4e^-, E^\circ_{cell} = 1.23$ volts

C. $Na^+_{(aq)} + e^- \rightarrow Na_{(s)}, \quad E^\circ_{cell} = -2.71$ volts

D. $H^+_{(aq)} + e^- \rightarrow \frac{1}{2}H_2, \quad E^\circ_{cell} = 0.00$ volts

Answer: A

View Text Solution

44. How many Faraday are required to reduce 1 mole of $Cr_2O_7^{2-}$ to Cr^{3+} in acid solutions ?

A. 2

B. 3

C. 5

D. 6

Answer: D

View Text Solution

45. A fuel cell is supplied 1 mole of H_2 gas and 10 moles O_2gas. If the fuel cell is operated at 96.5 mA currecnt, how long will it deliver power?

A. $1 \times 10^6 s$

B. $0.5 \times 10^6 s$

C. $2 \times 10^6 s$

D. $4 \times 10^6 s$

Answer: C

Watch Video Solution

46. Given :

$E^{\circ}_{Cl_2/Cl^-} = 1.36 \text{ V}, E^{\circ}_{Cr^{3+}/Cr} = 0.74V.$

$E^{\circ}_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33 \text{ V}, E^{\circ}_{MnO_4^-/Mn^{2+}} = 1.51 \text{ V}.$

Among the following, the strongest reducing agent is :

A. Cr^{3+}

B. Cl^{-}

C. Cr

D. Mn^{2+}

Answer: C

View Text Solution

47. How long (approximate) should water be electrolysed by passing through 100 amperes current so that the oxygen released can completely burn 27.66 g of diborane (Given atomic mass of B=10.8u)

A. 0.8 hour

B. 3.2 hours

C. 1.6 hours

D. 6.4 hours

Answer: B

View Text Solution

48. For a cell involving two electrons changes, $E^{\circ}_{cell} = 0.3 \text{ V}$ at $25\,^{\circ}C$. The equilibrium constant for the reaction is :

A. 10^{10}

B. 3×10^{-2}

C. 10

D. 10^{10}

Answer: D

View Text Solution

49. What amount of electricity can deposit 1 mole of Al metal at cathode when passed through molten $AlCl_3$?

A. 0. 3F

B. 1 F

C. 3 F

D. $1/3F$

Answer: C

View Text Solution

COMPREHENSION I

1. Electrolysis is the decomposition of an electrolyte on passing current and it involves the migration of the ions of the electrolyte towards oppositely charged electrodes. Reduction occurs at cathode by the gain of electrons while oxidation at the anode by the loss of electrons. The electrical conductivity of an electrolyte increases upon dilution as well as with the increase in temperature. The nature of the products formed at the respective electrodes depends upon the nature of the electrodes as well as the nature of electrolyte whether in molten state or in aqueous solution. The mass of the substance deposited at a particular electrode is guided by the Faraday's first and second laws of electrolysis.

In and electrolytic cell, one litre of 1 M aqueous solution of MnO_4 is reduced at the cathode. The quantity of electricity required, so that the final solution is 0.1 MnO_4^2, will be :

A. 0.1 F

B. 1 F

C. 10 F

D. 100 F

Answer: A

View Text Solution

2. Electrolysis is the decomposition of an electrolyte on passing current and it involves the migration of the ions of the electrolyte towards oppositely charged electrodes. Reduction occurs at cathode by the gain of electrons while oxidation at the anode by the loss of electrons. The electrical conductivity of an electrolyte increases upon dilution as well as with the increase in temperature. The nature of the products formed at the respective electrodes depends upon the nature of the electrodes as well as the nature of electrolyte whether in molten state or in aqueous solution. The mass of the substance deposited at a particular electrode is guided by the Faraday's first and second laws of electrolysis.

An ion is reduced to an element when it absorbs 6×10^{20} electrons. The number of equivalents of ion is :

A. 0.1

B. 0.01

C. 0.001

D. 0.0001

Answer: C

View Text Solution

3. Electrolysis is the decomposition of an electrolyte on passing current and it involves the migration of the ions of the electrolyte towards oppositely charged electrodes. Reduction occurs at cathode by the gain of electrons while oxidation at the anode by the loss of electrons. The electrical conductivity of an electrolyte increases upon dilution as well as with the increase in temperature. The nature of the products formed at the respective electrodes depends upon the nature of the electrodes as well as the nature of electrolyte whether in molten state or in aqueous solution. The mass of the substance deposited at a particular electrode is guided by the Faraday's first and second laws of electrolysis.

A current of 12 amperes is passed through an electrolytic cell contianing aqueous $NiSO_4$ solution. Both Ni and H_2 are formed at cathode. The current efficiency is 60%. What is the mass of nickel deposited on the cathode per hour ? (Atomic mass of Ni=58.7).

