



## CHEMISTRY

### BOOKS - TARGET CHEMISTRY (HINGLISH)

## ELECTROCHEMISTRY

### Classical Thinking

1. A redox reaction is:

A. only oxidation process takes place

B. only reduction process takes place

C. both oxidation and reduction reaction takes place  
simultaneously

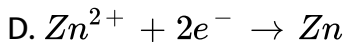
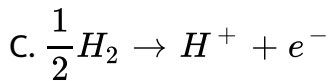
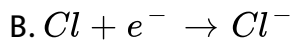
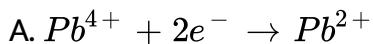
D. either oxidation or reduction reaction takes place

Answer: C



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2. An example for an oxidation reaction is \_\_\_\_\_.

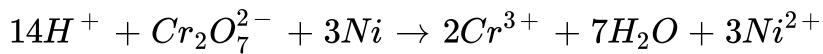


Answer: C



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3. Which substance is serving as a reducing agent in the following reaction?



A.  $H_2O$

B. Ni

C.  $H^+$

D.  $Cr_2O_7^{2-}$

**Answer: B**



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4. The flow of the electric current through a metallic conductor is

A. metal atoms

B. electrons

C. ions

D. metallic kernels

**Answer: B**



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5. An electrolyte is a substance which

- A. conducts electric current in any state
- B. is capable of ionization and allow passage of electric current in its aqueous solutions
- C. dissociates into ions by dissolving in any solvent
- D. facilitates the movement of electrons even in the solid state

**Answer: B**



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6. Electrolytic conduction is due to the movement of :

A. electrons

B. protons

C. ions

D. molecules

**Answer: C**

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7. Strong electrolytes are those which:

A. dissociates into ions only at low dilution

B. do not conduct electricity

C. dissociates into ions only at high dilution

D. completely dissociate into ions at all dilutions

**Answer: D**

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8. Best conductor of electricity is

- A. 1M Acetic acid
- B. 1M Sulphuric acid
- C. 1M Boric acid.
- D. 1M Formic acid.

**Answer: B**

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9. Which of the following is a poor conductor of enectricity

- A.  $CH_3COONa$
- B.  $C_2H_5OH$

C. NaCl

D. KOH

**Answer: B**



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**10.** Electrolytes when dissolved in water dissociate into ions because:

A. the water dissolves them

B. they are unstable

C. the forces of repulsion increases

D. the forces of electrostatic attraction are broken down by the  
water

**Answer: D**



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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.  $7.0 \times 10^{-5}$

B.  $9.2 \times 10^{-9}$

C.  $6.0 \times 10^{-7}$

D.  $4.0 \times 10^{-8}$

**Answer: B**



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12. If X is the conductivity of the solution and M is the molarity of the solution, the molar conductivity of the solution is given by \_\_\_\_\_.



A.  $\frac{1000X}{M}$

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

C.  $\frac{1000M}{X}$

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

**Answer: A**

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**13.** The increase in the equivalent conductance of a salt solution on dilution is due to increase in the

A. ionic attraction

B. molecular attraction

C. degree of association of the electrolyte

D. degree of ionization of the electrolyte

**Answer: D**



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**14.** When a concentrated solution of an electrolyte is diluted

- A. decreases
- B. increases
- C. remains same
- D. first increases then decreases

**Answer: B**



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**15.** At infinite dilution of an electrolyte, the equivalent conductance of cations at anions are ..... of each other.

- A. dependent on each other
- B. independent of each other
- C. dependent on the nature of the solvent
- D. dependent on the cell

**Answer: B**

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**16.** The electrodes of a conductivities cell are 3 cm apart and have a cross-sectional area of  $4 \text{ cm}^2$ . The cell constant of the cell (in  $\text{cm}^{-1}$ ) is \_\_\_\_\_

- A.  $4 \times 3$
- B.  $4/3$
- C.  $3/4$
- D.  $9/4$

**Answer: C**



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17. At  $25^{\circ}C$  specific conductivity of a normal solution of  $KCl$  is  $0.0022765$  ohm. The resistance of cell is  $400$  ohms. The cell constant is .

A.  $0.815$

B.  $1.016$

C.  $1.106$

D.  $2.016$

**Answer: C**



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18. Specific conductance of 0.1M nitric acid is  $6.3 \times 10^{-2} \text{ ohm}^{-1} \text{ cm}^{-1}$

. The molar conductance of the solution is:

A. 100

B. 315

C. 630

D. 6300

**Answer: C**

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19. The molar conductance of NaCl, HCl and  $\text{CH}_3\text{COONa}$  at infinite dilution are 126.45, 426.16 and  $91 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$  respectively. The molar conductance of  $\text{CH}_3\text{COOH}$  at infinite dilution is :

A. 201.28

B. 390.71

C. 698.28

D. 540.48

**Answer: B**

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20. The molar conductance of 0.001 M acetic acid is  $50 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ . The maximum value of "mol"ar conductance is  $250 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ . What is its degree of ionization ?

A. 0.2 %

B. 2 %

C. 20 %

D. 22 %

**Answer: C**



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21. The equivalent conductance of  $1M$  benzoic acid is  $12.8\text{ohm}^{-1}\text{cm}^2$ . If the conductance of benzoate ion and  $H^+$  ion are 12 and  $288.42\text{ohm}^{-1}\text{cm}^2$  respectively. Its degree of dissociation is :

- A. 39 %
- B. 3.9 %
- C. 0.35 %
- D. 0.039 %

**Answer: A**



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22. Which of the following is INCORRECT ?

- A. The device used to study chemical reactions electrically is called as an electrochemical cell.
- B. For electrochemical reactions, the net cell reaction is obtained by sum of the oxidation half reaction and reduction half reaction taking place at the respective electrodes.
- C. Electrolytic cells and voltaic cells are the two types of electrochemical cells.
- D. In an electrochemical cell, anode is always positive.

**Answer: D**

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23. Which of the following is NOT a voltaic cell ?



A. Cell used for metal plating

B. Lead storage cell

C. Fuel cell

D. NICAD

**Answer: A**



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**24.** In an electrolytic cell

A. chemical energy into electrical energy

B. electrical energy into chemical energy

C. chemical energy into mechanical energy

D. electrical energy into mechanical energy

**Answer: B**

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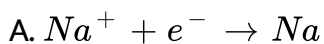
25. In dry cell , reaction which takes place at the anode is \_\_\_\_\_.

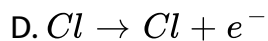
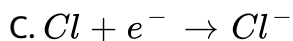
- A. oxidation
- B. reduction
- C. dissociation
- D. dilution

**Answer: A**

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26. If Pt is used as cathode in the electrolysis of aqueous NaCl solution, the ion reduced at cathode is :





**Answer: A**

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27. Which of the following gases are evolved by the electrolysis of aqueous solution of  $NaCl$ ?

A.  $Cl^-$  ion is oxidized at cathode

B.  $Cl^-$  ion is reduced at anode

C.  $Cl^-$  is oxidized at anode

D.  $Cl^-$  ion is either reduced nor oxidized

**Answer: C**

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28. When 1 ampere of current flows for 1 second through a conductor, this quantity is called \_\_\_\_\_.

A. Coulomb

B. Faraday

C. EMF

D. Ohm

**Answer: A**

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29. The amount of electric charge on one mole of electrons is \_\_\_\_\_.

A. Ampere

B. Volt

C. Ohm

D. Faraday

**Answer: D**



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**30.** One coulomb is equal to

A. Ampere  $\times$  second

B. Ampere  $\times$  minute

C. Watt  $\times$  second

D. Volt  $\times$  second

**Answer: A**

**31.** Write Faraday's Laws of electrolysis.

A. for the same electrolyte , the mass of a substance produced or consumed at an electrode is directly proportional to the quantity of electricity passed through the electrolytic cell.

B. When same quantity of electricity is passed through different electrolytes, the amount of product obtained is proportional to their equivalent mass

C. when same quantity of electricity is passed through different electrolytes , the amounts of products obtained are proportional to their molecular masses.

D. for the same electrolytes , the mass of a substance produced or consumed at an electrode is inversely proportional to the

quantity of electricity passed through the electrolytic cell

**Answer: A**

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32. When the same quantity of electricity is passed through the solution of different electrolytes in series, the amount of product obtained is proportional to their

- A. empirical mass
- B. equivalent mass
- C. atomic number
- D. valency

**Answer: B**

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33. What is electrochemical equivalent of a substance ?

- A. faraday
- B. one coulomb
- C. 96500 coulomb
- D. one ampere

**Answer: B**



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34. The unit of electrochemical equivalent is

- A. gram
- B. gram/ampere
- C. gram/coulomb
- D. coulomb/gram



**Answer: C**



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**35.** The number of electron involved when one faraday of electricity is passed through an electrolytic solution is:

A.  $12 \times 10^{46}$

B. 96500

C.  $6.023 \times 10^{23}$

D.  $22.4 \times 10^{23}$

**Answer: C**



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36. An electric current of 'I' amperes was passed through a solution of an electrolyte for 't' seconds depositing 'W' grams of the metal 'M' on the cathode. The equivalent mass 'E' of the metal will be \_\_\_\_\_.

