Example Problems

1. A conductivity cell has two platinum electrodes separated by a distance 1.5 cm and the cross sectional area of each electrode is 4.5 sq. cm. Using this cell, the resistance of 0.5 N electrolytic solution was measured as 15Ω. Find the specific conductance of the solution.
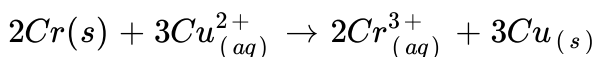
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2. Calculate the molar conductance of 0.025 M aqueous solution of calcium chloride at $25^\circ C$. The specific conductance of calcium chloride is $12.04 \times 10^{-2} Sm^{-1}$.

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3. The resistance of a conductivity cell is measured as 190Ω using $0.1KKCl$ solution (specific conductance of 0.1 M KCl is $1.3Sm^{-1}$). When the same cell is filled with 0.003 M sodium chloride solution, the measured resistance is 6.3Ω. Both these measurement are made at a particular temperature. Calculate the specificc and molar conductance of $NaCl$ solution.

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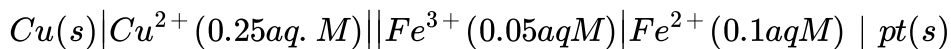**4.** The net redox reaction of a galvanic cell is given below

$$2Cr(s) + 3Cu^{2+}_{(aq)} \rightarrow 2Cr^{3+}_{(aq)} + 3Cu_{(s)}$$

Write the half reactions and describe the cell using cell notation.

5. Let us calculate the emf of the following cell at $25°C$ using Nernst equation.

$$Cu(s)\big|Cu^{2+}(0.25aq.\ M)\big\|Fe^{3+}(0.05aqM)\big|Fe^{2+}(0.1aqM)\ |\ pt(s)$$

6. A solution of silver nitrate is electrolysed for 20 minutes with a current of 2 ameres. Calculate the mass of silver deposited at the cathode.

Textbook Evaluation Choose The Correct Answer

1. The number of electrons that have a total charge of 9650 coulombs is

....
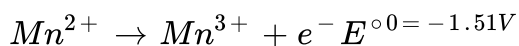
A. 6.22×10^{23}

B. 6.022×10^{24}

C. 6.022×10^{22}

D. 6.022×10^{-34}

Answer: C

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2. Consider the following half cell reactions :

$Mn^{2+} + 2e^- \rightarrow Mn E^\circ = -1.18V$

$Mn^{2+} \rightarrow Mn^{3+} + e^- E^{\circ 0} = -1.51V$

The E° for the reaction $3Mn^{2+} \rightarrow Mn + 2Mn^{3+}$, and the possibility of the forwad reactions are respectively

A. 2.69V and spontaneous
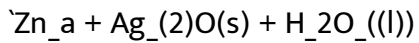
B. -2.69 and non spotaneous

C. 0.33V and Spontaneous

D. 4.18 V and non spontaneous

Answer: B

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3. The button cell used in watches function as follows

`Zn_a + Ag_(2)O(s) + H_2O_((l))

A. 0.84 V

B. 1.34 V

C. 1.10 V

D. 0.42 V

Answer: C

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4. The molar conductivity of a $0.5 moldm^{-3}$ solution of $AgNO_3$ with electrolytic conductivity of $5.76 \times 10^{-3} Scm^{-1}$ at 298 K is ....

A. $2.88 Scm^2 mol^{-1}$

B. $11.52 Scm^2 mol^{-1}$

C. $0.086 Scm^2 mol^{-1}$

D. $28.8 Scm^2 mol^{-1}$

Answer: B

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5.

Electrolyte	KCI	KNO_3	HCI	NaOAC	NaCI
Λ_- (S cm² mol⁻¹)	149.9	145.0	426.2	91.0	126.5

Calculate Λ°_{HOAc} using appropriate molar conductances of the electrolytes listed above at infinite dilution in water at $25^\circ C$.

A. 517.2

B. 552.7

C. 390.7

D. 217.5

Answer: C

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6. Faradays constant is defined as

A. charge carried by 1 electron

B. charge carried by one mole of electrons

C. charge requried to deposit one mole of substance

D. charge carried by 6.22×10^{10} electrons

Answer: B

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7. How many faradays of electricity are required for the following reaction to occur $MnO4^- \rightarrow Mn^{2+}$

A. $5F$

B. $3F$

C. $1F$

D. $7F$

Answer: A

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8. A current strength of 3.86 A was passed through molten Calcium oxide for 41 minutes and 40 seconds. The mass of Calcium in grams deposited at the cathode is (atomic mass of Ca is 40g/mol and 1F = 96500 C).

A. 4

B. 2

C. 8

D. 6

Answer: B

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9. During electrolysis of molten sodium chloride, the time required to produce 0.1 mol of chlorine gas using a current of 3A is ....

    A. 55 minutes

    B. 107.2 minutes

    C. 220 minutes

    D. 330 minutes

Answer: B

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10. The number of electrons delivered at the cathode during electrolysis by a current of 1A in 60 seconds is (charge of electron = $1.6 \times 10^{-19}C$)

A. 6.22×10^{23}

B. 6.022×10^{20}

C. 3.75×10^{20}

D. 7.48×10^{23}

Answer: C

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11. Which of the following electrolytic solution has the least specific conductance ?

A. 2N

B. $0.002N$

C. $0.02N$

D. $0.2N$

Answer: B

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12. While charging lead storage battery

A. $PbSO_4$ on cathodc is reduced to Pb

B. $PbSO_4$ on anode is oxidised to PbO_2

C. $PbSO_4$ on anode is reduced to Pb

D. $PbSO_4$ on cathode is oxidised to Pb

Answer: C

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13. Among the following cells

I. Leclanche cell   II. Nickel - Cadmiun cell

III. Lead storage battery   IV. Mercury cell

Primaru cells are ....

    A. I and IV

    B. I and III

    C. III and IV

    D. II and III

Answer: A

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14. Zinc can be coated on iron to produce galvanized iron but the reverse

is not possible. It is because

    A. Zinc is lighter than iron

B. Zinc has lower melting point than iron

C. Zinc has lower negative electrode potential than iron

D. Zinc has higher negative electrode potential than iron

Answer: D

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15. Assertion : pure iron when heated in dry air in converted with a layer of rust.

Reason : Rust has the compostion Fe_3O_4

A. If both assertion and reason are true and reason is the correct explanation of assertion.

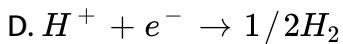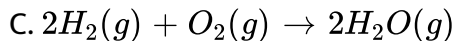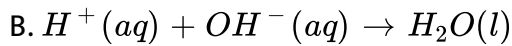B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. assertion is true but reason is false.
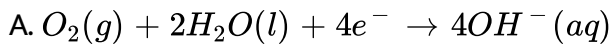
D. both assertion and reason are false.

Answer: D

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16. In $H_2 - O_2$ fuel cell the reaction occur at cathode is ....

A. $O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH^-(aq)$

B. $H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$

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

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

Answer: A

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17. The equivalent conductance of $M/36$ solution of a weak monobasic acid is $6\,mhocm^2$ and at infinite dilution is $400\,mhocm^2$. The dissociation constant of this acid is ....

    A. 1.25×10^{-6}

    B. 6.25×10^{-6}

    C. 1.25×10^{-4}

    D. 6.25×10^{-5}

Answer: B

▶ **View Text Solution**

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18. A conductivity cell has been calibrated with a 0.01M, 1:1 electrolytic solution (specific conductance $\left(k = 1.25 \times 10^{-3}\,Scm^{-1}\right)$ in the cell and the measured resistance was 800Ω at $25°C$. The cell constant is,

    A. $10^{-1}cm^{-1}$

B. $10^1 cm^{-1}$

C. $1 cm^{-1}$

D. 5.7×10^{-12}

Answer: C

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19. Conductivity of a saturated of a sparingly soluble salt AB (1:1 electrolyte) at 298 K is $1.85 \times 10^{-5} Sm^{-1}$. Solubility product of the salt AB at $298(\Lambda_m^\circ) = 14 \times 10^{-3} Sm^2 mol^{-1}$

A. 5.7×10^{-12}

B. 1.32×10^{-12}

C. 7.5×10^{-12}

D. 1.74×10^{-12}

Answer: D

20. In the electrochemical cell : $Zn|ZnSO_4(0.01M)|CuSO_4(1.0M) \mid Cu$, the emf of this Daniel cell is E_1. When the concentration of $ZnSO_4$, is changed to 1.0 M and that $CuSO_4$ changed to 0.01M, the emf changes to E_2. From the following , which one is the relationship between E_1 and E_2 ?