A. 7.883 g

B. 3.941 g

C. 5.91 g

D. 2.645 g

Answer: A

View Text Solution

4. Electrolysis is the decomposition of an electrolyte on passing current and it involves the migration of the ions of the electrolyte towards oppositely charged electrodes. Reduction occurs at cathode by the gain of electrons while oxidation at the anode by the loss of electrons. The electrical conductivity of an electrolyte increases upon dilution as well as with the increase in temperature. The nature of the products formed at the respective electrodes depends upon the nature of the electrodes as well as the nature of electrolyte whether in molten state or in aqueous solution. The mass of the substance deposited at a particular electrode is guided by the Faraday's first and second laws of electrolysis.

The same quantity of electrical charge that deposited 0.583 g of Ag was passed through a solution of gold salt and 0.355 g of gold was formed. What is the oxidation state of gold in the salt ?

A. $+1$

B. $+2$

C. $+3$

D. zero

Answer: C

View Text Solution

COMPREHENSION 2

1. Molar conductivity of an electrolyte is the conductance of all the ions produced by one gram mole of the electrolyte in solution and is denoted as Λ_m.

$$\Lambda_m = \frac{k \times 1000}{c}$$

Here k is the specific conductance while c is the molar concentration of the electrolyte. The molar conductance of the strong electrolytes at infinite dilution $\left(\Lambda_m^{\infty}\right)$ can be obtained graphically by extrapolation while the same for weak electrolytes cannot be obtained graphically. It can be calculated theoretically with the help of Kohrausch's. Law.

$$\Lambda^{\infty}_{m(AxBy)} = x\lambda^{\infty}_{m}\left(A^{y+}\right) + y\lambda^{\infty}_{m}\left(B^{x}\right)$$

48250 C of electricity was required to deposit all the copper present in 0.5 L of $CuSO_4$ solution using inert electrodes. The molarity of solution was (Assume volume constant).

A. 0.50 M

B. 2.50 M

C. 0.25 M

D. 1.0 M

Answer: A

View Text Solution

2. Molar conductivity of an electrolyte is the conductance of all the ions produced by one gram mole of the electrolyte in solution and is denoted as Λ_m.

$$\Lambda_m = \frac{k \times 1000}{c}$$

Here k is the specific conductance while c is the molar concentration of the electrolyte. The molar conductance of the strong electrolytes at infinite dilution $\left(\Lambda_m^{\infty}\right)$ can be obtained graphically by extrapolation while the same for weak electrolytes cannot be obtained graphically. It can be calculated theoretically with the help of Kohrausch's. Law.

$$\Lambda_{m(AxBy)}^{\infty} = x\lambda_m^{\infty}\left(A^{y+}\right) + y\lambda_m^{\infty}\left(B^{x}\right)$$

Which of the following solution of KCl will have the maximum value of specific conductance ?

A. 1.0 N

B. 0.1 N

C. 1.0×10^{-2} N

D. 0.5 N.

Answer: A

View Text Solution

3. Molar conductivity of an electrolyte is the conductance of all the ions produced by one gram mole of the electrolyte in solution and is denoted as Λ_m.

$$\Lambda_m = \frac{k \times 1000}{c}$$

Here k is the specific conductance while c is the molar concentration of the electrolyte. The molar conductance of the strong electrolytes at infinite dilution $\left(\Lambda_m^\infty\right)$ can be obtained graphically by extrapolation while the same for weak electrolytes cannot be obtained graphically. It can be calculated theoretically with the help of Kohrausch's. Law.

$$\Lambda_{m(AxBy)}^\infty = x\lambda_m^\infty\left(A^{y+}\right) + y\lambda_m^\infty\left(B^{x}\right)$$

Equivalent conductance of 1 M methanoic acid solution is $10 \text{ ohm}^{-1} cm^2 \text{ equiv}^{-1}$ and at infinite dilution it is $200 \text{ ohym}^{-1} cm^2 \text{ equiv}^{-1}$. The pH of methanoic acid solution is :

A. 7

B. 3.3

C. 1.3

D. 6.8.

Answer: C

View Text Solution

COMPREHENSION 3

1. Redox reactions play a pivotal role in chemistry and biology. The value of standard reduction potetials $\left(E^{\circ}\right)$ of the two half cells reactions decide which way the reaction is expected to proceed. A simple example is of Daniell cell in which zinc goes into solution and copper gets deposited. Given below are a set of half-cell reactions (acidic medium) along with with E° values. Using the data obtain the correct explanation to the questions that are mentioned.