A.  $E = \frac{I \times t}{W \times 96,500}$

B.  $E = \frac{I \times W}{t \times 96,500}$

C.  $E = \frac{96,500 \times W}{I \times t}$

D.  $\frac{I \times t \times 96,500}{W}$

Answer: C

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37. On passing electric current into a solution of a salt of metal M, the reaction taking place at the cathode is  $M^{2+} + 2e^- \rightarrow M$ . The atomic mass of M is 65. The equivalent mass of the metal is \_\_\_\_\_.

A. 16.2

B. 130

C. 65

D. 32.5

**Answer: D**



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**38.** The time required to pass 36,000 C through an electroplating bath using a current of 10 A is \_\_\_\_\_.

A. 30 mins

B. one hour

C. one hour 30 mins

D. two hours

**Answer: B**



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39. The quantity of electricity needed to liberate 0.5 gram equivalent of an element is \_\_\_\_\_.

- A. 48250 Faradays
- B. 48250 Coulombs
- C. 193000 Faradays
- D. 193000 Coulombs

**Answer: B**



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40. Quantity of electricity which liberates 108 g of Ag from  $AgNO_3$  solution is equal to \_\_\_\_\_.

- A. one ampere
- B. one coulomb
- C. one Faraday
- D. electrochemical equivalent

**Answer: C**

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41. Number of Faradays required to liberate 2 g of hydrogen is \_\_\_\_\_.

- A. 2
- B. 4

C. 6

D. 1

**Answer: A**



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**42.** How much charge in faraday is required for the reduction of 1 mole of  $Cu^{2+}$  ions to Cu ?

A.  $1.23 \times 10^5 C$

B.  $1.63 \times 10^5 C$

C.  $1.93 \times 10^5 C$

D.  $2.12 \times 10^5 C$

**Answer: C**



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43. What is the equivalent mass of a metal having electrochemical equivalent of  $3.4 \times 10^{-7}$  kg?

A.  $32.81 \times 10^{-2} Kg$

B.  $3.281 \times 10^{-2} Kg$

C.  $3281 \times 10^2 Kg$

D.  $328.1 \times 10^{-2} Kg$

**Answer: B**

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44. 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**



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45. One Faraday electricity is passed through  $Al_2(SO_4)_3$  solution, number of atoms of Al deposited at cathode will be \_\_\_\_\_.

A.  $6.023 \times 10^{23}$

B.  $2.008 \times 10^{23}$

C.  $3.010 \times 10^{23}$

D. 27

**Answer: B**



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46. The number of electrons required to deposit 1g atom of aluminium (At. Wt. = 27) from a solution of aluminium chloride will be (where N is Avogadro's number)

A. 1N

B. 2N

C. 3N

D. 4N

**Answer: C**

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47. The atomic weight of Fe is 56. The weight of Fe deposited from  $FeCl_3$  solution by passing 0.6 Faraday of electricity is \_\_\_\_\_.

A. 5.6 g

B. 11.2 g

C. 22.4g

D. 33.6 g

**Answer: B**

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**48.** How long does it take to deposit 100 g of Al from an electrolytic cell containing  $Al_2O_3$  using a current of 125 ampere ?

A. 95.30 min

B. 143 min

C. 47.65 min

D. 10 min

**Answer: B**



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**49.** The current in amperes when 11.74 g of nickel is deposited from a nickel(II) ion solution in 1000 second is \_\_\_\_\_

(At. Mass of Ni = 58.7)

A. 96.5 A

B. 38.6A

C. 24.125 A

D. 19.3 A

**Answer: B**



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50. The amount of electricity that should be passed through  $CuSO_4$  solution with Cu electrodes to deposit 0.1 g atom of Cu is \_\_\_\_\_.

- A. 9650 coulombs
- B. 96500 coulombs
- C. 19300 coulombs
- D. 193000 coulombs

**Answer: C**

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51. What is electrochemical equivalent of a substance ?

- A.  $\frac{\text{Atomic mass} \times \text{valency}}{96500}$
- B.  $\frac{\text{Atomic mass} \times 96500}{\text{Valency}}$
- C.  $\frac{\text{Atomic mass}}{\text{Valency} \times 96500}$

D.  $\frac{\text{Valency} \times 96500}{\text{Atomic mass}}$

**Answer: C**

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52. A cell in which electric current is produced by redox process is called \_\_\_\_\_ cell.

A. voltaic

B. standard

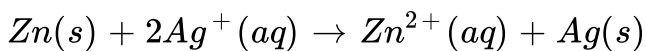
C. reference

D. electrolytic

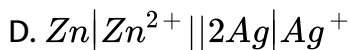
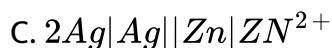
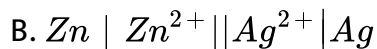
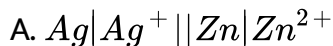
**Answer: A**

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53. The cell reaction



is best represented by



**Answer: B**

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54. In the cell  $\text{Zn}|\text{Zn}^{2+}||\text{Cu}^{2+}|\text{Cu}$ , the negative terminal is

A. inert graphite electrode

B. metallic copper strip

C. metallic zinc strip

D. metallic aluminium strip

**Answer: C**



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55. The potential difference between the metal electrode and solution around it under equilibrium condition is called as \_\_\_\_\_ potential.

A. standard reduction

B. standard oxidation

C. redox

D. electrode

**Answer: D**



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56. The e.m.f. of an electrolytic cell depends mostly on :

- A. temperature
- B. nature of electrode
- C. concentration of solution of two half-cells
- D. all of these

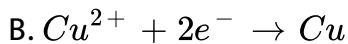
**Answer: D**

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



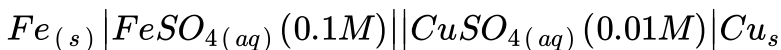




**Answer: B**

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58. The e.m.f. of the following cell at  $25^{\circ}C$  is \_\_\_\_\_.



$$\left( E_{Fe^{2+} || Fe}^{\circ} = -0.44V \text{ and } E_{Cu^{2+} | Cu}^{\circ} = 0.337V \right)$$

A.  $-0.403V$

B.  $0.777V$

C.  $-0.777V$

D.  $0.403V$

Answer: B



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59.  $E^\circ$  for  $F_2 + 2e^- \rightleftharpoons 2F^-$  is  $2.8V$ ,  $E^\circ$  for  $\frac{1}{2}F_2 + e^- = F^-$  is

—

A.  $2.8V$

B.  $1.4V$

C.  $-2.8V$

D.  $-1.4V$

Answer: A



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60. In the cell,  $Zn|Zn^{2+}||Cu^{2+}|Cu$ \_\_\_\_\_.

A. zinc gets oxidized

B. copper gets oxidized

C. zinc gets oxidized and copper gets reduced

D. copper gets oxidized and zinc gets reduced

**Answer: C**

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61. The Nernst equation for the potential of an electrode

$M_{(aq)}^{n+} | M_{(s)}$  is \_\_\_\_\_.

A.  $E_{el} = E_{el}^{\circ} + \frac{2.303RT}{nF} \log_{10} \frac{[M]}{[M^{n+}]}$

B.  $E_{el} + E_{el}^{\circ} + \frac{0.592RT}{nF} \log_{10} \frac{[M^{n+}]}{[M]}$

C.  $E_{el} + E_{el}^{\circ} + \frac{0.592RT}{nF} \log_{10} [M]$

D.  $E_{el} = E_{el}^{\circ} + \frac{2.303RT}{nF} \log_{10} [M^{n+}]$

**Answer: D**



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**62.** In a galvanic cell

A.  $E_{\text{cell}}$

B.  $FE_{\text{cell}}$

C.  $nFE_{\text{cell}}$

D.  $\frac{E_{\text{cell}}}{nF}$

**Answer: C**



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**63.** Which of the following has been universally accepted as a reference electrode at all temperature and has been assigned a value

of zero volt?

- A. Platinum electrode
- B. Graphite electrode
- C. Calomel electrode
- D. Standard hydrogen electrode

**Answer: D**



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**64.** The electrode  $Pt, H_{2(g)} | HCl$  is reversible with respect to \_\_\_\_\_.

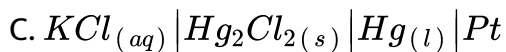
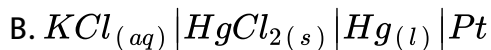
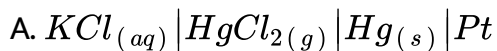
- A.  $Cl^-$  ions
- B.  $H^+$  ions
- C. both  $H^+$  and  $Cl^-$  ions

D. HCl

**Answer: B**

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65. The calomel electrode can be represented as \_\_\_\_\_.



**Answer: C**

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66. In a calomel electrode, the glass tube is filled with \_\_\_\_\_.

A. paste of calomel in Hg and saturated KCl solution

B. paste of calomel in Hg

C. paste of  $PbCl_2$  in Hg

D. saturated KCl and  $PbCl_2$

**Answer: A**

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67. The type of a battery, in which the reaction occurs only once and then battery becomes dead over a period of time is known as \_\_\_\_\_.

A. primary cell

B. secondary cell

C. lead storage battery

D. nickel cadmium cell

**Answer: A**



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**68.** A dry cell is also known as \_\_\_\_\_ cell.

A. lead storage

B. Leclanche

C. fuel

D. Daniel

**Answer: B**



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69. In a Leclanche cell, cathode is \_\_\_\_\_.