A. $E_1 < E_2$

B. $E_1 > E_2$

C. $E_2 = 0 \uparrow E_1$

D. $E_1 = E_2$

Answer: B

21. Consider the change in oxidation state of Bromine corresponding to different emf values as shown in the diagram below :

$$BrO_4^- \xrightarrow{1.82V} BrO_3^- \xrightarrow{1.5V} HBrO \xrightarrow{1.595V} Br_2 \xrightarrow{1.0652V} Br^-$$

Then the species undergoing disproportional is ....

A. Br_2

B. BrO_4^-

C. BrO_3^-

D. $HBrO$

Answer: D

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22. For the cell reaction

$$2Fe^{3+}(aq) + {}^{21-}(aq) \rightarrow 2Fe^{2+}(aq) + 1_2(aq)$$
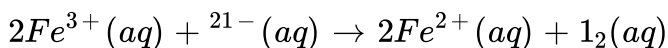
$E_{cell}^\circ = 0.24V$ at $298K$. The standard Gibbs energy (Δ, G°) of the cell reactions is :

A. $-46.32KJmol^{-1}$

B. $-23.16KJmol^{-1}$

C. $46.32KJmol^{-1}$

D. $23.16KJmol^{-1}$

Answer: A

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23. A certain current liberated 0.504 gm of hydrogen in 2hours. How many grams of copper can be liberated by the same current flowing for the same time in a copper sulphate solution?

A. 31.75

B. 15.8

C. 7.5

D. 63.5

Answer: B

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24. A gas X at 1 atm is bubble through a solution containing a mixture of $1MY^-$ and $1MZ^-$ at $25°C$. If the reduction potential of $Z > Y > X$, then

    A. Y will oxidized X and not Z

    B. Y will oxidize Z and not X

    C. Y will oxidize X and Z

    D. Y will reduce both X and Z

Answer: A

25. Cell equation : $A + 2B^- \rightarrow A^{2+} + 2B$,

$A^{2+} + 2e^- \rightarrow A E^\circ = +0.34V$ and $\log_{10} K = 15.6$ at 300 K for cell

reaction find E° for $B^1 + e^- \rightarrow B$

A. 0.80

B. 1.26

C. -0.54

D. -10.94

Answer: A

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Textbook Evaluation Short Answer

1. Define anode and cathode .

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2. Why does conductivity of a solution decrease on dilution of the solution ?

> ▶ View Text Solution

3. State Kohlrausch Law. How is it useful to determine the molar conductivity of weak electrolyte at infinite dilution.

> ▶ View Text Solution

4. Describe the electrolysis of molten $NaCl$ using inert electrodes.

> ▶ View Text Solution

5. State Faraday's Laws of electrolysis.

> ▶ View Text Solution

6. Describe the construction of Daniel cell. Write the cell reaction.

7. Why is anode is galvanic cell considered to be negative and cathode positive electrode ?

8. The conductivity of a 0.01 M solution of a $1:1$ weak electrolyte at 298 K is $1.5 \times 10^{-4} Scm^{-1}$.

(i) molar conductivity of the solution

(ii) degree of dissociation and the dissociation constant of the weak electrolyte

Given that $\lambda^{\circ}_{cation} = 248.2$ S cm^2 mol^{-1}

$\lambda^{\circ}_{anion} = 51.8$ S cm^2 mol^{-1}

9. Whichof 0.1M HCl and 0.1 M KCl do you expect to have greater molar conductance and why?

> ▶ **View Text Solution**

10. Arrange the following solution solutions in the decreasing order of specific conductance.

(i) 0.01 M KCl (ii) 0.005 M KCl (iii) 0.1 M KCl

(iv) 0.25 M KCl (v) 0.5 M KCl

> ▶ **View Text Solution**

11. Why is AC current used instead of DC in measuring the electrolytic conductance ?

> ▶ **View Text Solution**

12. 0.01 M NaCl solution is placed in two different cells having cell constant 0.5 and $0.25cm^{-1}$ respectively. Which of the two will have greater value of specific conductance.

▶ View Text Solution

13. A current of 1.608 A is passed through 250 mL of 0.5 M solution of copper sulphate for 50 minutes. Calculate the strength of Cu^{2+} after electrolysis assuming volume to be constant and the current efficiency is 100 % .

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14. Can Fe^{3+} oxidise Bromide to bromine under standard conditions ?

Given : $E_{Fe^{3+}\,|\,Fe^{2+}} = 0.771$ $E^{\circ}_{Br_2\,|\,Br^-}$ =-1.09V`

▶ View Text Solution

15. Is it possible to store copper sulphate in an iron vessel for a long time ?

Given : $E^{\circ}_{Cu^{2+} \mid Cu} = 0.34V$ and $E^{\circ}_{Fe^{2+} \mid Fe} = +0.44V$

▶ View Text Solution

16. Two metals M_1 and M_2 have reduction potential values of $-xV$ and $+yV$ respectively. Which will liberate H_2 in H_2SO_4?

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17. Calculate the standard emf of the cell : $Cd \mid Cd^{2+} \mid Cu^{2+} \mid Cu$ and determine the cell reaction. The standard reduction potential of $Cu^{2+} \mid Cu$ and $Cd^{2+} \mid Cd^2 \mid Cd$ are 0.34 V and -0.40 volts respectively. Predict the feasibility of the cell reaction.

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18. In fuel cell H_2 and O_2 react to produce electricity. In the process, H_2 gas is oxidised at the anode and O_2 at cathode. If 44.8 litre of H_2 at $25°C$ and also pressure reacts in 10 minutes, what is average current produced ? If the entire current is used for electro deposition of Cu from Cu^{2+}, how many grams of Cu deposited ?

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19. 0.1 M copper sulphate solution in which copper electrode is dipped at $25°C$. Calculate the electrode potential of copper. [Given $E^\circ_{Cu^{2+}|Cu} = 0.34$]

> ▶ View Text Solution

20. For the cell $Mg(s)|Mg^{2+}(aq)||Ag^+(aq)|Ag(s)$, calculate the equilibrium constant at $25°C$ and maximum work that can be obtained during operation of cell. Given :

$E^\circ_{Mg^{2+}|Mg} = +2.37V$ and $E^\circ_{Ag^{2+}|Ag} = 0.80V$

21. 8.2×10^{12} litres of water is available in a lake. A power reactor using the electrolysis of water in the lake produces electricity at the rate of $2 \times 10^6 Cs^{-1}$ at an appropriate voltage. How many years would it like to completely electrolyse the water in the lake. Assume that there is no loss of water except due to electrolysis.

22. Derive an expression for Nernst equation.

23. Write a not on sacrificial protection.

24. Example the function of $H_2 - O_2$ fuel cell.

25. Ionic conductance at infinite dilution of Al^{3+} and SO_4^{2-} are 189 and 160 mho cm^2equiv^{-1}. Calculate the equivalent and molar conductance of the electrolyte $Al_2(SO_4)_3$ at infinite dilution.

Evaluate Yourself

1. Calculate the molar conductance of 0.01M aqueous KCl solution at $25°C$. The specific conductance of KCl at $25°C$ is $14.114 \times 10^{-2} Sm^{-1}$.

2. The resistance of 0.15M solution of an electrolyte is 50Ω. The specific conductance of the solution is $2.4Sm^{-1}$. The resistance of 0.5 N solution of the same electrolyte measured using the same conductivity cell is 480Ω. Find the equivalent conductivity of 0.5 N solution of the electrolyte.
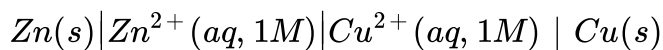
▶ View Text Solution

3. The emf of the following cell at $25°C$ is equal to $0.34v$. Calculate the reduction potential of copper electrode.
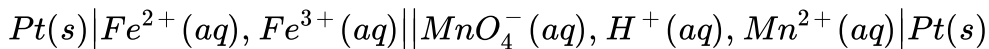
$Pt(s)|H_2(g, 1atm)|H^+(aq, 1M)|Cu^{2+}(aq, 1M)|Cu(s)$.
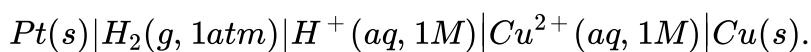
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4. Using the calculated emf value of zinc and copper electrode, calculate the emf of the following cell at $25°C$
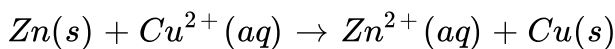
$Zn(s)|Zn^{2+}(aq, 1M)|Cu^{2+}(aq, 1M) | Cu(s)$

▶ View Text Solution

5. Write the overall redox reaction which takes place in the galvanic cell,

$$Pt(s)\big|Fe^{2+}(aq),\ Fe^{3+}(aq)\big\|MnO_4^-(aq),\ H^+(aq),\ Mn^{2+}(aq)\big|Pt(s)$$

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6. The electrochemical cell reaction of the Daniel cell is

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

What is the change in the cell voltage on increasing the ion concentration in the anode compartment by a factor 10 ?