$I_2 + e^- \rightarrow 2I^-, E^{\circ} = 0.54 \text{ V}$

$Cl_2 + 2e^- \rightarrow 2Cl^-, E^{\circ} = 1.36 \text{ V}$

$Mn^{2+} + 2e^- \rightarrow Mn, E^{\circ} = 1.50 \text{ V}$

$Fe^{3+} + e^- \rightarrow Fe^{2+}, E^{\circ} = 0.77 \text{ V}$

$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O, E^\circ = 1.23 \text{ V}.$

Among the following, identify the correct statement :

A. Cl^- ion is oxidised by O_2

B. Fe^{2+} ion is oxidised by iodine.

C. I^- ion is oxidised by chlorine.

D. Mn^{2+} ion is oxidised by chlorine.

Answer: C

View Text Solution

2. Redox reactions play a pivotal role in chemistry and biology. The value of standard reduction potetials $\left(E^\circ\right)$ of the two half cells reactions decide which way the reaction is expected to proceed. A simple example is of Daniell cell in which zinc goes into solution and copper gets deposited. Given below are a set of half-cell reactions (acidic medium) along with with E° values. Using the data obtain the correct explanation to the questions that are mentioned.

$I_2 + e^- \rightarrow 2I^-, E^\circ = 0.54 \text{ V}$

$Cl_2 + 2e^- \rightarrow 2Cl^-, E^\circ = 1.36 \text{ V}$

$Mn^{2+} + 2e^- \rightarrow Mn, E^\circ = 1.50 \text{ V}$

$Fe^{3+} + e^- \rightarrow Fe^{2+}, E^\circ = 0.77 \text{ V}$

$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O, E^\circ = 1.23 \text{ V}.$

While Fe^{2+} ion is stable, Mn^{2+} ion is not stable in acid solution because :

A. O_2 oxidises Mn^{2+} to Mn^{3+}

B. O_2 oxidises both Mn^{2+} to Mn^{3+} to Fe^{3+}

C. Fe^{3+} oxidises H_2O to O_2

D. Mn^{3+} oxidises H_2O to O_2

Answer: D

View Text Solution

3. Redox reactions play a pivotal role in chemistry and biology. The value of standard reduction potetials $\left(E^\circ\right)$ of the two half cells reactions decide which way the reaction is expected to proceed. A simple example is of Daniell cell in which zinc goes into solution and copper gets deposited.

Given below are a set of half-cell reactions (acidic medium) along with with E° values. Using the data obtain the correct explanation to the questions that are mentioned.

$I_2 + e^- \rightarrow 2I^-, E^\circ = 0.54\ \mathrm{V}$

$Cl_2 + 2e^- \rightarrow 2Cl^-, E^\circ = 1.36\ \mathrm{V}$

$Mn^{2+} + 2e^- \rightarrow Mn, E^\circ = 1.50\ \mathrm{V}$

$Fe^{3+} + e^- \rightarrow Fe^{2+}, E^\circ = 0.77\ \mathrm{V}$

$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O, E^\circ = 1.23\ \mathrm{V}.$

Sodium fusion extract obtained from aniline, on treatment with iron (II) sulphate and H_2SO_4 in the presence of air, gives a prussian blue precipitate. The blue colour is due to the formation of :

A. $Fe_4\left[Fe(CN)_6\right]_3$

B. $Fe_3\left[Fe\left[(CN)_6\right]_2\right.$

C. $Fe_4\left[Fe(CN)_6\right]_2$

D. $Fe_3\left[Fe(CN)_6\right]_3.$

Answer: A

View Text Solution

COMPREHENSION 4

1. The concentration of potassium ions inside a biological cell is at least twenty times higher than the outside. The resulting potential difference across the cell is important in serveral processes such as transmission of nerve impules and maintaining the ion balance. A simple model for such a concentration cell involving a metal M is :

$M_{(s)} \left| M^+(aq, 0.05 \text{ molar}) \right| \left| M^+(aq, 1 \text{ molar}) \right| M_{(s)}$

For the above electroltic cell, the magnitude of the cell potential $\left|E_{cell}\right| = 70mV.$

For the above cell :

A. $E_{cell} < 0, \Delta G > 0$

B. $E_{cell} >, \Delta G < 0$

C. $E_{cell} < 0, \Delta G^\circ > 0$

D. $E_{cell} < 0, \Delta G^\circ > 0$

Answer: B

View Text Solution

2. The concentration of potassium ions inside a biological cell is at least twenty times higher than the outside. The resulting potential difference across the cell is important in serveral processes such as transmission of nerve impules and maintaining the ion balance. A simple model for such a concentration cell involving a metal M is :

$M_{(s)} \left| M^+(aq, 0.05 \text{ molar}) \right| \left| M^+(aq, 1 \text{ molar}) \right| M_{(s)}$

For the above electroltic cell, the magnitude of the cell potential $\left| E_{cell} \right| = 70mV.$

If the 0.05 molar solution of M^+ is replaced by a 0.0025 molar M^+ solution, then the magnitude of the cell potential would be :