A. zinc rod

B. FeO and  $Fe(OH)_2$

C. zinc container

D.  $MnO_2 + C$

**Answer: D**

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70. The acid used in lead storage battery is`

A.  $H_2SO_4$

B.  $H_3PO_4$

C. HCl

D.  $HNO_3$

**Answer: A**



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71. During the recharging of lead storage cell,\_\_\_\_\_.

- A. concentration of lead is decreased
- B. lead sulphate concentration is increased
- C. concentration of  $H_2SO_4$  is increased
- D. concentration of  $PbO_2$  is decreased

**Answer: C**



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72. When fully charged, the e.m.f. of a lead accumulator cell is \_\_\_\_\_.

A. 0 volt

B. 5 volts

C. 2.04 volts

D. 3 volts

**Answer: C**



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**73.** NICAD cell consists of \_\_\_\_\_ cathode.

A. cadmium

B.  $NiO_2$

C. carbon

D. Pb

**Answer: B**

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74. NICAD cell can be sealed as \_\_\_\_\_.

- A. it does not contain liquid electrolyte
- B. no gaseous product are formed in the reaction
- C. it is a secondary cell
- D. it is more expensive

**Answer: B**

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75. The middle compartment of the hydrogen-oxygen fuel cell contains, hot aqueous solution of \_\_\_\_\_.

- A. NaOH

B. KOH

C. HCl

D.  $H_2SO_4$

**Answer: B**

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**76.** The product obtained in fuel cell is \_\_\_\_\_.

A. hydrochloric acid

B. hydrogen gas

C. water

D. potassium hydroxide

**Answer: C**

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77. The elements placed in the lower part of the left side of e.m.f. series are \_\_\_\_\_ agents.

- A. good oxidizing
- B. weak oxidizing
- C. good reducing
- D. weak reducing

**Answer: B**

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78. Which of the following is strongly electropositive ?

- A.  $A(E^\circ = -0.44V)$
- B.  $B(E^\circ = -2.37V)$

C.  $C(E^\circ = -2.86V)$

D.  $D(E^\circ = -2.92V)$

**Answer: D**

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**79.** Corrosion is basically

A. direct action of oxygen on metal

B. electrochemical phenomenon

C. biochemical phenomenon

D. union between light metal and heavy metal

**Answer: B**

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

A. anode

B. cathode

C. neither anode or cathode

D. neither anode or cathode depending upon its standard reduction potential

**Answer: A**

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81. Which of the following indicates corrosion ?

A. Rust on iron

B. Formation of green film on brass



C. Loss of luster of silver metal

D. all of these

**Answer: D**

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82. During rusting of iron, it gets \_\_\_\_\_

A. oxidised and dehydrated

B. reduced and hydrated

C. oxidised and hydrated

D. reduced and dehydrated

**Answer: C**

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**83.** The most durable metal plating on iron to protect it against corrosion is

- A. nickel
- B. copper
- C. tin
- D. zinc

**Answer: D**



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**84.** What of the following represents process of passivation ?

- A. Coating the metal surface by point
- B. Coating the metal surface with another metal
- C. Connecting the metal with more easily oxidizable agent.

D. Treating the metal with a strong oxidizing agent.

**Answer: D**

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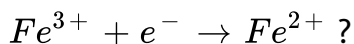
## Critical Thinking

1. Which of the following is INCORRECT about an oxidising agent ?
- A. Oxidising agent itself undergoes reduction.
  - B. Oxidising agent accepts electrons
  - C. There is no change in the oxidation number of the atoms of the oxidising agent.
  - D. Oxidising agent brings about oxidation in another species.

**Answer: C**

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2. Which statement is NOT true for the given reaction



A.  $Fe^{3+}$  is being reduced.

B. The oxidation state of Fe has changed.

C.  $Fe^{3+}$  could be referred to as an oxidising agent in this reaction.

D. It is anodic reaction in electrolytic cell.

**Answer: D**

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3. Which one is NOT a conductor of electricity ?

A. NaCl(aqueous)

B. NaCl (solid)

C. NaCl (molten)

D. Ag metal

**Answer: B**

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4. Which of the following is NOT a non-electrolyte ?

A. Acetic acid

B. Glucose

C. Sucrose

D. Urea

**Answer: A**

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5. A solution of  $HCl$  in water is good conductor while gaseous hydrogen chloride is not. This is due to the reason that

- A. water is a good conductor of electricity
- B. hydrogen chloride gas ionizes in water solution
- C. gas does not obey Ohm's law whereas solution does
- D. gas does not obey Ohm's law whereas solution does

**Answer: B**

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6. The electrical conductance of a conductor \_\_\_\_\_.

- A. increases as its length increases and increases with its area of cross section
- B. decreases as its length increases and increases with its area of cross section
- C. increases as its length increases and decreases with its area of cross section
- D. decreases as its length increases and decreases with its area of cross section

**Answer: B**

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7. Which of the following relationship between the units of electrical conductance (G) is CORRECT ?

A.  $1S = 1\Omega s^{-1}$

B.  $1S = 1A^{-1}Vs^{-1}$

C.  $1S = 1CV^{-1}s^{-1}$

D.  $1S = 1CA s^{-1}$

**Answer: C**

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8. The unit of molar conductivity is \_\_\_\_\_.

A.  $8.76 \times 10^4 \text{ohm}^{-1} \text{cm}^{-1}$

B.  $8.76 \times 10^{-4} \text{ohm}^{-1} \text{cm}^{-1}$

C.  $8.76 \times 10^{-3} \text{ohm}^{-1} \text{cm}^{-1}$

D.  $8.76 \times 10^{-2} \text{ohm}^{-1} \text{cm}^{-1}$

**Answer: C**

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9. A conductivity cell having cell constant  $8.76\text{cm}^{-1}$  is placed in 0.01 M solution of an electrolyte offered a resistance of 1000 ohm . What is the conductivity of electrolytic solution ?

A.  $8.76 \times 10^4 \text{ohm}^{-1} \text{cm}^{-1}$

B.  $8.76 \times 10^{-4} \text{ohm}^{-1} \text{cm}^{-1}$

C.  $8.76 \times 10^{-3} \text{ohm}^{-1} \text{cm}^{-1}$

D.  $8.76 \times 10^{-2} \text{ohm}^{-1} \text{cm}^{-1}$

**Answer: C**



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10. The resistance of a 0.1M solution of acetic acid is 250 ohm, when measured in a cell of cell constant  $1.15\text{cm}^{-1}$ . The molar conductance (in  $\text{ohm}^{-1} \text{cm}^2 \text{mol}^{-1}$ ) of 0.1 M acetic acid is \_\_\_\_\_.

A. 46

B. 9.2

C. 18.4

D. 2.3

**Answer: A**

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11. Kohlrausch law of independent migration of ions applicable for \_\_\_\_\_.

A. high concentrated electrolyte solution

B. 1M electrolyte solution

C. electrolyte at zero concentration

D. electrolyte at any concentration

Answer: C



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12. According to Kohlrausch law for infinite dilution, the molar conductance of the electrolyte is equal to \_\_\_\_\_.

A. sum of the molar conductance of the cations and anions present in it

B. difference of the molar conductance of the cations and anions present in it

C. the ratio of the corresponding conductance of the cations to the anions present in it.

D. product of the corresponding conductance of the cations and anions present in it

**Answer: A**

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

- A. mobility of  $H^+$  ions is same as that of  $Cl^-$  ions
- B. mobility of  $Na^+$  ions is much more than that of  $H^+$  ions.
- C. mobility of  $H^+$  ions is much more than that of  $Na^+$  ions
- D. mobility of  $Cl^-$  ions is different in both the solutions

**Answer: C**

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14. The molar conductivities  $\Lambda_{NaOAc}^{\circ}$  and  $\Lambda_{HCl}^{\circ}$  at infinite dilution in water at  $25^{\circ}C$  are  $91.0$  and  $426.2 S cm^{\circ} / mol$  respectively. To calculate  $\Lambda_{HOAc}^{\circ}$ , the additional value required is:

- A.  $\Lambda_{H_2O}^{\circ}$
- B.  $\Lambda_{KCl}^{\circ}$
- C.  $\Lambda_{NaOH}^{\circ}$
- D.  $\Lambda_{NaCl}^{\circ}$

**Answer: D**

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

$\lambda_{NaCl} = 38.2 \text{ohm}^{-1} \text{cm}^2 \text{ gmeq}^{-1}$ .

$\lambda_{HCl} = 203 \text{ohm}^{-1} \text{cm}^2 \text{ gm eq}^{-1}$ .

What is the value of  $\lambda_{ClCH_2COOH}$  ?

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

B.  $298.5 \text{ohm}^{-1} \text{cm}^2 \text{gmeq}^{-1}$

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

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

**Answer: C**

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**16.** Which of the following is TRUE about electrochemical cell ?

A. Oxidation occurs at cathode

B. Redcution occurs at anode

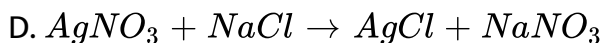
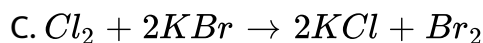
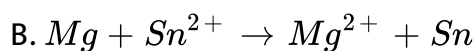
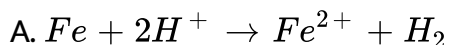
C. Electrons flow from anode to cathode

D. Electrons flow from cathode to anode

**Answer: C**

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17. Which one of the following reactions cannot be used to set up an electrochemical cell?