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7. A solution of a salt of metal was electrolysed for 150 minutes with a current of 0.15 amperes. The mass of the metal deposited at the cathode is $0.783g$. Calculate the equivalent mass of the metal.

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1. Which one of the following is an example of conductor?

A. PVC

B. Bakelite

C. Aluminium

D. Rubber

Answer: C

▶ **View Text Solution**

2. Which one of the following can act as an insulator?

A. Bakelite

B. Aluminium

C. Copper

D. NaCl Solution

Answer: B

▶ **View Text Solution**

3. Which form of energy is converted to electrical energy in batteries?

A. tidal energy

B. Chemical energy

C. mechanical energy

D. atomic energy

Answer: B

▶ **View Text Solution**

4. Electron chemical reactions are generally ....

A. Reduction reactions

B. Oxidation reactions

C. Redox reactions

D. Condensation reactions

Answer: C

5. Consider the following statements:

(i) Energy can neither be created nor be destroyed but one form of energy can be converted to another form

(ii) In batteries, electrical energy is converted to chemical energy.

(iii) Electrochemical reactions are redox reactions.

Which of the above statement is/are not correct?

A. i & ii only

B. ii only

C. i only

D. iii only

Answer: B

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6. Which one of the following represents Ohm's law?

A. $V = IR$

B. $R = \dfrac{I}{V}$

C. $I = \dfrac{V}{R}$

D. $R = VI$

Answer: A

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7. The unit of resistivity is ....

A. Ωm^{-1}

B. Ωm

C. $m^{-1} Ohm^2$

D. $\Omega^{-1} m^{-1}$

Answer: B

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8. When cell constant is unit, the resistance is known as ....

A. specific resistance

B. conductance

C. specific conductance

D. equivalent conductance

Answer: A

---

9. The unit of specific resistence is equal to ....

A. Ohm metre

B. Ohm^{-1} metre

C. $Ohm^{-1}metre^{-1}$

D. Ohm

Answer: A

---

10. Which is the SI unit of conductance?

A. $\text{Siemen}^{-1}(\text{ or })S^{-1}$

B. Siemen (or) S

C. Sm^{-1}

D. $S^{-1}m^{-1}$

Answer: B

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11. Which one of the following represents specific conductance (kappa)?

A. $\dfrac{I}{C} \cdot \dfrac{l}{a}$

B. $\dfrac{I}{P} \cdot \dfrac{a}{l}$

C. $\dfrac{I}{P} \cdot \dfrac{a}{l^2}$

D. $\dfrac{I}{P} \cdot \dfrac{l}{a}$

Answer: D

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12. Which one is the unit of specific conductance ?

A. Ohm m

B. Ohm^{-1} m

C. $Ohm m^{-1}$

D. $Ohm^{-1}m^{-1}$

Answer: D

▶ View Text Solution

13. Which one of the following formula represents equivalent conductance?

A. $\dfrac{I}{P} \cdot \dfrac{l}{a}$

B. $\dfrac{I}{P} \cdot \dfrac{A}{l}$

C. $C \times \dfrac{l}{a}$

D. $\dfrac{k \times 10^{-3}}{N}$

Answer: D

---

14. The unit of equivalent conductance is ....

A. $Sm^2 g\text{equivalent}^{-1}$

B. Sm^{-1}

C. $Ohm^{-1}m^{-1}$

D. $Ohm m$

Answer: A

---

15. Consider the following statement :

(i) Solvent of higher dielectric constant show very low conductance in solution.

(ii) Conductance is directly proportional to viscosity of the medium .

(iii) Molar conductance of a solution increases with increase in dilution.

Which of the above statement is I are correct ?

A. i & ii

B. ii and iii

C. iii only

D. i only

Answer: C

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16. Consider the following statements:

(i) If the temperature of the electrolytic solution increases, conductance decreases.

(ii) Conductivity increases with the decrease in viscosity .

(iii) Molar conductance of a solution decreases with increase in dilution.

Which of the above statement is I are not correct ?

A. i & iii

B. i and iii

C. iii only

D. ii only

Answer: A

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17. Which one of the following is used to measure conductivity of ionic solutions?

A. metre scale

B. wheat stone bridge

C. Dynamo

D. Ammeter

Answer: B

18. Which of the following is used to calculate the conductivity of strong electrolytes?

    A. Kohlraush's law

    B. Henderson equation

    C. Debye-Huckel and Onasager equation

    D. Ostwald's dilution law

Answer: C

19. Which one of the following represents Debye-Huckel and Onasager equation?

A. $(\Lambda_m^\circ)_{A_x B_y} = x(\lambda_m^\circ)_{A^y} + y(\lambda_m^\circ)_{B^{x-}}$

B. $\Lambda_m = \Lambda_m^\circ - (A + B\Lambda_m^\circ)\sqrt{C}$

C. $K_a = \dfrac{\alpha^2 C}{I - \alpha}$

D. $\Lambda_m^\circ = \Lambda - (A + B)\Lambda_m^\circ - C$

Answer: B

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20. The value of A in Debye-Huckel and Onsager equation is ....

A. $A = \dfrac{8.20 \times 10^5}{3\sqrt{DT}}$

B. $A = \dfrac{8.20 \times 10^{-5}}{\sqrt{DT}}$

C. $A = \dfrac{82.4}{\sqrt{DT}\eta}$

D. $A = \dfrac{82.4}{3\sqrt{DT}}$

Answer: C

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21. The value of B in Debye-Huckel and Onsager equation is ....

A. $B = \dfrac{8.20 \times 10^5}{3\sqrt{DT}}$

B. $B = \dfrac{8.20 \times 10^{-5}}{\sqrt{DT}}$

C. $B = \dfrac{82.4}{\sqrt{DT}\eta}$

D. $B = \dfrac{82.4}{3\sqrt{DT}}$

Answer: A

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22. Kohlrausch's law is applied to calculate ....

A. molar conductance at infinite dilution of a weak electrolyte

B. degree of dissociation of weak electrolyte

C. solubility of a sparingly soluble salt

D. all the above

Answer: D

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23. In which of the following interconversion of electrical energy into chemical energy and vice versa take place ?

    A. electrochemical cell

    B. electric cell

    C. Dynamo

    D. AC generator

Answer: A

---

24. Consider the following statements :

(i) In Galvanic cell, chemical energy is converted into electrical energy.

(ii) In electrolytic cell, electrical energy is converted into chemical energy.

(iii) In Voltaic cell, electrical energy is converted into chemical energy.

Which of the above statement is/are not correct ?

A. i & ii

B. iii only

C. ii only

D. i only

Answer: B

▶ **View Text Solution**

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25. In Galvanic cell, the Zinc metal strip placed gets ....

A. Oxidised

B. reduced

C. hydrolysed

D. condensed

Answer: A

> ▶ **View Text Solution**

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26. Consider the following statements :

(i) In Galvanic cell, Zinc is oxidised to Zn^{2+} ions and Cu^{2+} ions are reduced to copper.

(ii) In Galvanic cell, Zn^{2+} ions are reduced to Zinc and copper is oxidised to Cu^{2+} ions.

(iii) In Galvanic cell, Zn and copper both get oxidised.

Which of the above statement is/are correct ?

    A. i only

    B. ii & iii
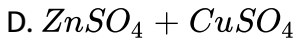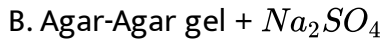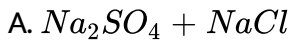
    C. ii only

    D. iii only

Answer: A

27. The salt bridge used in Daniel cell contains ....

    A. $Na_2SO_4 + NaCl$

    B. Agar-Agar gel + Na_2SO_4

    C. Silica get + $CuSO_4$

    D. $ZnSO_4 + CuSO_4$

Answer: B

28. Consider the following statements:

(i) In Daniel cell, when the switch (k) closes the circuit, the electrons flow

from Zinc strip to copper strip.