A. 35 mV

B. 70 mV

C. 140 mV

D. 700 mV

Answer: C

View Text Solution

COMPREHENSION 5

1. The electrochemical cell shown below is concentration cell.

$M \mid M^{2+}\left(\text{saturated solution of a sparingly soluble salt, } MX_2\right) \| M^{2}\left(0.001 mol dm^{-3}\right)$

The emf of the depends on the difference in concentration M^{2+} ions at the two electrodes. The emf of the cell at 298 K is $0.059\ \text{V}$

The value of $\Delta G\left(kJ\ \text{mol}^{-1}\right.$ for the given cell is $\left(\text{take} 1F = 96500\ \text{C mol}^{-1}\right)$

A. -5.7

B. 5.7

C. 11.4

D. -11.4

Answer: D

View Text Solution

2. The electrochemical cell shown below is concentration cell.

$M|M^{2+}\left(\text{saturated solution of a sparingly soluble salt, } MX_2\right)||M^2\left(0.001 moldm^{-3}\right)$

The emf of the depends on the difference in concentration M^{2+} ions at the two electrodes. The emf of the cell at 298 K is $0.059\ \text{V}$

The solubility product $\left(K_{sp}, \text{mol}^3 dm^{-9}\right)$ of MX_2 at 298 K based on the information available for the given concentration cell is :

(take$2.303 \times R \times 298F = 0.059\ \text{V}$)

A. 1×10^{-15}

B. 4×10^{-15}

C. 1×10^{-12}

D. 4×10^{-12}

Answer: B

View Text Solution

COMPREHENSION 6

1. Fuel cell is an electrical cell which converts chemical energy into electrical energy. The most successful fuel cell is H_2 - O_2 fuel cell, which is known as Bacon cell. It had been used to fulfil the electric power supply required in Appolo mission. This fuel cell is pollution free.

The cell used in Appolo mission was

A. Leclanche cell

B. Daniell cell

C. Voltaic cell

D. Bacon cell

Answer: D

View Text Solution

2. Fuel cell is an electrical cell which converts chemical energy into electrical energy. The most successful fuel cell is H_2 - O_2 fuel cell, which is known as Bacon cell. It had been used to fulfil the electric power supply required in Appolo mission. This fuel cell is pollution free.

The fuel used in the cell used in Appolo mission was

A. H_2

B. H_2 - O_2

C. CH_4

D. O_2

Answer: B

View Text Solution

3. Fuel cell is an electrical cell which converts chemical energy into electrical energy. The most successful fuel cell is H_2 - O_2 fuel cell, which is known as Bacon cell. It had been used to fulfil the electric power supply required in Appolo mission. This fuel cell is pollution free.

Fuel cells are preferred to other energy producing devices in space because of

A. high efficiency

B. pollution free nature

C. less weight

D. all of these

Answer: D

View Text Solution

STRAIGHT OBJECTIVE TYPE MCQs (SINGLE CORRECT OPTION)

1. A standard hydrogen electrode has zero electrode potential because :

A. hydrogen is easiest to oxidise

B. the electrode potential is assumed to be zero

C. hydrogen atom has only one electron

D. hydrogen is the lightest element

Answer: B

Watch Video Solution

2. The standard reduction potential of three metallic cations X,Y and Z are +0.52, -0.52, 3.03 and -1.18 V respectively. The order of reducing power is :

A. $Y > Z > X$

B. $X > Y > Z$

C. $Z > Y > X$

D. $Z > X > Y$

Answer: A

View Text Solution

3. A gas X at 1 atm is bubbled through a solution containing a mixture of $1MY^{-}$ and $1MZ^{-}$ at $25\,^{\circ}C$. If the order of reduction potentials is $Z > Y > X$, then

A. Y will oxidise X and not Z

B. Y will oxidise Z and not X

C. Y will oxidise both Z and X.

D. Y will oxidise both X and Z.

Answer: A

Watch Video Solution

4. The correct order of equivalent conductance at infinite dilution of $LiCl$, $NaCl$ and KCl is:

A. $LiCl > NaCl > KCl$

B. $KCl > NaCl > LiCl$

C. $NaCl > KCl > LiCl$

D. $LiCl > KCl > NaCl$

Answer: B

Watch Video Solution

5. A standard solution of KNO_3 is used to make salt bridge, because

A. Velocity of K^+ is greater than of NO_3^-

B. Velocity of NO_3^- is greater than that of K^+

C. Velocities of both K^+ and NO_3^- are nearly the same

D. KNO_3 is highly soluble in water

Answer: C

Watch Video Solution

6. In an electrolytic cell, the flow of electrons is form

A. cathode to anode in solution

B. cathode to anode through external supply

C. cathode to anode through internal supply.

D. anode to cathode through internal supply.

Answer: C

Watch Video Solution

7. The emf of the cell,

$Zn\left|Zn^{2+}(0.01M)\right|\left|Fe^{2+}(0.001M)\right|Fe$

at 298 K is 0.2905 then the value of equilibrium constant for the cell reaction is:

A. $e^{\frac{0.32}{0.0295}}$

B. $10^{\frac{0.32}{0.0295}}$

C. $10^{\frac{0.26}{0.0295}}$

D. $10^{\frac{0.32}{0.0591}}$

Answer: B

Watch Video Solution

8. The half cell reaction for rusting of iron are:

$$2H^+ + 2e^- + \frac{1}{2}O_2 \rightarrow H_2O(l), E^\circ = +1.23V$$

$$Fe^{2+} + 2e^- \rightarrow Fe(s), E^\circ = -0.44V$$

ΔG° (in KJ) for the reaction is

A. -76

B. -322

C. -161

D. -152.

Answer: B

Watch Video Solution

9. Electrolysis of dilute aqueous NaCl solution was carried out by passing 10 milli ampere current. The time required to liberate 0.01 mol of H_2 gas at the cathode is (1 Faraday=96500 C mol^{-1})

A. $9.65 \times 10^4 s$

B. $19.3 \times 10^4 s$

C. $28.95 \times 10^4 s$

D. $38.6 \times 10^4 s$

Answer: B

Watch Video Solution

10. $AgNO_{3(aq)}$ was added to an aqueous KCl solution gradually and the conductivity of the solution was measured. The plot of conductance (Λ)

versus the volume of $AgNO_3$ is

View Text Solution

11. Consider the following cell reaction.

$2Fe(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{2+}(aq) + 2H_2O(l)$,

$E^\circ = 1.67V$

At $\left[Fe^{2+}\right] = 10^{-3}M, P\left(O_2\right) = 0.1$ atm and pH=3, the cell potential at $25^\circ C$ is

A. 1.47V

B. 1.77 V

C. 1.87 V

D. 1.57 V

Answer: D

Watch Video Solution

12. For the following electrochemical cell at $298K$

$$Pt(s) + H_2(g, 1^-)\Big|H^+(aq, 1M)\Big|\Big|M^{4+}(aq), M^{2+}(aq)\Big|Pt(s)$$

$$E_{cell} = 0.092V \text{ when } \frac{\left[M^{2+}(aq)\right]}{\left[M^{4+}(aq)\right]} = 10^x$$

Guven, $E^{\circ}_{M^{4+}/M^{2+}} = 0.151V, 2.303\frac{RT}{F} = 0.059$

The value of x is-

A. -2

B. -1

C. 1

D. 2

Answer: D

Watch Video Solution

13. For the following cell,

$$Zn(s)\Big|ZnSO_4(aq)\Big|\Big|CuSO_4(aq)\Big| \mid Cu(s)$$

When the concentration of Zn^{2+} is 10 times the concentration of Cu^{2+}, the expression for ΔG

(in $\mathrm{J\ mol^{-1}}$)

[F is Faraday constant, R is gas constant] T is temperaure, $E^{\circ}(\text{cell}) = 1.1V$

A. 2.303 RT +1.1 F

B. 1.1 F

C. 2.303 RT -2.2 F

D. $-2.2F$

Answer: C

Watch Video Solution

MULTIPLE CORRECT OPTIONS TYPE MCQs

1. In s salt bridge, KCl is used because

A. it is and electrolyte

B. KCl is found in pure crystalline state in large deposits

C. it is a good conductor of electricity

D. it forms a good jelly with agr-agr.

Answer: A::C::D

View Text Solution

2. Which are true for a standard hydrogen electrode ?

A. The H^+ ion concentration is 1 M

B. Temperature is $35^\circ C$

C. Pressure of hydrogen is 1 atmosphere.

D. It contains metallic conductor which does not adsorb hydrogen.

Answer: A::C::D

Watch Video Solution

3. For the cell, $TI|TI^+(0.001M)||Cu^{2+}(0.1M)|Cu(s), E^\circ_{cell}$ at $25^\circ C$ is 0.83 V. It can be increased by :

A. increasing $[Cu^{2+}]$

B. increasing $[TI^+]$

C. decreasing $[Cu^{2+}]$

D. decreasing $[TI^+]$

Answer: A::D

View Text Solution

4. For the reduction of NO_3^- ion in an aqueous solution E° is $+0.96V$. Values of E° for some metal ions are given below

$V^{2+}(aq) + 2e^- \Leftrightarrow V, E^\circ = -1.19Vtt$

$Fe^{3+}(aq) + 3e^- \rightarrow Fe : E^\circ = -0.04V$

$Au^{3+}(aq) + 3e^- \rightarrow Au, E^\circ = +1.40V$

$Hg^{2+}(aq) + 3e^- \rightarrow Hg, E^\circ = +0.86V$

The pari(s) of metals that is/are oxidised by NO_3^- in aqueous solution is (are)