Answer: D

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18. If a salt bridge is removed between the half cells, the voltage

A. drops to zero

B. does not change

C. increases rapidly

D. increases gradually

**Answer: A**



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**19.** Which one of the following is an INCORRECT statement for an electrochemical cell ?

A. The oxidising and reducing agents should be separated from each other.

B. A salt bridge containing the same electrolyte solution as present in oxidation half cell should be used to internally connect the two half cells.

C. The cells stops working after some time.



D. The circuit is completed externally by connected a wire to the electrodes.

**Answer: B**

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20. Which reaction occurs at the anode during the electrlysis of fused lead bromide ?

- A.  $Br^-$  ions are reduced.
- B.  $Pb^{2+}$  ions are oxidised .
- C.  $Pb^{2+}$  ions are reduced.
- D.  $Br^-$  ions are oxidised

**Answer: D**

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21. Among  $Na$ ,  $Hg$ ,  $S$ ,  $Pt$  and graphite, which can be used as electrodes in electrolytic cells having aqueous solutions?

- A. Na and S
- B. Pt and graphite only
- C. Na , Hg and S
- D. Hg, Pt and graphite

**Answer: D**

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22. Faraday first law of electrolysis gives the relation between \_\_\_\_\_.

- A. amount of a substance deposited or dissolved and the quantity of electricity
- B. amount of a substance deposited or dissolved and the equivalent mass.
- C. amount of a substance deposited or dissolved and the concentration of an electrolyte
- D. amount of a substance deposited or dissolved and the molecular mass.

**Answer: A**

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**23.** If the same quantity of electricity is passed through two electrolytes. It A and B are the two substances liberated at the

respective electrodes then, Faraday's second law of electrolysis can be expressed as \_\_\_\_\_.

- A.  $\frac{\text{Weigth of B deposited}}{\text{Weight of A liberated}} = \frac{\text{Equivalent weight of A}}{\text{Electrochemical equivalent of B}}$
- B.  $\frac{\text{Weigth of B deposited}}{\text{Weight of A liberated}} = \frac{\text{Electrochemical Equivalent of A}}{\text{Electrochemical equivalent of B}}$
- C.  $W = Zit$
- D.  $\frac{\text{Weigth of B deposited}}{\text{Weight of A liberated}} = \frac{\text{Equivalent weight of B}}{\text{Equivalent weight of A}}$

**Answer: D**



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24. Faraday constant \_\_\_\_\_.

- A. is a numerical constant
- B. depends on equivalent
- C. depends upon the current passed

D. depends on the number of electrons

**Answer: A**

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25. The charge ( in coulombs) on  $N_3^+$  ions is ,\_\_\_\_\_.

A.  $4.8 \times 10^{19}$

B.  $4.8 \times 10^{-10}$

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

D. 96500

**Answer: C**

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26. One coulomb is equal to

A. 96500 electrons

B. 1 electron

C.  $6.241 \times 10^{18}$  electrons

D.  $6.022 \times 10^{23}$  electrons

Answer: C



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27. The atomic mass of oxygen is 16, hence the electrochemical equivalent(ECE) of oxygen in Kg per coulomb is \_\_\_\_\_.

A.  $\frac{8 \times 10^{-3}}{96500}$

B.  $\frac{8 \times 10^{-2}}{96500}$

C.  $\frac{16 \times 10^{-3}}{96500}$

D.  $\frac{16 \times 10^{-2}}{96500}$

**Answer: A**

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28. The number of coulombs required to liberate  $0.224dm^3$  of chlorine at  $0^\circ C$  and 1 atm pressure is \_\_\_\_\_.

A.  $2 \times 965$

B.  $\frac{965}{2}$

C. 965

D. 9650

**Answer: A**

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29. In the electrolysis of water, one faraday of electrical energy would evolve at STP

- A. one mole of dioxygen
- B. one gram atom of dioxygen
- C. 8 gram of dioxygen
- D. 22.4 litres of dioxygen

**Answer: C**

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30. One Faraday of electricity will liberate half gram atom of the metal from a solution of \_\_\_\_\_.

- A.  $AuCl_2$
- B.  $CuCl$



C.  $BaCl_2$

D. NaCl

**Answer: C**



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**31.** If the atomic mass of M is x, the electrochemical equivalent of M in the solution of  $M_2(SO_4)_3$  will be \_\_\_\_\_.

A.  $\frac{3x}{F}$

B.  $\frac{x}{3F}$

C.  $\frac{2x}{F}$

D.  $\frac{x}{F}$

**Answer: B**



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32. When 48250 C of electricity is passed through an aqueous solution of  $NiI_2$  (atomic mass of Ni = 58.8), the mass of nickel metal deposited would be \_\_\_\_\_.

A. 7.3 g

B. 14.7 g

C. 22.0 g

D. 29.4 g

**Answer: B**

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33. Mass of copper deposited by the passage of 2 A of current for 965 s through a 2 M solution of  $CuSO_4$  is (At. Mass of Cu = 63.5) \_\_\_\_\_.

A. 0.325 g

B. 0.635 g

C. 1 g

D. 1.2 g

**Answer: B**

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**34.** Passage of 96500 coulomb of electricity liberates ..... litre of  $O_2$  at NTP during electrolysis-

A. 5.6

B. 6.5

C. 22.4

D. 11.2

**Answer: A**



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35. When a current of 3A is passed through an aqueous solution of a palladium salt, the mass of Pd metal deposited in 1 hour is 2.98 g. If the metal's atomic mass is 106.4, the valency of palladium is \_\_\_\_\_.

A. 5

B. 4

C. 3

D. 2

**Answer: B**



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36. The number of molecules of chlorine that would be deposited from molten NaCl in one minute by current of 300 milliamperes is

-----.

A.  $1.123 \times 10^{20}$

B.  $6.621 \times 10^{-3}$

C.  $2.216 \times 10^{20}$

D.  $5.6 \times 10^{19}$

**Answer: D**

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**37.** A metal is known to form fluoride  $MF_2$ . When  $10A$  of electricity is passed through a molten salt for  $330 \text{ sec}$ ,  $1.95g$  of metal is deposited.

Find the atomic weight of  $M$ . What will be the quantity of electricity required to deposit the same mass of  $Cu$  from  $CuSO_4$ ?

A. 57.02

B. 148

C. 228

D. 114

**Answer: D**

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**38.** What will be the current required to deposited on the cathode 39.4 g gold/hour from a solution containing a salt of gold (III)?

A. 16 A

B. 26.5 A

C. 56 A

D. 100 A

**Answer: A**

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39. How many hour are required for a current of 3.0 ampere to decompose 18g water?

- A. 9 hrs
- B. 12 hrs
- C. 18 hrs
- D. 24 hrs

Answer: C

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40. Cell-I containing a solution of mercuric perchlorate  $Hg(ClO_4)_2$ , Cell -II containing a solution of mercuric nitrate  $Hg(NO_3)_2$  and Cell - III containing a solution of mercurous perchlorate  $Hg(ClO_4)_2$  were

connected in such a way that the same current passed through each of the cells. The amount of mercury deposited, will be same in \_\_\_\_\_.

- A. all the cells
- B. Cell-I and -II but more in cell -III
- C. cells-II and III but more in cell-I
- D. cells -I and -III but more in cell-II

**Answer: B**



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41. When electricity is passed through  $H_2SO_4$  and  $CaCl_2$  solution , the ratio of mass of hydrogen and calcium liberated will be \_\_\_\_\_.

(Atomic mass of Ca = 40)

- A. 1 : 5
- B. 1 : 20



C. 1: 10

D. 1: 40

**Answer: B**



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**42.** Two electrolytic cells, one containing acidified ferrous sulphate and other containing acidified ferric sulphate are connected in series. The ratio of iron deposited at respective cathodes in the two cells will be \_\_\_\_\_ respectively.

A. 2: 1

B. 2: 3

C. 1: 1

D. 3: 2

**Answer: D**



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43. An industry produced 40 Kg of calcium in two hours by electrolysis .How much of aluminium will be produced by the same current in two hours ? (Atomic mass : Ca=40, Al=27)

- A. 9 kg
- B. 22 kg
- C. 27 Kg
- D. 18 kg

**Answer: D**



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44. A salt bridge

A. complete the circuit

B. reduce the electrical resistance in the cell

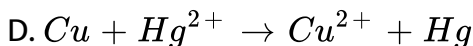
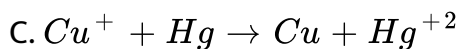
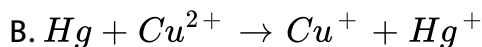
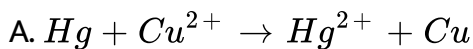
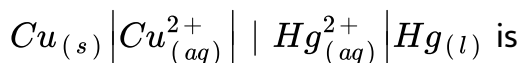
C. separate cathode from anode

D. carry salts for the chemical reaction

**Answer: A**

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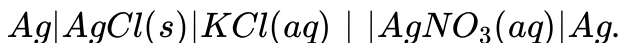
45. The cell reaction of the galvanic cell :



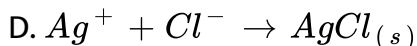
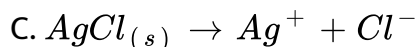
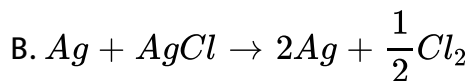
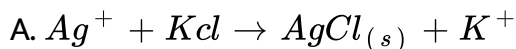
Answer: D

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46. for the electrochemical cell:



The overall cell reaction is

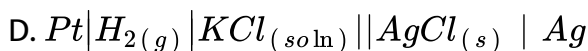
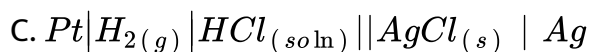
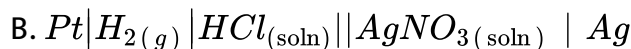
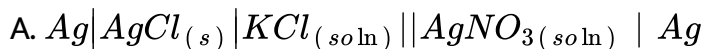


Answer: D

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47. The reaction,  $\frac{1}{2}H_2(g) + AgCl(s) \rightarrow H^+(aq) + Cl^-(aq) + Ag(s)$ .