(ii) In Daniel cell, when the switch (k) closes the circuit, the electrons flow from copper strip to Zinc strip .

(iii) In Daniel cell, when the Switch (k) opens the circuit, the electrons flow from Zinc to copper.

Which of the above statement is/are correct?

A. i only

B. ii & iii

C. ii only

D. iii only

Answer: A

▶ View Text Solution

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29. Which one of the following can act as an inert electrode ?

A. Graphite

B. Copper

C. Platinum

D. either a (or) c

Answer: D

▶ **View Text Solution**

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30. The SI unit of cell potential is ....

A. Ampere

B. Ohm

C. Volt

D. Ohm^{-1}

Answer: C

▶ **View Text Solution**

31. The emf of Daniel cell $Zn_{(s)} + Zn^{2+}_{(aq)\,(lm)}\,\big|\,\big|Cu^{2+}_{(aq)\,(lm)}\big|Cu(s)$ is equal to ....

    A. -1.107 Volts

    B. 1.107 Volts

    C. 3.4 Volts

    D. 7.6 Volt

Answer: B

▶ **View Text Solution**

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32. Which instrument is used potential difference ?

    A. Ammeter

    B. Voltmeter

    C. Wheat stone bridge

D. metre bridge

Answer: B

▶ **View Text Solution**

33. The value of EMF of standard electrode at $25^\circ C$ is................ .

A. maximum

B. zero

C. negative

D. positive.

Answer: B

▶ **View Text Solution**

34. The electrode used in SHE is made of ....

A. Graphite

B. Copper

C. Platinum

D. iron

Answer: C

▶ View Text Solution

35. What is the charge of one electron ?

A. $1.602 \times 10^{19} C$

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

C. $9645 C$

D. $96488 C$

Answer: B

▶ View Text Solution

36. The maximum work that can be obtained from a galvanic cell is ....

A. $+nFE$

B. $-nFE$

C. $2F$

D. $96500F$

Answer: B

▶ View Text Solution

37. For all spotaneous cell reactions, the value of $D\eta G$ should be ....

A. constant

B. zero

C. negative

D. positive.

Answer: C

▶ **View Text Solution**

38. The value of one Faraday is equal to ....

A. $96400C$

B. $96500C$

C. $1.602 \times 10^{-19}C$

D. $1.602 \times 10^{19}C$

Answer: B

▶ **View Text Solution**

39. The relationship between standard free energy change and equilibrium constant is expressed as ....

A. $\Delta G^{\circ} = -RT\ln k_{eq}$

B. $\Delta G = RT\ln k_{eq}$

C. $\Delta G^{\circ} = \dfrac{1}{RT\ln k_{eq}}$

D. $\Delta G = RT\log_{eq}$

Answer: A

▶ **View Text Solution**

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40. Which equation relates the cell potential and the concentration of the species involved in an electro chemical reaction?

A. Henderson equation

B. Arrhenius equation

C. Debye Huckel Onsagar equation

D. Nernst equation

Answer: D

---

41. Which one of the following is Nernst equation,

A. $E_{cell} = E_{cell}^{\circ} + \dfrac{0.0591}{n} \log \dfrac{[C]^{1}[D]^{m}}{[A]^{x}[B]^{y}}$

B. $E_{cell} = E_{cell}^{\circ} - \dfrac{0.0591}{n} \log \dfrac{[A]^{x}[B]^{y}}{[C]^{1}[D]^{m}}$

C. $E_{cell} = E_{cell}^{\circ} - \dfrac{0.0591}{n} \log \dfrac{[C]^{1}[D]^{m}}{[A]^{x}[B]^{y}}$

D. $E_{cell} = E_{cell}^{\circ} + \dfrac{0.0591}{n} \log \dfrac{[A]^{x}[B]^{y}}{[C]^{1}[D]^{m}}$

Answer: C

---

42. Gibbs free energy can be related to cell emf as follows:

A. $\Delta G^\circ = -nFE_{cell}$

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

C. $\Delta G = nFE_{cell}$

D. $\Delta G^\circ = nFE^\circ_{cell}$

Answer: B

▶ **View Text Solution**

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43. Which one of the following represents Faraday's first law ?

A. $m = Zlt$

B. $m = \dfrac{Z}{It}$

C. $m = \dfrac{It}{Z}$

D. $Z = Mlt$

Answer: A

▶ **View Text Solution**

44. When I coulomb of electric current is passed the amount of substance deposited or liberated is known as ....

    A. equivalent mass

    B. electro chemical equivalent

    C. molar mass

    D. 1Faraday

Answer: B

▶ View Text Solution

45. The value of electro chemical equivalent is equal to ....

A. $\dfrac{96500}{\text{Equivalent mass}}$

B. $\dfrac{96500}{\text{Molar mass}}$

C. $\dfrac{\text{Molar mass}}{96500}$

D. $\dfrac{\text{Equivalent mass}}{96500}$

Answer: D

▶ **View Text Solution**

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46. The mathematocal expression of Faraday's second law is ....

A. $m = Zit$

B. $\dfrac{m_1}{E_1} = \dfrac{m_2}{E_2} = \dfrac{m_3}{E_3}$

C. $\dfrac{m_1}{Z_1} = \dfrac{m_2}{Z_2} = \dfrac{m_3}{Z_3}$

D. $Z = \dfrac{m}{It}$

Answer: C

▶ **View Text Solution**

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47. Which one of the following is used in cell phone, dry cell in flashlight?

A. Zn - Cu battery

B. Li - ion battery

C. Ag - Cu battery

D. Na, NaCl battery

Answer: B

▶ View Text Solution

48. The primary bateries are ....

A. rechargeable

B. non-rechargeable

C. reversible

D. renewable

Answer: B

▶ View Text Solution

49. Consider the following statements.

(i) The secondary batteries are rechargeable.

(ii) Primary batteries are non-rechargeable.

(iii) Batteries are used as a source of AC current at a constant voltage.

Which of the above statement is/are not correct?

    A. i & ii

    B. iii only

    C. i only

    D. ii only

Answer: B

▶ **View Text Solution**

50. The anode and cathode used in Leclanche cell are .... respectively.

A. Zinc , Graphite rod with MnO_2

B. Graphite rod in MnO_2 and Zinc container

C. Zn container and copper rod

D. Copper container and Zinc rod

Answer: A

▶ View Text Solution

51. Which electrolyte is used in Leclanche cell?

A. $ZnSO_4 + CuSO_4$

B. $NH_4Cl + ZnCl_2$

C. $NaCl + CuSO_4$

D. $MnSO_4 - MnO_2$

Answer: B

▶ View Text Solution

52. Which one of the following is used as cathode in Mercury button cell ?

A. Zinc

B. Copper

C. Zinc amalgamated with mercury

D. HgO mixed with graphite

Answer: C

▶ View Text Solution

53. Which one of the following is used as anode in Mercury button cell?

A. HgO mixed with graphite

B. Zinc amalgamated with mercury

C. Copper amalgamated with mercury

D. HgO mixed with Copper

Answer: A

▶ **View Text Solution**

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54. The value of cell emf of Mercury button cell is ....

A. $1.35V$

B. $-0.76V$

C. $0.34V$

D. $100V$

Answer: A

▶ **View Text Solution**

55. Which one of the following is used in pacemakers, cameras and electronic watches ?
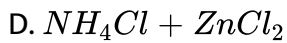
A. Li-ion battery

B. Leclanche cell

C. Galvanic cell

D. Mercury button cell

Answer: D

▶ **View Text Solution**

56. The electrolyte used in Mercury button cell is ....

A. Paste of kOH and ZnO

B. $CuSO_4 + ZnSO_4$

C. $NaCl + MgCl_2$

D. $NH_4Cl + ZnCl_2$

Answer: A

▶ View Text Solution

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57. Which of the following is an example of secondary batteries ?

A. Mercury button cell

B. Leclanche cell

C. Lead storage battery

D. Daniel cell

Answer: C

▶ View Text Solution

58. Which of the following acts as cathode and anode in Lead storage battery?

    A. Lead plate bearing PbO_2 , spongy Lead

    B. Spongy lead, lead plate bearing PbO_2

    C. Lead Copper

    D. Mercury oxide, PbO

Answer: A

▶ **View Text Solution**

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59. Which one of the folloiwng is used as an electrolyte Lead storage battery?