A. V and Hg

B. Hg and Fe

C. Fe and Au

D. Fe and V.

Answer: A::B::D

Watch Video Solution

5. One gram equivalent of a substance is liberated at an electrode by :

A. 6.22×10^{23} electrons

B. 96500 C

C. 1 amp of current for one second

D. 1 amp current for 96500 C

Answer: A::B::D

Watch Video Solution

6. In which case $\left(E_{\text{cell}} - E^{\circ}_{\text{cell}}\right)$ is zero

A. $Cu\left|Cu^{2+}(0.01M)\right|\left|Ag^{+}(0.1M)\right|Ag$

B. $Pt\left(H_2\right)|pH = 1|\left|Zn^{2+}(0.01M)\right|Zn$

C. $Pt\left(H_2\right)|pH = 1|\left|Zn^{2+}(1M)\right|Zn$

D. $Pt\left(H_2\right) \mid H^{+} = 0.01M\Big) \mid \left|Zn^{2+}(0.01M)\right|Zn$

Answer: A::B

Watch Video Solution

7. During electrolysis of molten NaCl, some water is added, What will happen :

A. Electrolysis will stop.

B. Hydrogen will evolve

C. Some amount of caustic soda will be formed

D. A fire is likely.

Answer: B::C::D

View Text Solution

INTEGER ANSWER TYPE QUESTIONS

1. Calculate the number of coulombs required to deposit 40.5 g of Al when the electrode reaction is ,

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

Watch Video Solution

2. What is the value equilibrium constant if $E^{\circ}_{cell} = 0$?

View Text Solution

3. By passing a charge of 1930 through an aqueous solution of gold chloride, 1.314 g of gold was deposited. Find the oxidation state of gold. (Given atomic mass of Au =197 amu).

View Text Solution

4. A current of 2.0A passed for 5 hours through a molten metal salt deposits 22.2 g of metal (At. Wt. =177). The oxidation state of the metal in the metal salt is

Watch Video Solution

5. Calculate the emf of the cell :

$$Mg\left|Mg^{2+}(0.1M)\right|\left|Ag^{+}\left(1.0\times10^{-3}M\right)\right|Ag$$

Given that $E^{\circ}_{cell} = 3.15\ \text{V}.$

View Text Solution

6. What is the number of Faradays required to convert 1 mole of $Cr_2O_7^{2-}$ into Cr^{3+} ions ?

View Text Solution

7. In the Ma-Al cell, the number of electrons involved in the cell reaction are :

View Text Solution

8. For $Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6e^- \rightarrow 2Cr^{3+}(aq) + 7H_2O(aq)$

$E^\circ = 1.33\ \text{V}. At\left[Cr_2O_7^{2-}\right] = 4.5\ \text{millimole}, \left[Cr^{3+}\right] = 15\ \text{millimole}, Eis1.067\ \text{V}$

. The pH of the solution is :

View Text Solution

9. ΔG for the reaction :

$$\frac{4}{3}Al + O_2 \rightarrow \frac{2}{3}Al_2O_3$$

is $-772kJmol^{-1}$ of O_2.

Calculate the minimum EMF in volts required to carry out an electrolysis of Al_2O_3

Watch Video Solution

10. Consider the reaction :

$$H_2(g), Pt \mid H^+(aq), E = 0.1 \text{ V}$$

The pH of the solution is

View Text Solution

11. All the energy released from the reaction $X \rightarrow Y, \Delta_r G^\circ = -193kJ\text{mol}^{-1}$ is used for oxidising M° as $M^+ \rightarrow M^{3+} + 2e^-, E^\circ = -0.25V.$

Under standard conditions, the number of moles of M^+ oxidised when one mole of X is converted to Y is $\left[F = 96500 C mol^{-1}\right]$

Watch Video Solution

12. If K_c for the reaction

$Cu^{2+}(aq) + Sn^{2+}(aq) \rightarrow Sn^{4+}(aq) + Cu(s)$

at 25° C is represented as 2.6×10^y then find the value of y.

(Given:$E^\circ_{Cu^{2+}|Cu} = 0.34V, E_{Sn^{4+}|Sn^{2+}} \wedge (\circ) = 0.15V$

Watch Video Solution

13. The conductance of 0.0015 M aqueous solution of a weak monobasic acid was determined by using a conductivity cell consisting of platinized Pt electrodes. The distance between the electrodes is 120 cm with an area of cross section of $1 cm^2$. The conductance of this solution was found to be 5×10^{-7} S . The pH of the solution is 4. The value of limiting molar conductivity Λ_m^0 of weak monobasic acid in aqueous solution is

$Z \times 10^2$ S cm^{-1}. The value of Z is

View Text Solution

MATRIX-MATCH TYPE QUESTIONS

1.