Occurs in the galvanic cell :



**Answer: C**

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48. The passage of electricity in the Daniell cell when Zn and Cu electrodes are connected is from :

A. Cu and Zn within the cell

B. Zn and Cu within the cell

C. Cu and Zn outside the cell

D. Zn and Cu outside the cell

**Answer: C**



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**49.** The initial cell potential of Daniel cell is \_\_\_\_\_

A. 0.5 V

B. 1.1 V

C. 1.6 V

D. 2.1 V

**Answer: B**



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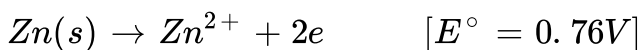
50. In the representation of galvanic cells, a double vertical line between two solutions indicates\_\_\_\_\_.

- A. direct contact between them
- B. that they are connected by a salt bridge
- C. the phase boundary
- D. that there are two cells

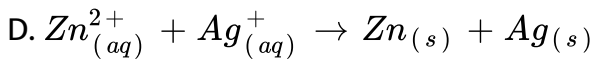
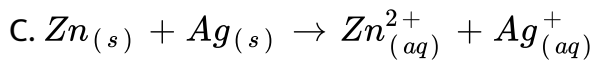
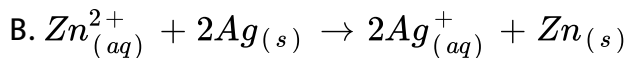
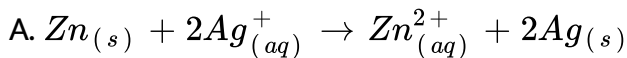
**Answer: B**

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51. The standard oxidation potentials of Zn and Ag in water at  $25^{\circ}C$  are



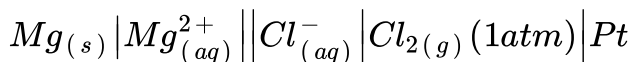
Which of the following reactions actually takes place ?



**Answer: A**

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**52.** Which is the CORRECT Nernst equation for reaction taking place in the following cell ?



$$A. E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0592}{2} \times \log \frac{[Cl^-]^{2-}}{[Mg^{2+}]}$$

$$B. E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0592}{2} \times \log \frac{[Mg^{2+}]}{[Cl^-]}$$

$$C. E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0592}{2} \times \log [Mg^{2+}] [Cl^-]$$

$$D. E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0592}{2} \times \log \frac{[Mg^{2+}]}{[Cl^-]^2}$$



**Answer: C**



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**53.** Silver-silver chloride electrode is a \_\_\_\_\_.

A. metal-metal ions

B. metal-sparingly soluble salt

C. gas does not obey Ohm's law whereas solution does

D. redox

**Answer: B**



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**54.** A hydrogen electrode is dipped in a solution of  $pH = 3.0$  at  $25^\circ C$

The potential for the cell will be .

A. 0.177 V

B.  $-0.177V$

C. 0.087 V

D. 0.059 V

**Answer: B**

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55. Calculate the half-cell potential at 298 K for the reaction,



If  $[\text{Zn}^{2+}] = 0.1M$  and  $E^{\circ} = -0.76$  volt.

A. 0.789 V

B.  $-0.789V$

C.  $-0.698V$

D. 0.698 V

**Answer: B**

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56. If the  $Zn^{2+}$  and  $Cu^{2+}$  concentrations are 0.1 M and  $10^{-9}$  M respectively at  $25^\circ C$ , the potential of the cell containing  $Zn/Zn^{2+}$  and  $Cu/Cu^{2+}$  electrodes is \_\_\_\_\_.

[Given  $E_{Zn/Zn^{2+}}^\circ = +0.76$ ,  $E_{Cu/Cu^{2+}}^\circ = -0.34V$ ]

A. 0.864 V

B.  $-0.864V$

C. 1.33 V

D. 1.10 V

**Answer: A**

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57. In the Daniel cell, if the concentrations of  $Zn^{2+}$  and  $Cu^{2+}$  ions are doubled at 298 K, the e.m.f. Of the cell \_\_\_\_\_.

- A. is doubled
- B. is reduced to half
- C. remains same
- D. becomes four times

**Answer: C**

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

- A. 0.1470 V

B.  $-1.470V$

C.  $14.70V$

D.  $147 V$

**Answer: B**

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59. The standard cell potential of  $Zn|zn^{2+}_{(aq)}||Cu^{2+}_{(aq)}|Cu$  cell is  $1.10 V$

. The maximum work obtained by this cell will be \_\_\_\_\_.

A.  $106.15 KJ$

B.  $212.30 KJ$

C.  $318.45 KJ$

D.  $424.60 KJ$

**Answer: B**

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60. Calomel electrode is \_\_\_\_\_.

- A. a non-metal metal ion electrodes
- B. used as a secondary reference electrode
- C. having zero potential at all preference
- D. always used as a cathode

**Answer: B**

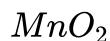
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61. In the dry cell , \_\_\_\_\_.

- A. the graphite rod is anode
- B. the ammonia gas accumulates in the cell during its working

C. the Zn vessel is a negative terminal

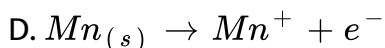
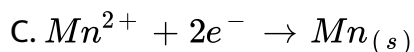
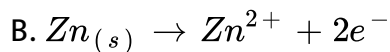
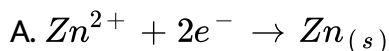
D. the cell reaction involves the complex formation of Zn with



**Answer: C**

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62. In dry cell , reaction which takes place at the anode is \_\_\_\_\_.



**Answer: B**

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63. During the use of lead storage battery, \_\_\_\_\_.

A.  $PbSO_4$  is consumed

B.  $H_2SO_4$  is consumed

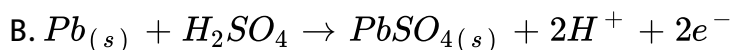
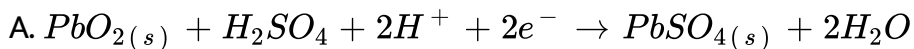
C.  $SO_2$  is formed

D. Pb is formed

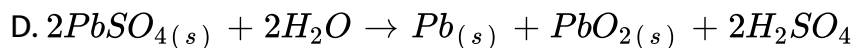
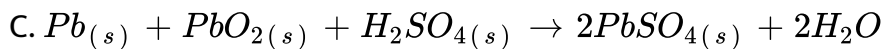
**Answer: B**

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64. Which of the following is the reduction half-reaction for a lead storage battery?







**Answer: A**

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65. During recharging of lead storage cell , \_\_\_\_\_.

A. external e.m.f. is greater than e.m.f. of the cell

B. external e.m.f. is equal to e.m.f. of the cell

C. external e.m.f. is less than e.m.f. of the cell

D. external e.m.f. is negligible

**Answer: A**

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66. In  $H_2 - O_2$  fuel cell the electrodes are made up of \_\_\_\_\_.

- A. graphite
- B. porous graphite
- C. metallic zinc strip
- D. metallic copper strip

**Answer: B**

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67. Which of the following is WRONG regarding fuel cell ?

- A. They function due to combustion reaction
- B. They are different
- C. They cause no pollution
- D. They cannot work continuously

**Answer: D**

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**68.** If the half-cell reaction  $A + e^- \rightarrow A^-$  has a large negative reduction potentials, it follows that:

- A. A is readily reduced
- B. A is readily oxidised
- C. A is readily reduced
- D. A is readily oxidised

**Answer: D**

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69. Li, Ca and K metals can be arranged in the decreasing order of their standard reduction potentials as \_\_\_\_\_.

A. Ca , K , Li

B. Li , Ca , K

C. K , Ca ,Li

D. Li , K , Ca

**Answer: A**

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70. When a piece of copper is placed in an aqueous solution of silver nitrate , the colour of the solution becomes blue. This is due to \_\_\_\_\_.

A. oxidation of Ag

B. reduction of Cu

C. formation of a complex

D. oxidation of Cu

**Answer: D**

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71. An aqueous solutions of which of the following metal ions can oxidize hydrogen ?