    A. $PbSO_4$

    B. H_2SO_4

    C. $CuSO_4$

D. HNO_3

Answer: B

▶ **View Text Solution**

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60. The emf of lead storage battery is ....

A. $+1.1V$

B. $2.4V$

C. $2V$

D. $11.2V$

Answer: C

▶ **View Text Solution**

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61. The Lead storage battery is used in ....

A. pacemakers

B. automobiles

C. electonic watches

D. flash light

Answer: B

▶ **View Text Solution**

62. Which one of the following is used in automobiles, trains and in inverters?

A. Lithium ion battery

B. Mercury button cell

C. Lead storage battery

D. Leclanche cell

Answer: C

63. Which one of the following is used as an anode in Lithium ion battery?

    A. Porous graphite

    B. Lithium

    C. CoO_2

    D. Copper

Answer: A

64. Which one of the following is used as cathode in Lithium ion battery?

    A. Porous graphite

    B. Lithium

C. CoO_2

D. Chromium

Answer: C

▶ View Text Solution

65. Which one of the following is used in cellular phones, Laptop computers and in digital camera?

A. Mercury button cell

B. Lithium - ion battery

C. H_2O_2 fuel cell

D. Leclanche cell

Answer: B

▶ View Text Solution

66. Which one of the following is used as an electrolyte in H_2O_2 fuel cell?

A. Aqueous $CuSO_4$

B. Aqueous CoO_2

C. Aqueous KOH

D. $NH_4Cl + ZnCl_2$

Answer: C

▶ **View Text Solution**

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67. Which one of the following is an example for electrochemical process?

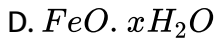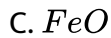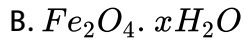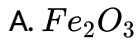A. Chrome plating

B. Rusting of iron

C. Galvanisation

D. all the above

Answer: D

---

68. The formula of rust is ....

A. Fe_2O_3

B. $Fe_2O_4 \cdot xH_2O$

C. FeO

D. $FeO \cdot xH_2O$

Answer: B

---

69. Which one of the following is/are very important for rusting?

A. Oxygen

B. Water

C. Both a & b

D. H_2O_2

Answer: C

▶ **View Text Solution**

70. The electro plating of Zinc over a metal is called.............. .

A. Electrolysis

B. Redox reaction

C. Galvanisation

D. Passivation

Answer: C

▶ **View Text Solution**

71. Consider the following statements.

(i) The standard reduction potential (E°) is a measure of oxidising tendency of the species.

(ii) The standard oxidation potental (E°) is a measure of oxidising tendency of the species.

(iii) The standard oxidation potential (E°) is a measure of redox tendency of the species.

Which of the above statement is/are not correct?
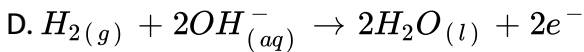
    A. i only

    B. ii only

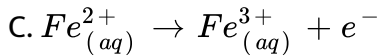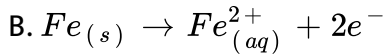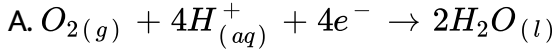   C. ii & iii

    D. iii only

Answer: C

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72. On the basis of the electrochemical theory of aqueous corrosion, the reaction occuring at the cathode is ....

A. $O_{2(g)} + 4H^+_{(aq)} + 4e^- \rightarrow 2H_2O_{(l)}$

B. $Fe_{(s)} \rightarrow Fe^{2+}_{(aq)} + 2e^-$

C. $Fe^{2+}_{(aq)} \rightarrow Fe^{3+}_{(aq)} + e^-$

D. $H_{2(g)} + 2OH^-_{(aq)} \rightarrow 2H_2O_{(l)} + 2e^-$

Answer: A

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73. The standard reduction potential for the half reactions are as

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

$Fe \rightarrow Fe^{2+} + 2e^- \; E^\circ = +0.41V.$ So   for   cell   reaction

$Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$ is ....
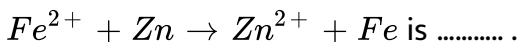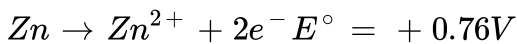
A. $-0.35V$

B. $+0.35V$

C. $+1.17V$

D. $-1.17V$

Answer: B

> ▶ View Text Solution

74. The standard emf for the given cell reaction $Zn + Cu^{2+} \rightarrow Cu + Zn^{2+}$ is $1.10V$ at $25°C$. The emf for the cell reaction when $0.1MCu^{2+}$ and $0.1MZn^{2+}$ solution are used at $25°C$ is ....

A. $1.10V$

B. $0.110V$

C. $-1.10V$

D. $-110V$

Answer: A

75. Which amount of chlorine gas liberated at anode, if 1 ampere current is passed for 30 minutes from NaCl solution?

    A. 0.66 moles

    B. 0.33 moles

    C. 0.66 g

    D. 0.33g

Answer: C

76. When Zinc piece is kept in $CuSO_4$ solution the copper gets precipitated due to standard potential of Zinc is ....

A. gt copper

B. lt copper

C. gt sulphate

D. lt sulphate

Answer: B

▶ **View Text Solution**

77. Which equation shows the relation between electrode potential (E)
standard electrode potential (E°) and concentration of ions in solution
is ....

A. Kohlrausch's equation

B. Nernst equation

C. Ohm's equation

D. Faraday's equation

Answer: B

---

78. The standard electrode potential of SHE at 298 K is ....

A. $0.05V$

B. $0.01V$

C. $0.0V$

D. $0.11V$

Answer: C

---

79. The reaction $Zn^{2+} + 2e^- \rightarrow Zn$ has a standard potential of $-0.76V$. This means

A. Zn cannot replace hydrogen from acids

B. Zn is a reducing agent

C. Zn is an oxidising agent

D. Zn^{2+} is a reducing agent

Answer: B

▶ **View Text Solution**

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80. K,Ca and Li metals may be arranged in the decreasing order of their standard electrode potentials as ....
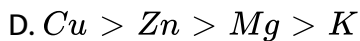
A. K, Ca, Li

B. Ca, K, Li

C. Li, Ca, K

D. Ca, Li,K

Answer: B

81. The correct order of chemical reactivity with water according to electrochemical series ………. .

    A. $K > Mg > Zn > Cu$

    B. $Mg > Zn > Cu > K$

    C. $K > Zn > Mg > Cu$

    D. $Cu > Zn > Mg > K$
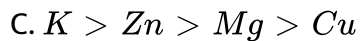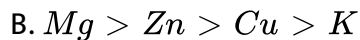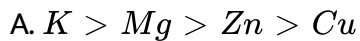
Answer: A

82. For a spontaneous reaction, the ΔG, the equilibrium constant (K) and E°_{cell} will be respectively ………. .
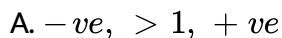
    A. $-ve, \ > 1, \ + ve$

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

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

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

Answer: A

▶ View Text Solution

83. $E°$ values of mg^{2+}/mg is $-2.37V, Zn^{2+}/Zn$ is $-0.76V,$ and Fe^{2+}/Fe is $-0.44V.$ Which of the following statement is correct ?

A. Zn will reduce Fe^{2+}

B. Zn will reduce mg^{2+}

C. Mg oxidises Fe

D. Zn oxidises Fe

Answer: A

84. In which cell, the free energy of a chemical reaction is directly converted into elecricity ?

A. Lechanche cell

B. Fuel cell

C. Lead storage battery

D. Lithium ion battery

Answer: B

85. Which of the following has the highest electrode potential ?

A. Li

B. Cu

C. Au

D. Al

Answer: C

86. Consider the following statements.

(i) A slat bridge is used to eliminate liquid junction potential

(ii) The Gibbs free energy change ΔG is related with electro motive force (E) as $\Delta G = -nFE$.

(iii) Nernst equation for a single electrode potential is $E = E° - \dfrac{RT}{nF} \ln a_{m^{n+}}$

(iv) The efficiency of a hydrogen oxygen fuel cell is 23%.

Which of the above statement is I are not correct ?

A. i & ii

B. ii & iii

C. iv only

D. i only

Answer: C

> ▶ **View Text Solution**

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87. The specific conductance of $0.1NKCl$ solution at $23°C$ is $0.012Ohm^{-1}cm^{-1}$. The resistance of the cell containing the solution at the same temperature was found to be 55 Ohm. The cell constant will be ....