Note : Hints for Q. No. 10 are given on next Page

View Text Solution

2. The standard reduction potential data at $25\,^\circ C$ is given below

$E^\circ\left(Fe^{3+}, Fe^{2+}\right) = +0.77V,$

$E^\circ\left(Fe^{2+}, Fe\right) = -0.44V,$

$E^\circ\left(Cu^{2+}, Cu\right) = +0.34V,$

$E^\circ\left(Cu^{+}, Cu\right) = +0.52V,$

$$E^\circ\left(O_2(g) + 4H^+ + 4e^- \rightarrow 2H_2O\right] = +1.23V$$

$$E^\circ\left[\left(O_2(g) + 2H_2O + 4e^- \rightarrow 4OH^-\right)\right] = +0.40V,$$

$$E^\circ\left(Cr^{3+}, Cr\right) = -0.74V,$$

$$E^\circ\left(Cr^{2+}, Cr\right) = -0.91V,$$

Match E° of the redox pair in List-I with the values given in List-II and select the correct answer using the code given below teh lists:

List - I	*List - II*
$(P)E^\circ\left(Fe^{3+}, Fe\right)$	(1) $-0.18V$
$(Q)E^\circ\left(4H_2O \Leftrightarrow 4H^+ + 4OH^+\right)$	(2) $-0.4V$
$(R)E^\circ\left(Cu^{2+} + Cu \rightarrow 2Cu^+\right)$	(3) $-0.04V$
$(S)E^\circ\left(Cr^{3+}, Cr^{2+}\right)$	(4) $-0.83V$

Codes:

Watch Video Solution

BRAIN STORMING MULTIPLE CHOICE QUESTIONS (MCQs)

1. How long a current of 3amp has to be passed through a solution of $AgNO_3$ to coat a metal surface of $80cm^2$ with $0.005mm$ thick layer. Density of silver is $10g/cm^3$ and atomic weight = $108g/\text{mole}$.

A. 25.00 s

B. 125.12 s

C. 200 s

D. 400 s

Answer: B

Watch Video Solution

2. A solution of a salt of a metal was electrolysed for 150 minutes by passing 0.15 A current. The weight of the metal deposited was 0.783 g. The specific heat of the metal is $0.057 \text{ cal}/gK$. The atomic mass X of the metal is :

A. $111.80 \ g/mol$

B. $52.2 \ g/mol$

C. $200 \ g/mol$

D. $250 \ g/mol$

Answer: A

View Text Solution

3. At 291 K, the molar conductivities at infinite dilution of NH_4Cl, NaOH and NaCl are 129.8, 217.4 and $108.9 \ S \ cm^2 mol^{-1}$ respectively. The molar conductivity of a centinormal solution of NH_4OH is $9.33 \ S \ cm^2 mol^{-1}$. The percentage dissociation of NH_4OH at this dilution and the dissociation constant of NH_4OH are :

A. $3.92\ \%, 1.599 \times 10^{-5}$

B. $6.92\ \%, 3.599 \times 10^{-5}$

C. $3.92\ \%, 4.599 \times 10^{-2}$

D. $9.92\ \%,\ 1.599 \times 10^{-5}$

Answer: A

View Text Solution

4. One coulomb of charge passes through a solution of $AgNO_3$ and $CuSO_4$ connected in series and the concentration of the two solutions is in the ratio $1:2$. The ratio by weight of Ag and Cu deposited on Pt electrode is :

A. $107.9 : 63.54$

B. $54 : 31.77$

C. $107.9 : 31.77$

D. $54 : 63.54$

Answer: C

View Text Solution

5. $Cu^{2+} + 2e^- \rightarrow Cu$. For this, graph between E_{red} versus $\ln\left[Cu^{2+}\right]$ is a straight line of intercept $0.34V$, then the electrode oxidation potential of the half cell $Cu \mid Cu^{2+}(0.1M)$ will be

A. $-0.34 + \dfrac{0.0591}{2}V$

B. $0.34 + 0.0591\ \text{V}$

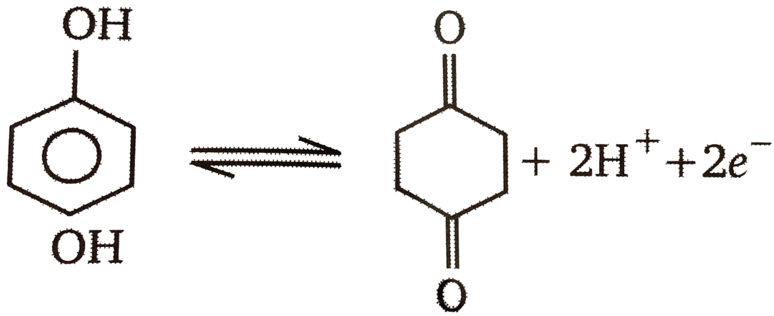
C. $0.34\ \text{V}$

D. none of these.

Answer: A

Watch Video Solution

6. At $pH = 2, E^{\circ}_{(\text{Quinhydrone})} = 1.30V, E_{\text{Quinhydrone}}$ will be :



A. $1.36 \;\; \text{V}$

B. $1.30 \;\; \text{V}$

C. $1.42 \;\; \text{V}$

D. $1.20 \;\; \text{V}$

Answer: C

Watch Video Solution

7. For the cell reaction, $Cu^{2+}_{C_2}(aq) + Zn(s) \rightarrow Zn^{2+}_{C_1}(aq) + Cu(s)$

The change in free energy (ΔG) at a given temperature is a function of :