A.  $Mg^+$  and  $Cr^+$

B.  $Na^+$  and  $Al^{3+}$

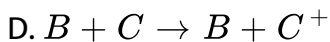
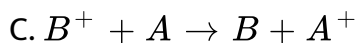
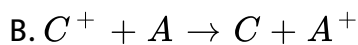
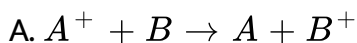
C.  $Ag^+$  and  $Cu^{2+}$

D.  $Zn^{2+}$  and  $Hg^{2+}$

**Answer: C**

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72. The standard reduction potentials of  $A^+ / A$ ,  $B^+ / B$  and  $C^+ / C$  are  $+3.03V$ ,  $-0.70V$  and  $-0.42V$  respectively. Which of the following reactions is spontaneous ?



**Answer: A**

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73. The rusting of iron is catalysed by which of the following ?

A. Fe

B.  $O_2$

C. Zn

D.  $H^+$

**Answer: D**

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**74.** 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  $H_2O$

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**



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75. Zinc is used to protect iron from rusting because \_\_\_\_\_.

- A. zinc is stronger oxidizing agent than Fe
- B. Zinc protect Fe from being oxidised
- C. zinc does not melt easily
- D. zinc is cheap

**Answer: B**



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76. The cost of electricity required to deposit 1 g of Mg is Rs 3.00. The cost to deposit 8 g of Al is \_\_\_\_\_. (At. Mass Al = 27 , Mg = 24)



A. Rs 12.00

B. Rs 24.00

C. Rs 32.00

D. Rs 42.50

**Answer: C**

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## Competitive Thinking

1. Which of the following statements is NOT applicable to electrolytic conductors ?

A. New products show up at the electrodes

B. Ions are responsible for carrying the current.

C. Show a positive temperature coefficient for conductance.

D. A single stream of electrons flows from cathode to anode

**Answer: D**



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2. Which of the following statement is INCORRECT with respect to metallic or electronic conductivity ?

- A. Metallic conductivity depends on the structure of metal and its characteristics.
- B. Metallic conductivity depends on the number of electrons in the valence shell of atom of metal.
- C. The electrical conductivity of metal increases with increase in temperature.
- D. There is no change in the structure of metal during electrical conduction.

**Answer: C**

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3. Aqueous solution of which of the following compounds is the best conductor of electric current ?

A. Ammonia,  $NH_3$

B. Fructose,  $C_6H_{12}O_6$

C. Acetic acid,  $C_2H_4O_2$

D. Hydrochloric acid, HCl

**Answer: D**

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4. What is the SI unit of conductivity?

A.  $S\ m$

B.  $S\ m^{-1}$

C.  $S\ m^2$

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

**Answer: B**



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5. How is electrical conductance of a conductor related with length and area of cross section of the conductor ?

A.  $G = l. a. \kappa^{-1}$

B.  $G = \kappa. l. a^{-1}$

C.  $G = \kappa. a. l^{-1}$

D.  $G = \kappa. l. a^{-2}$

**Answer: C**

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6. The molar conductivity is maximum for the solution of concentration \_\_\_\_\_.

A. 0.001 M

B. 0.005 M

C. 0.002 M

D. 0.004 M

**Answer: A**

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7. The highest electrical conductivity of the following aqueous 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 difluoroacetic acid

**Answer: D**

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8. Conductivity of 0.01 M NaCl solution is  $0.00147 \text{ ohm}^{-1} \text{cm}^{-1}$  what happens to this conductivity if extra 100 mL 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**



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9. Which among the following solution is not used in determination of the cell constant ?

A.  $10^{-2} M$  KCl

B.  $10^{-1} M$  KCl

C. 1 M KCl

D. Saturated KCl

**Answer: D**

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10. The limiting molar conductivities  $\Lambda^\circ$  for NaCl, KBr, and KCl are 126, 152 and 150  $S\text{cm}^2\text{mol}^{-1}$  respectively. The  $\Lambda^\circ$  for NaBr\_\_\_\_\_.

A.  $278S\text{cm}^2\text{mol}^{-1}$

B.  $176S\text{cm}^2\text{mol}^{-1}$

C.  $128S\text{cm}^2\text{mol}^{-1}$

D.  $302S\text{cm}^2\text{mol}^{-1}$

**Answer: C**

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11. The conductivity of  $0.1\text{molL}^{-1}$  KCl solution is  $1.41 \times 10^{-3}S\text{cm}^{-1}$ . What is its molar conductivity (in  $S\text{cm}^2\text{mol}^{-1}$ ) ?



A. 14.1

B. 1.41

C. 1410

D. 141

**Answer: A**

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12. The molar conductivity of a  $0.5 \text{ mol} / \text{dm}^3$  solution of  $\text{AgNO}_3$  with electrolytic conductivity of  $5.76 \times 10^{-3} \text{ Scm}^{-1}$  at  $298\text{K}$  is

A.  $28.8 \text{ Scm}^2 / \text{mol}$

B.  $2.88 \text{ Scm}^2 / \text{mol}$

C.  $11.52 \text{ Scm}^2 / \text{mol}$

D.  $0.086 \text{ Scm}^2 / \text{mol}$

Answer: C

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13. Resistance of  $0.2M$  solution of an electrolyte is  $50\Omega$ . The specific conductance of the solution is  $1.4Sm^{-1}$ . The resistance of  $0.5M$  solution of the same electrolyte is  $280\Omega$ . The molar conductivity of  $0.5M$  solution of the electrolyte is  $Sm^2mol^{-1}$  is.

A.  $5 \times 10^{-4}$

B.  $5 \times 10^{-3}$

C.  $5 \times 10^3$

D.  $5 \times 10^2$

Answer: A

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14. At  $25^{\circ}C$ , the molar conductance of  $0.007\text{ M}$  hydrofluoric acid is  $150\text{ mho cm}^2\text{ mol}^{-1}$  and  $\Lambda_{\infty} = 500\text{ mho cm}^2\text{ mol}^{-1}$ . The value of the dissociation constant of the acid at the given concentration at  $25^{\circ}C$  is \_\_\_\_\_.

A.  $7 \times 10^{-4}$

B.  $7 \times 10^{-5}$

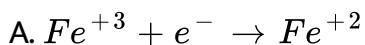
C.  $9 \times 10^{-3}$

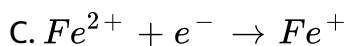
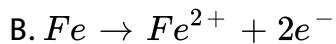
D.  $9 \times 10^{-4}$

**Answer: D**

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15.  $Cd|Cd^{+2}||Fe^{+3}, Fe^{+2}|Pt$  which of the following reaction occurs at the +ve electrode ?





**Answer: A**

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**16.** The overall reaction taking place at anode during electrolysis of fused sodium chloride using suitable electrode is

- A. oxidation of chloride
- B. reduction of sodium ions
- C. reduction of chlorine
- D. oxidation of sodium atoms

**Answer: A**

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17. What products are formed during the electrolysis of a concentrated aqueous solution of NaCl?

- A. turns red litmus into blue
- B. turns blue litmus into red
- C. remains colourless with phenolphthalein
- D. the colour of red or blue litmus does not change

**Answer: A**

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18. The metal that cannot be obtained by electrolysis of an aqueous solution of its salts is :

A. Ag

B. Ca

C. Cu

D. Cr

**Answer: B**

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**19.** According to Faraday's first law

A. 
$$W = \frac{E \times I \times t}{96500}$$

B. 
$$E = \frac{I \times t \times 96500}{W}$$

C. 
$$W = \frac{96500 \times E}{I \times t}$$

D. 
$$E = \frac{I \times W}{t \times 96500}$$

**Answer: A**

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

A.  $9.65 \times 10^4 C$

B.  $1.93 \times 10^4 C$

C.  $1.93 \times 10^5 C$

D.  $19.3 \times 10^5 C$

**Answer: C**

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21. How many Faradays of electricity are required to deposit 10 g of calcium from molten calcium chloride using inert electrodes ?

( molar mass of calcium =  $40 \text{ g mol}^{-1}$  )

A. 0.5 F

B. 1F

C. 0.25 F

D. 2 F

**Answer: A**

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22. Number of Faraday's required to deposit 4 g of  $H_2$  is \_\_\_\_\_.

A. 2

B. 7

C. 96500

D. 4

**Answer: D**



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23. The number of moles of electrons passed when current of 2 A is passed through an solution of electrolyte for 20 minutes is \_\_\_\_\_.

A.  $4.1 \times 10^{-4} \text{ mol } e^{-}$

B.  $1.24 \times 10^{-2} \text{ mol } e^{-}$

C.  $2.487 \times 10^{-2} \text{ mol } e^{-}$

D.  $2.487 \times 10^{-1} \text{ mol } e^{-}$

**Answer: C**

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24. Aluminium oxide may be electrolysed at  $1000^{\circ}\text{C}$  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.  $5.49 \times 10^7 C$

B.  $1.83 \times 10^7 C$

C.  $5.49 \times 10^4 C$

D.  $5.49 \times 10^1 C$

**Answer: A**



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

A. 1.08 g

B. 10.8 g

C. 21.6 g

D. 108g

**Answer: B**

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**26.** The quantity of electricity required to electrolyse separately 1 M aqueous 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**

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27. When one coulomb of charge is passed the quantity of silver deposited is \_\_\_\_\_.