    A. $0.142cm^{-1}$

    B. $0.66cm^{-1}$

    C. $0.918cm^{-1}$

    D. $1.12cm^{-1}$

Answer: B

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

A. $Cd_{(s)} + 2Ni(OH)_{3(s)} \rightarrow CdO_{(s)} + 2Ni(OH) + H_2O_{(l)}$

B. $Pb_{(s)} + PbO_{2(s)} + 2H_2SO_{4(aq)} \rightarrow 2PbSO_{4(s)} + 2H_2O_{(l)}$

C. $2Fe_{(s)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$

D. $2Fe_{(s)} + O_{2(g)} + 4H^+_{(aq)} \rightarrow 2Fe^{2+}_{(aq)} + 2H_2O_{(l)}$
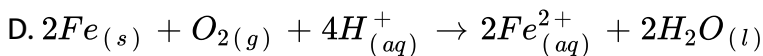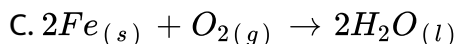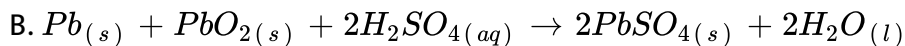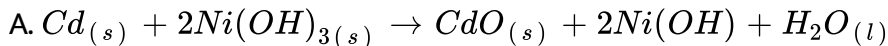
Answer: C

89. When lead storage battery is charged ....

A. PbO_2 is dissolved

B. H_2SO_4 is regenerated

C. $PbSO_4$ is deposited on lead electrode

D. Lead is deposited on lead electrode

Answer: C

> ▶ **View Text Solution**

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90. Which colourless gas evolves when NH_4Cl reacts with Zinc in a dry cell battery?

A. NH_3

B. N_2

C. H_2

D. Cl_2

Answer: C

> ▶ **View Text Solution**

91. A cell from the following which converts electrical energy into chemical energy?

    A. dry cell

    B. Electro chemical cell

    C. Electrolytic cell

    D. Lithium ion battery

Answer: C

▶ **View Text Solution**

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92. When 9.65 Coulomb of electricity is passed through a solution of silver nitrate (Atomic weigth of Ag = 107.85g), the amount of silver deposited is ....

    A. $10.8mg$

    B. $5.4mg$

C. $16.2mg$

D. $21.2mg$

Answer: A

▶ View Text Solution

93. What weight of copper will be deposited by passing 2 Faraday's of electricity through a cupric salt (Atomic weight of Cu = 63.5)

A. $2.0g$

B. $3.175g$

C. $63.5g$

D. $127.0g$

Answer: C

▶ View Text Solution

94. In electrolysis of a fused salt, the weight of the deposite on an electrode will not depend on ....

    A. temeperature of the bath

    B. current intensity

    C. electro chemical equivalent of ions

    D. time for electrolysis

Answer: A

▶ **View Text Solution**

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95. The mass deposited at an electrode is directly proportional to ....
.

    A. atomic weight

    B. equivalent weight

    C. molecular weight

D. atomic number

Answer: B

> ▶ **View Text Solution**

96. Which solution will show the highest resistance during the passage of current ?

A. 0.05 N NaCl

B. 2N NaCl

C. 0.1 N NaCl

D. 1 N NaCl

Answer: B

> ▶ **View Text Solution**

97. In a galvanic cell, the electrons flow 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

▶ **View Text Solution**

98. Rusting of iron is catalysed by which of the following ?

A. Fe

B. O_2

C. Zn

D. H^+

Answer: D

99. The conductivity of strong electrolyte is ....

    A. increase on dilutin slightly

    B. decrease on dilution

    C. does not change with dilution

    D. depend upon density of electrolyte itself.

Answer: A

100. Which one of the not a conductor of electricity ?

    A. $NaCl_{(\text{aqueous})}$

B. $NaCl_{(\text{solid})}$

C. $NaCl_{(\text{molten})}$

D. $Ag_{(\text{metal})}$

Answer: B

▶ View Text Solution

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101. The molar conductivity is maximum for the solution of concentration................ .

A. $0.001m$

B. $0.005m$

C. $0.002m$

D. $0.004m$

Answer: A

▶ View Text Solution

102. Resistance of 0.2 m solution of an electrolyte is $50 Ohm^{-1}$. The specific conductance of the solution is $1.3 Sm^{-1}$. If resistance of 0.4 m solution of the same electrolyte is $260 Ohm^{-1}$, its molar conductivity is ....

A. $62.5 Sm^2 mol^{-1}$

B. $6250 Sm^2 mol^{-1}$

C. $62.5 \times 10^{-4} Sm^2 mol^{-1}$

D. $625 \times 10^{-4} Sm^2 mol^{-1}$

Answer: C

▶ View Text Solution

103. Saturated solution of KCl (or) Na_2SO_4 is used to make salt bridge because

A. velocity of K^+ is greater than that of Cl^-

B. velocity of Cl^- is greater than that of K^+

C. velocity of both K^+ and Cl^- are nearly the same

D. KCl is highly soluble in water

Answer: C

▶ **View Text Solution**

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

A. $0.02N$

B. $0.2N$

C. $2N$

D. $0.002N$

Answer: D

105. An increase in equivalent conductance of a strong electrolyte with dilution is mainly due to ....

    A. increase in both the number of ions and ionic mobility of ions

    B. increase in number of ions

    C. increase in ionic mobility of ions

    D. 100% ionization of electrolyte at normal dilution

Answer: C

106. Li occupies higher position in the electrochemical series of metal as compared to Cu, since

A. the standard reduction potential of Li^+/Li is lower than that of Cu^{2+}/Cu.

B. the standard reduction potential of Cu^{2+}/Cu is lower than that of Li^+/Li

C. the standard oxidation potential of Li/Li^+ is lower than that of Cu/Cu^{2+}

D. Li is smaller in size as compared to Cu.

Answer: A

▶ **View Text Solution**

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107. The one which decreases with dilution is ....

A. conductance

B. specific conductance

C. equivalent conductance

D. molar conductance

Answer: B

---

108. 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. 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

109. A button cell used in watches functions as following :

`Zn_((s)) + Ag_(2)O_((s)) + H_2O_((l)) If half cell potential are

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

$$E^\circ = -0.76V$$
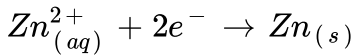
$$Ag_2O_{(s)} + H_2O_{(l)} + 2e^- \rightarrow 2Ag_{(s)} + 2OH_{(aq)}^- \quad E^\circ = 0.34V$$
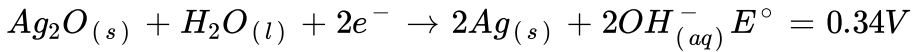
The cell potential will be ....

    A. 1.10 V

    B. 0.42 V

    C. 0.84 V

    D. 1.34 V

Answer: A

▶ View Text Solution

110. Among the following cells Leclanche cell (I) Nickel-cadmium cell (II), Lead storage battery (III) and Mercury Cell (IV), primary cells are ....

A. I & II

B. I & III

C. II & III

D. I & IV

Answer: D

▶ View Text Solution

Additional Questions Fill In The Blanks

1. .... Is defined as the resistance of an electrolyte confined between two electrons having unit cross sectional area and separated by a unit distance

▶ View Text Solution

2. The reciprocal of the specific reistance is called the .... And represented by symbol

▶ View Text Solution

3. The SI unit of sepecific conductance is ....

▶ View Text Solution

4. The relation between equivalent condutance and the specific conductance is given as ....

▶ View Text Solution

5. Conductivity increases with the .... In viscosity .

▶ View Text Solution

6. Λ_m° values of the weak electrolytes can be determined using ....

> ▶ **View Text Solution**

7. .... Is a device in which a spontaneous chemical reactoin generates an electric current.

> ▶ **View Text Solution**

8. .... Is a device that converts electrical energy into chemical energy.

> ▶ **View Text Solution**

9. The salt bridge contains a agar-agar gel mixed with an inert electrolyte such as ....

> ▶ **View Text Solution**

10. The SI unit of cell potential is ....

▶ View Text Solution

11. The value of charge of one electron is equal to ....

▶ View Text Solution

12. For a spontaneous cell reaction, the ΔG should be ....

▶ View Text Solution

13. .... Is a process in which electrical energy is used to cause a non-spontaneous chemical reaction.

▶ View Text Solution

14. The negative E° values shows that the reactoins are ....

> ▶ View Text Solution

15. .... Is defined as the amount of a substance deposited or liberated at the electrode bya charge of 1 Coulomb.