A. In C_1

B. In $\left(c_2/c_1\right)$

C. In $\left(c_1 + c_2\right)$

D. In c_2

Answer: B

View Text Solution

8. When the total cell emf of a voltaic cell is greater than zero, which of the following is true about the reaction quotient Q and free energy change $DelatG$ for the cell reaction ?

A. Q is less than one and ΔG is greater than zero

B. Q greater than one and ΔG is greater than zero.

C. Q is less than one and ΔG is less than zero.

D. Q is greater than one and ΔG is less than zero.

Answer: C

View Text Solution

9. Two electrochemical cells, $Zn^{2+}\left|Zn^{2+}\right|\left|Cu^{2+}\right|Cu$ and $Fe\left|Fe^{2+}\right|\left|Cu^{2+}\right|Cu$ are connected in series. What will be the net e.m.f. of the cell at $25^{\circ}C$?

Given : E° of $Zn^{2+} \mid Zn = -0.76\ \text{V}$,

$Cu^{2+}\left|Cu = +0.34\ \text{V}, Fe^{2+}\right|Fe = -0.41\ \text{V}$

A. $+1.85\ \text{V}$

B. $-1.85\ \text{V}$

C. $+0.83\ \text{V}$

D. $-0.83\ \text{V}$

Answer: A

View Text Solution

10. The emf of the following three galvanic cells :

1. $Zn/Zn^{2+}(1M) \mid \mid Cu^{2+}(1M)/Cu$

2. $Zn/ZN^{2+}(1M) \mid \mid Cu^{2+}/cu$3. Zn//Zn^(2+) (1 M) || Cu^(2+) (0.1 M) Cu

*arerepersentedby*E_1, E_2, E_3` which of the following statement is true ?

A. $E_1 > E_2 > E_3$

B. $E_3 > E_2 > E_1$

C. $E_3 > E_1 > E_2$

D. $E_2 > E_1 > E_3$.

Answer: D

Watch Video Solution

11. The oxidation potential of hydrogen half-cell will be negative if:

A. $p(H_2) = 1 \text{ atm and} \left[H^+\right] = 1M$

B. $p(H_2) = 1 \text{ atm and} \left[H^+\right] = 2M$

C. $p(H_2) = 0.2 \text{ atm and} [H^+] = 1M$

D. $p(H_2) = 0.2 \text{ atm and} [H^+] = 2M$

Answer: B::C

Watch Video Solution

12. $E^{\circ}(SRP)$ of different half cell given

$E^{\circ}_{Cu^{2+}/Cu} = 0.34\text{volt}$ $\quad E^{\circ}_{Zn^{2+}/Zn} = -0.76\text{volt}$

$E^{\circ}_{Ag^{+}/Ag} = 0.8\text{volt}$ $\quad E^{\circ}_{Mg^{2+}/Mg} = -2.37\text{volt}$

In which cell Δ° is most negative:-

A. $Zn|Zn^{2+}(1M)||Mg^{2+}(1M)|Mg$

B. $Zn|Zn^{2+}(1M)||Ag^{+}(1M)|Ag$

C. $Cu|Cu^{2+}(1M)||Ag^{+}(1M)|Ag$

D. $Ag|Ag^{+}(1M)||Mg^{2+}(1M)|Mg$

Answer: B

Watch Video Solution

Others

1. The answer to each of the following question is a single digit integer, ranging from 0 to 9. if the correct answers to the question number A,B,C and D (say) are 4,0,9 and 2 respectively. Then the correct correct darkening of bubbles should be as shown on the side.

A. In Mg-Al cell, the number of electrons involved in the cell reaction i s

B. 0.25 mole of propane is subjected to combustion. If this reaction is used for making a fuel, cell the number of moles of electrons involved in each half cell for this amount of propane will be

C. Three litres of 0.5M $K_2Cr_2O_7$ solution have to be completely reduced in the acidic medium. The number of faradays of electricity required will be

D. For the Mg-Ag cell, how many times the difference between the EMF of the cell and its standard EMF will change if concentration of Mg^{2+} ions changed to 0.1M and that of Ag^{+} ions is changed from 0.5M to 0.25M.

Answer: A

View Text Solution