- A. 1 g of silver
- B. 0.1 gram atom of silver
- C. 2 electrochemical of silver
- D. 1 chemical equivalent of silver

**Answer: C**

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28. If 9650 coulombs of electricity is passed through a copper sulphate solution , the number of moles of copper deposited will be \_\_\_\_\_.

A. 0.05

B. 0.01

C. 2

D. 3.15

**Answer: A**



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**29.** During the electrolysis of molten sodium chloride, the time required to produce  $0.10\text{mol}$  of chlorine gas using a current of 3 amperes is

A. 330 minutes

B. 55 minutes

C. 110 minutes

D. 220 minutes

**Answer: C**

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**30.** When 1 F of electricity is passed through acidulated water  $O_2$  evolved is

A.  $11.2dm^3$

B.  $5.6dm^3$

C.  $22.4dm^3$

D.  $1.0dm^3$

**Answer: B**

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31. A current of 10 amperes is passed through acidulated water for 80 minutes . The volume of hydrogen gas liberated is \_\_\_\_\_.

A. 22.4 L

B. 11.14 L

C. 5.6 L

D. 2.78L

**Answer: C**



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32. The amount of silver deposited by passing  $241.25C$  of current through silver nitrated solution is .

A. 2.7 g

B. 2.7 mg

C. 0.27 g

D. 0.54 g

**Answer: C**



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**33.** The atomic weight of Fe is 56. The weight of Fe deposited from  $FeCl_3$  solution by passing 0.6 Faraday of electricity is \_\_\_\_\_.

A. 5.6 g

B. 11.2 g

C. 22.4 g

D. 33.6 g

**Answer: B**



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34. If 0.5 amp current is passed through acidified silver nitrate solution for 10 minutes. The mass of silver deposited on cathode, is (eq. wt. of silver nitrate = 108).

A. 0.235 g

B. 0.336 g

C. 0.536 g

D. 0.636 g

**Answer: B**

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35. During electrolysis of molten  $CaCl_2$  0.005 A current is passed through the cell for 200 s. The mass of product formed at cathode (molar mass of Ca =  $40 \text{ gmol}^{-1}$ ) will be\_\_\_\_\_.

A. 0.0002073 g of Ca

B. 0.0004145 g of Ca

C. 0.0003678 g of  $Cl_2$

D. 0.0007357g of  $Cl_2$

**Answer: A**

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**36.** 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= $96500\text{ C mol}^{-1}$ )

A.  $9.65 \times 10^4\text{ s}$

B.  $19.3 \times 10^4\text{ s}$

C.  $28.95 \times 10^4\text{ s}$

D.  $38.6 \times 10^4\text{ s}$

**Answer: B**



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37. Two Faraday of electricity is passed through a solution of  $CuSO_4$ .

The mass of copper deposited at the cathode is (at. Mass of Cu=63.5u)

A. 0 g

B. 63.5 g

C. 2 g

D. 127 g

**Answer: B**



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38. The number of electrons required to reduce  $4.5 \times 10^{-5}$  g of  $Al^{+3}$  is :

A. 3

B.  $5.01 \times 10^6$

C.  $3.0 \times 10^{18}$

D.  $1.8 \times 10^{20}$

**Answer: C**

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39. 20 mL solution of 0.1 M ferrous sulphate was completely oxidised using a suitable oxidising agent what is the number of electronic exchanged ?

A.  $1.204 \times 10^{22}$

B. 193

C. 1930

D.  $1.204 \times 10^{21}$

**Answer: D**



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**40.** The number of electrons delivered at the cathode during electrolysis by a current of 1 ampere in 60 seconds is (charge on electron =  $1.60 \times 10^{-19} C$ )

A.  $7.48 \times 10^{23}$

B.  $6 \times 10^{23}$

C.  $6 \times 10^{20}$

D.  $3.75 \times 10^{20}$

**Answer: D**



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41. When 0.5 amp of current was passed for 200 seconds, 0.34 gm of copper was deposited , the electrochemical equivalent of copper will be \_\_\_\_\_.

A. 34

B. 3.4

C. 0.034

D. 0.0034

**Answer: D**



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42. Copper is a divalent metal . The value of its electrochemical equivalent is  $3.29 \times 10^{-4}$  g. Its atomic mass is

A. 63.5

B. 31.74

C. 15.87

D. Data insufficient

**Answer: A**



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43. The weight of silver (at *wt.* = 108) displaced by a quantity of electricity which displaced  $5600\text{mL}$  of  $O_2$  at *STP* will be:

A. 5.4 g

B. 10.8 g

C. 54.0 g

D. 108.0 g

**Answer: D**



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44. Same amount of electricity is passed through solutions of ferrous chloride and ferric chloride. Ratio of weight of iron deposited in the two solutions is \_\_\_\_\_.

A. 1 : 2

B. 2 : 3

C. 3 : 2

D. 1 : 1

**Answer: C**



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45. When same quantity of electricity is passed for half an hour, the amount of Cu and Cr deposited are respectively 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**

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46. 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 g of aluminium is obtained ?

(  $\text{Al} = 27\text{g mol}^{-1}$  ,  $\text{Ni} = 58.5\text{g mol}^{-1}$  )

- A. 58.5 g
- B. 117 g
- C. 29.25 g
- D. 5.85 g

**Answer: A**

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**47.** In the cell represented by

$\text{Pb}(s) | \text{Pb}^{2+}(1M) || \text{Ag}^{+}(1M) | \text{Ag}(s)$  the reducing agent is

- A. Pb
- B.  $\text{Pb}^{2+}$

C. Ag

D.  $Ag^+$

**Answer: A**



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**48.** De-electronation process in Nernst theory means \_\_\_\_\_.

A. cathodic reaction

B. anodic reaction

C. cathodic oxidation

D. anodic oxidation

**Answer: D**



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49. The electrode where de-electronation takes place acts as \_\_\_\_\_.

- A. anode
- B. cathode
- C. +ve electrode
- D. both (B) and (C)

**Answer: A**

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50. 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**

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**51.** Given below are half-cell reactions

A.  $2.69V$ , the reaction will not occur

B.  $-2.69V$ , the reaction will occur

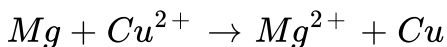
C.  $-0.33V$ , the reacton will not occur

D.  $-0.33V$ , the reaction will occur

**Answer: A**

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52. The cell reaction of a cell is



(Given  $E_{Mg^{2+}/Mg} = -2.37V$ ,  $E_{Cu^{2+}/Cu} = 0.337V$ )

The e.m.f of the cell will be \_\_\_\_\_.

A.  $-2.7V$

B.  $2.7V$

C.  $-2.03V$

D.  $+2.03V$

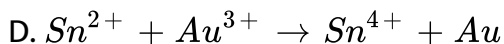
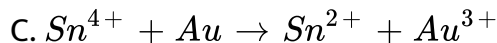
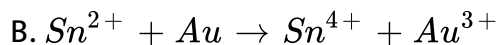
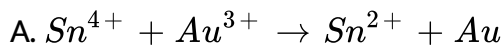
**Answer: B**



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53. Standard reduction potential of  $Au^{3+}/Au$  and  $Sn^{4+}/Sn^{2+}$  electrodes are 1.5 V and 0.15 V respectively. The net reaction is

\_\_\_\_\_.



**Answer: D**

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**54.** The e.m.f of galvanic cell , with oxidation potentials of  $\text{Zn} = +0.76\text{V}$  and that of  $\text{Cu} = -0.34\text{V}$  , is \_\_\_\_\_.

A.  $-1.1\text{V}$

B.  $+1.1\text{V}$

C.  $+0.345\text{V}$

D.  $+0.76V$

**Answer: B**

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55. The  $E_{cell}^{\circ}$  value for  $Pt, H_2|H^+||Ag^+|Ag$  is \_\_\_\_\_.

$$\left[ E_{Ag/Ag^+}^{\circ} = -0.799V \right]$$

A. 0.0 V

B.  $-0.799V$

C. 0.799 V

D. 0.399 V

**Answer: C**

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56. In the cell  $Zn|Zn^{2+}(1M)||H^+(1M)|H_{2(g)}|Pt$  Zn electrode is replaced by Cu electrode. The cell potential will \_\_\_\_\_.

- A. increases
- B. decreases
- C. remain the same
- D. become double

**Answer: B**



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57. The e.m.f of the following cell,

$Zn|ZnSO_4(1M)||H^+(1M)|H_{2(g)} 1atm|Pt$  is 0.769 Volts. The reduction potential of Zn electrode will be\_\_\_\_\_.