> ▶ View Text Solution

16. .... Cell is used in pacemakers, electronic watches and cameras.

> ▶ View Text Solution

17. .... Battery is used in automobiles.

> ▶ View Text Solution

18. Rusting of iron is an .... Process.

Additional Questions Match The Following

1.

ColumnI	Column II
(i) Ohm's law	$(a)\, E_{cell} = E^\circ_{cell} - \frac{0.0591}{A}\log\frac{[C]^1[D]^m}{[A]^x[B]^y}$
(ii) Kohlraush's law	$(b)\, m = ZIT$
(iii) Nernst equation	$(c)\, V = IR$
(iv) Faradays first law	$(d)\, (\Lambda^\circ_m)_{A_x B_Y} = x(\Lambda^\circ_m)_{A^{y+}} + y(\Lambda^\circ_m)_{B^{x-}}$

Using the code given below, match the column I and Column II.

A.
A	B	C	D
c	d	a	b

B.
A	B	C	D
a	b	c	d

C.
A	B	C	D
d	c	b	a

D.
A	B	C	D
b	a	d	c

Answer: A

2.

(i) Resistance	(a) Ohm m
(ii) Resistivity	$(b) Sm^{-1}$
(iii) Conductance	$(c) Ohm$
(iv) Specific conductance	(d) S

A.
A	B	C	D
a	b	c	d

B.
A	B	C	D
c	a	d	b

C.
A	B	C	D
d	c	b	a

D.
A	B	C	D
b	d	a	c

Answer: B

3.

(i) Cell constant	$(a) Sm^2 mol^{-1}$
(ii) equivalent conductance	$(b) Sm^{-1}$
(iii) Molar conductance	$(c) Sm^2 geq^{-1}$
(iv) Specific conductance	$(d) m^{-1}$

A.
A	B	C	D
a	b	c	d

B.
A	B	C	D
c	d	b	a

C.
A	B	C	D
b	a	b	c

D.
A	B	C	D
d	c	a	b

Answer: C

▶ **View Text Solution**

4.

(i) Li-ion battery	(a) Pacemakers
(ii) Mercury button cell	(b) Fuel cell
(iii) Lead storage battery	(c) Cell phone
(iv) $H_2 - O_2$ cell	(d) Inverter

A.
A	B	C	D
a	b	c	d

B.
A	B	C	D
d	c	b	a

C.
A	B	C	D
b	d	a	c

D.
A	B	C	D
c	a	d	b

Answer: D

5.

(i) Zn - anode, Graphite - cathode with MnO_2 (a) Lithium - ion battery

(ii) Zn amalgamated with mercury anode, (b) Leclanche cell

     HgO mixed with graphite cathode

(iii) Spongy lead anode, plate bearing PbO_2 (c)Mercury button cell

(iv) Porous graphite andoe CoO_2 cathode   (d) Lead storage battery

A.
A	B	C	D
b	c	d	a

B.
A	B	C	D
a	b	c	d

C.
A	B	C	D
d	a	b	c

D.
A	B	C	D
c	d	a	b

Answer: A

Electrolyte | Battery

$(i) NH_4Cl + ZnCl_2 + H_2O$ (a) Mercury button cell
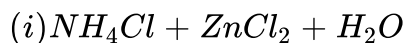
6. (ii) Paste of KOH and ZnO   (b) Lithium - ion battery

(iii) 38% by mass of H_2SO_4 (c) Leclanche cell

(iv) Lithium salt in an organic solvent   (d) Lead storage battery

A.
A	B	C	D
c	a	d	b

B.
A	B	C	D
d	c	b	a

C.
A	B	C	D
a	b	c	d

D.
A	B	C	D
c	a	d	b

Answer: A

▶ View Text Solution

Additional Questions Assertion And Reason

1. Assertion (A) : If the temperature of the electrolytic solution increases, conductance also increases.

Reason (R) : Increase in temperature increases the kinetic energy of the

ions and decreases the attractive force between the oppositely charged ions and hence conductivity increases.

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are wrong

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

▶ View Text Solution

2. Assertion (A) : Molar conductance of a solution increases with increase in dilution.

Reason (R) : For a strong electrolyte, inter ionic force of attraction decreases with dilution and so conductivity increases. For a weak electrolyte, degree of dissociation increases with dilution and coductivity increases.

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are wrong

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

▶ **View Text Solution**

3. Assertion (A) : AC current is used in wheatstone bridge arrangement to measure conductivity of ionic solution.

Reason (R) : If DC current is used in wheatstone bridge arrangement, it will lead to electrolysis of the solution taken in the cell. So AC current is used to prevent electrolysis.

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are wrong

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

▶ **View Text Solution**

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4. Assertion (A) : Strong electrolytes have low molar conductivity at high concentration.

Reason (R) : For a strong electrolyte, at high concentration, the number of constituent ions of the electrolyte is high and hence the attractive force between the oppositely charged ions is also high.

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are wrong

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

▶ View Text Solution

5. Assertion (A) : In Daniel cell, the salt bridge contains an agar-agar gel mixed with an inert electrolyte KCl (or) Na_2SO_4

Reason (R) : The ions of inert electrolyte do not react with other ions present in half cells and they are not either oxidised or reduced at electrodes.

A. Both A and R are correct

B. Both A and R are wrong

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

6. Assertion (A) : Current stops flowing when $E_{cell} = 0$

Reason (R) : At $E_{cell} = 0$, Equilibrium of the cell reaction is attained.

A. Both A and R are correct

B. Both A and R are wrong

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

▶ **View Text Solution**

7. Assertion (A) : Copper sulphate can be stored in a Zinc vessel.

Reason (R) : Zinc is less reactive than Copper.

A. Both A and R are correct

B. Both A and R are wrong

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: B

8. Assertion (A) : As a lead storage battery gets discharged, density of electrolyte present in decreases.

Reason (R) : Lead and Lead dioxide both react with sulphuric acid to form lead sulphate.

A. Both A and R are correct

B. Both A and R are wrong

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

9. Assertion (A) : The cell potential of mercury cell is 1.35 V which remains constant.

Reason (R): In mercury cell, the electrolyte is a paste of KOH and ZnO.

  A. Both A and R are correct, but R is not the correct explanation of A.

  B. Both A and R are correct, but R is the correct explanation of A.

  C. A is wrong but R is correct

  D. A is correct but R is wrong

Answer: A

▶ **View Text Solution**

10. Assertion (A) : If an iron rod is dipped in $CuSO_4$ solution, then blue colour of solution turns red.

Reason (R) : Iron is more reactive than copper and so iron displaces copper from $CuSO_4$ solution.

  A. Both A and R are correct, but R is not the correct explanation of A.

  B. Both A and R are correct, but R is the correct explanation of A.

  C. A is wrong but R is correct

D. A is correct but R is wrong

Answer: A

▶ **View Text Solution**

1. Find the odd one out and give the reasons :

A. $I\alpha V$

B. $I = \dfrac{V}{R}$

C. $V = IR$

D. $R = \dfrac{I}{V}$

Answer: D

▶ **View Text Solution**

2. Find the odd one out and give the reasons :

A. $m = ZIt$

B. $Z = \dfrac{m}{It}$

C. $m\alpha It$

D. $\dfrac{m_l}{Z_l} = \dfrac{m_2}{Z_2}$

Answer: D

▶ **View Text Solution**

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3. Find the odd one out and give the reasons :

A. Pacemaker

B. electronic watches

C. trains

D. cameras

Answer: C

4. Find the odd one out and give the reasons :

A. Automobiles

B. Pacemaker

C. Train

D. Inverters

Answer: B

5. Find the odd one out and give the reasons :

A. Cellular phone

B. Laptop

C. Digital Camera

D. Electronic watch

Answer: D

▶ **View Text Solution**

Additional Questions 2 Mark Questions

1. State Ohm's law.

▶ **View Text Solution**

2. Define Resistivity . Give its unit.

▶ **View Text Solution**

3. Define conductance and give its unit.

▶ View Text Solution

4. Define specific conductance . Give its SI unit.

▶ View Text Solution

5. What is meant by resistance ? Given its unit.

▶ View Text Solution

6. What is molar conductance? Give its SI unit.

▶ View Text Solution

7. Define equivalent conductance. Give its SI unit.

8. What are electro chemical cells? Mention its types.

  ▶ View Text Solution

9. Distinguish between galvanic cell and electrolytic cell.

  ▶ View Text Solution

10. What is meant by Faraday? How is it calculated?

  ▶ View Text Solution

11. Define corrosion. Give one example.

  ▶ View Text Solution

12. Can you stroe copper sulphate solution in a zine pot?

> ▶ View Text Solution

13. Why does the conductivity of a solution decrease with dilution?

> ▶ View Text Solution

14. Suggest a way to determine λ_m° value of water.

> ▶ View Text Solution

15. Write the chemistry of reacharging the lead storage battery , highlighting all the meterial that are involved during recharging?

> ▶ View Text Solution

16. What is meant by cell constant?

▶ View Text Solution

17. State two advantages of $H_2 - O_2$ fuel cell over ordinary cells.

▶ View Text Solution

18. Why λ_m° for CH_3COOH cannot be determined experimentally /

▶ View Text Solution

19. Which will have greater molar conductivity and why?

Sol.(A) 1 mol KCl dissolved in 200 cc of the solution.

Sol.(B) 1 mol KCl dissolved in 500 cc of the solution.

▶ View Text Solution

20. Raju and his father were going in a boat in the river. Raju's father was going to throw away the cell used in watches and hearing aids into the water. Raju prevented him doing so.

(a) As a student of chemistry , why would you advise Raju's father not to throw the cell in the water body?

(b) What is the value associated with the above decision ?

▶ **View Text Solution**

Additional Questions 3 Mark Questions

1. Explain abut conductivity cell with an example.

▶ **View Text Solution**

2. Explain about the factors affecting electrolytic conductance.

▶ **View Text Solution**

3. Explain about the variation of molar conductivity with concentration by Kohlraush studies?

> ▶ **View Text Solution**

4. For strong electrolytes the molar conductivity increases on dilution and reaches a maximum value at infinite dilution. Justify this statement.

> ▶ **View Text Solution**

5. For weak electrolyte, sudden increase in molar conductance with dilution. Prove this statement.

> ▶ **View Text Solution**

6. Explain about Debye-Huckel and Onsager equation.

> ▶ **View Text Solution**

7. What are the values of A and B in Debye Huckel and Onsagar equation?

▶ **View Text Solution**

8. How will you calculate degree of dissociation of weak electrolytes and dissociation constant using Kohlrausch's law?

▶ **View Text Solution**

9. How would you calculate the solubility of sparingly soluble salt using Kohlrausch's law?

▶ **View Text Solution**

**10.** What is the relationship between molar mass and electro chemical equivalent. Derive the equation.

11. What is meant by standard reduction potential ? What is its application?

12. What is meant by Electro chemical series? Mention the top most and the least placed element in that series.

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

$$Ni(s) + 2Ag^+(0.002M) \rightarrow Ni^{2+}(0.160M) + 2Ag(s)$$
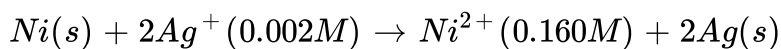
Given that $E^\circ_{\text{cell}} = 1.05V$.

14. If a current of 0.5 ampere flows through a metallic wire for 2-hours, then how many electrons would flow through the wire?

> ▶ View Text Solution

15. What are fuel cells ? Write the electrode reactions of a fuel cell which uses the reaction of hydrogen with oxygen?

> ▶ View Text Solution

16. Write the cell reaction which occur in the lead stroage battery

(i) When the battery is in use,

(ii) When the battery is charging.

> ▶ View Text Solution

17. Describe the composition of anode and cathode in a mercury cell. Write the electrode reactions for this cell.

▶ View Text Solution

18. How much copper is deposited on the cathode of an electrolytic cell if a current of 5 ampere is passed through a solution of copper sulphate for 45 minutes? [Molar mass of $Cu = 63.5 gmol^{-1}, 1F = 96,500 Cmol^{-1}$]

▶ View Text Solution

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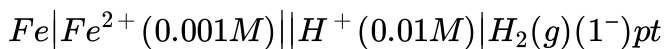
[Molar mass of $Cu = 63.5 gmol^{-1}, 1F = 96,500 Cmol^{-1}$]

▶ View Text Solution

20. Write is a salt bridge ? What is it used for ?

> ▶ View Text Solution

21. Calculate emf of the following cell of $25°C$:

$$Fe|Fe^{2+}(0.001M)||H^+(0.01M)|H_2(g)(1^-)pt$$

$$E_{(Fe^{2+}/Fe)} = -0.44V$$

$$E^°_{(H^+/H_2)} = 0.00V$$

> ▶ View Text Solution

22. What is corrosion? CO_2 is always present in natural water. Explain its effect (increases, stops or no effect) on rusting of Fe.

> ▶ View Text Solution

Additional Questions 5 Mark Questions

1. How would you measure the conductivity of ionic solutions?

▶ **View Text Solution**

2. Explain about SHE (Standard Hydrogen Electrode).

▶ **View Text Solution**

3. How would you determine the reduction potential of $Zn/Zn^{2+}(aq)$?

▶ **View Text Solution**

4. How will you calculate the reduction potential of Half cell?
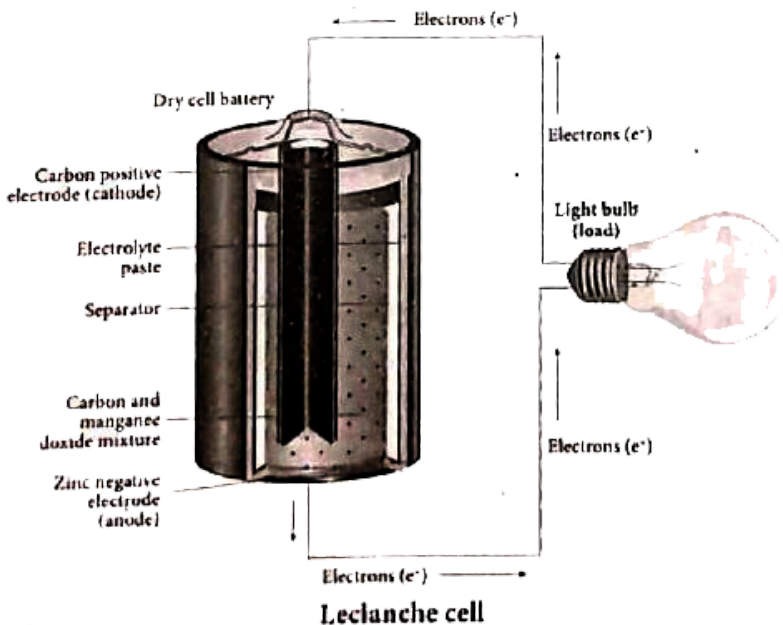
▶ **View Text Solution**

5. Derive the relationship between Gibb's free energy and maximum work obtained from galvanic cell and equillibrium constant.

6. Describe about the working principle of Leclanche cell.

Leclanche cell

7. Explain about the construction and uses of mercury button cell.

> ▶ View Text Solution

8. Describe about lead stroage battery construction and its uses.

> ▶ View Text Solution

9. Describe about lithium - ion battery and its uses.

> ▶ View Text Solution

10. What is corrosion? Explain about the electrochemical mechanism of corrosion.

> ▶ View Text Solution

11. Explain about the various protrction methods to prevent corrosion.

12. (a) Give reasons for the following

(i) Rusting of iron is quicker in saline water than in ordinary water.

(ii) Aluminium metal cannot be prodcued by the electrolysis of aqueous solution of aluminium salt.

(b) Resistance of a conductivity cell filled with 0.1 M KCl solution is 100 ohms. If the resistance of the same cell when filled with 0.02 M KCl solution is 520 ohms, calculate the conductivity and molar conductivity of 0.02 M KCl solution. Conductivity of 0.01 M KCl solution is $1.29 Sm^{-1}$.

13. (a) State two advantages of $H_2 - O_2$ fuel cell over ordinary cell.

(b) Silver is electron deposited on a metallic vessl of total surface area $900 cm^2$ by passing a current of 0.5 amp for two hours.

Calcuate the thickness of silver metal deposited,

[Given : Density of silver = $10.5 gcm^{-3}$ Atomic mass of silver = 108 u, $1F = 96500 Cmol^{-1}$].

> ▶ View Text Solution

14. Distinguish between Leclanche cell and Lead strorage battery.

> ▶ View Text Solution

15. Account for the following

(a) Aluminium undergo slow corrosion than iron.

(b) $H_2 - O_2$ fuel cell is more useful than other cells .

> ▶ View Text Solution