- A. 0.769 V
- B.  $-0.769V$

C. zero volt

D. none of these

**Answer: B**

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58. For the electrochemical cell,  $M|M^+||X^-|XE^\circ_{(M^+/M)} = 0.44V$   
and  $E^\circ_{(X/X^-)} = 0.33V$

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.  $E_{cell} = 0.77V$

D.  $E_{cell} = -0.77V$

**Answer: B**

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59. At temperature of 298 K , the e.m.f. of the following electrochemical cell

$Ag_{(s)} | Ag^+ (0.1M) || Zn^{2+} (0.1M) | Zn_{(s)}$  will be \_\_\_\_\_ . (Given

$$E_{cell}^{\circ} = - 1.562V)$$

A.  $- 1.532V$

B.  $- 1.503V$

C.  $1.532V$

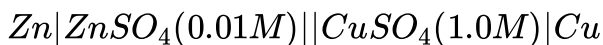
D.  $- 3.06V$

**Answer: A**



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60. In the electrochemical cell:



The EMF of this Daniel cell is  $E_1$ . When the concentration of  $\text{ZnSO}_4$  is changed to 1.0(M) and that of  $\text{CuSO}_4$  changed to 0.01(M), the EMF changes to  $E_2$ . From the following which one is the relationship between  $E_1$  and  $E_2$  (Given,  $\frac{RT}{F} = 0.059$ )-

A.  $E_1 < E_2$

B.  $E_1 > E_2$

C.  $E_2 = 0 \neq E_1$

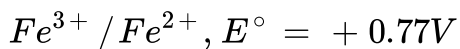
D.  $E_1 = E_2$

**Answer: B**



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61. Standard electrode potentials are



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

A. increase in  $Fe^{3+}$

B. decrease in  $Fe^{3+}$

C. no change in the ratio of  $\frac{Fe^{2+}}{Fe^{3+}}$

D. decrease in  $Fe^{2+}$

Answer: B

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62. Nernst equation for  $Zn^{2+}_{(aq)} + 2e^- \rightarrow Zn_{(s)}$  is  $E_{Zn^{2+}/Zn}$   
= \_\_\_\_\_.

$$A. E_{(Zn^{2+} / Zn)}^{\circ} + \frac{2.303RT}{2F} \log_{10} [Zn^{2+}]$$

$$B. E_{(Zn^{2+} / Zn)}^{\circ} - \frac{2.303RT}{2F} \log_{10} [Zn^{2+}]$$

$$C. E_{(Zn / Zn^{2+})}^{\circ} + \frac{2.303RT}{2F} \log_{10} [Zn^{2+}]$$

$$D. E_{(Zn / Zn^{2+})}^{\circ} - \frac{2.303RT}{2F} \log_{10} [Zn^{2+}]$$

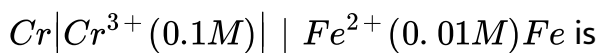
**Answer: A**

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63. Given  $E_{Cr^{3+} / Cr}^{\circ} = -0.72V$ , and

$$E_{Fe^{2+} / Fe}^{\circ} = -0.42V$$

The potential for the cell.



A. 0.339 V

B.  $-0.339V$

C.  $-0.26V$

D. 0.26 V

**Answer: D**

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64. The cell,  $Zn|Zn^{2+}(1M)||Cu^{2+}(1M)Cu$  ( $E_{\text{cell}}^{\circ} = 1.10V$ ),

Was allowed to be completely discharged at  $298K$ . The relative

concentration of  $Zn^{2+}$  to  $Cu^{2+}$   $\left[ \frac{Zn^{2+}}{Cu^{2+}} \right]$  is :

A. antilog (24.08)

B. 37.2

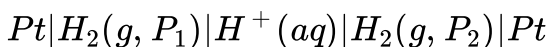
C.  $10^{37.2}$

D.  $9.65 \times 10^4$

**Answer: C**

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



A.  $\frac{RT}{F} \ln \frac{P_1}{P_2}$

B.  $\frac{RT}{2F} \ln \frac{P_1}{P_2}$

C.  $\frac{RT}{F} \ln \frac{P_2}{P_1}$

D. none of these

**Answer: B**

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

A.  $P_{(H_2)} = 1atm$  and  $[H^+] = 2.0 M$

B.  $P_{(H_2)} = 1atm$  and  $[H^+] = 1.0 M$

C.  $P_{(H_2)} = 2atm$  and  $[H^+] = 1.0M$



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

**Answer: C**

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67. The pressure of  $H_2$  required to make the potential of  $H_2$ -electrode zero in pure water at  $298K$  is

A.  $10^{-10}$  atm

B.  $10^{-4}$  atm

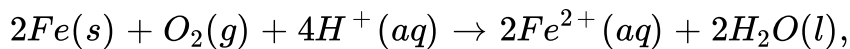
C.  $10^{-14}$  atm

D.  $10^{-12}$  atm

**Answer: C**

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68. Consider the following cell reaction.



$$E^\circ = 1.67V$$

At  $[Fe^{2+}] = 10^{-3}M$ ,  $P(O_2) = 0.1 \text{ atm}$  and  $pH=3$ , the cell potential at  $25^\circ C$  is

A. 1.47 V

B. 1.77 V

C. 1.87 V

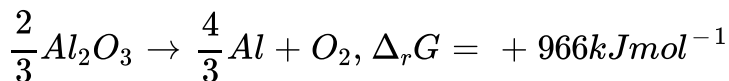
D. 1.57 V

Answer: D



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69. The Gibbs energy for the decomposition of  $Al_2O_3$  at  $500^\circ C$  is as follows:



The potential difference needed for electrolytic reeduction of  $Al_2O_3$

at  $500^\circ C$  is at least:

A. 5.0 V

B. 4.5 V

C. 3.0 V

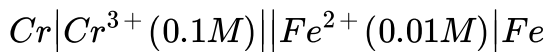
D. 2.5 V

**Answer: D**



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70. What is the potential for the cell



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

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

A.  $-173.7KJ$

B.  $-17.37KJ$

C.  $-1,737KJ$

D.  $-0.1737KJ$

**Answer: A**

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**71.** For a spontaneous reaction the  $\Delta G$ , equilibrium constant (K) and

$E_{\text{cell}}^{\circ}$  will be respectively

A.  $-ve > 1, +ve$

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

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

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

**Answer: A**

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72. What is the free energy change per mole of Cu(II) ion formed in a cell consisting of Cu|Cu(II) ion half-cell suitably connected to a  $Ag | Ag^+$  ion half-cell ? (Given:  $E^\circ = 0.46V$ )

A.  $-75KJ$

B.  $-89KJ$

C.  $-45KJ$

D.  $-25kJ$

**Answer: B**

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73. If the  $E_{cell}^\circ$  for a given reaction has a positive value, then which of the following gives the correct relationship for the values of  $\Delta G^\circ$

and  $K_{eq}$  :-

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

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

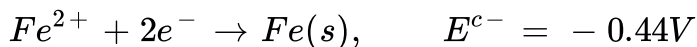
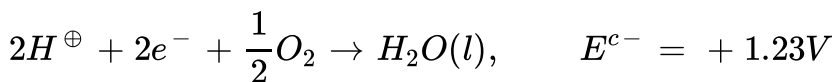
C.  $\Delta G^\circ > 0, K_{eq} > 1$

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

**Answer: B**

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**74.** The rusting of iron takes place as follows :



Calculate  $\Delta G^{c-}$  for the net process.

A.  $- 322KJmol^{-1}$

B.  $- 161KJmol^{-1}$

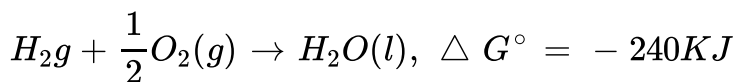
C.  $-152\text{KJmol}^{-1}$

D.  $-76\text{KJmol}^{-1}$

**Answer: A**

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75. For hydrogen oxygen fuel cell at atm and 298 K



$E^\circ$  for the cell is approximately (Gevien  $F=96500\text{ C}$ )

A. 2.48 V

B. 1.254 V

C. 2.5 V

D. 1.26 V

**Answer: B**

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76. 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.  $1 \times 10^{-10}$

B.  $29.5 \times 10^{-2}$

C. 10

D.  $1 \times 10^{10}$

**Answer: D**

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77. The emf of the cell,

$Zn|Zn^{2+}(0.01M)||Fe^{2+}(0.001M)|Fe$  at 298 K is 0.2905 V then the



value of equilibrium constant for the cell reaction is :

A.  $e^{\frac{0.32}{0.0296}}$

B.  $10^{\frac{0.32}{0.0296}}$

C. 3.26 V

D.  $10^{\frac{0.320}{0.0592}}$

**Answer: B**



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**78.** 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.  $2 \times 10^{11}$

B.  $4 \times 10^{12}$

C.  $1 \times 10^2$

D.  $1 \times 10^{10}$

**Answer: D**

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79. The platinised plate in SHE is used as \_\_\_\_\_.

A. oxidising agent

B. adsorbent

C. reducing agent

D. adsorbate

**Answer: B**

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80. Standard hydrogen electrode \_\_\_\_\_.

- A. is an indicator electrode
- B. is a reference electrode
- C. has a potential of 1 volt
- D. none of these

**Answer: B**



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81. Calomel is \_\_\_\_\_.

- A.  $HgCl_2$
- B.  $Hg_2Cl_2$
- C.  $Hgl_2$
- D.  $HgO$

**Answer: B**



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**82.** Dry cell converts \_\_\_\_\_.

- A. chemical energy into electrical energy
- B. electrical energy into chemical energy
- C. chemical energy into mechanical energy
- D. electrical energy into mechanical energy

**Answer: A**



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**83.** In a dry cell, what acts as negative electrode ?

A. Zinc

B. Graphite

C. Ammonium chloride

D. Manganese dioxide

**Answer: A**

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**84.** What is the density of solution of sulphuric acid used as an electrolyte in lead accumulator ?

A.  $1.5\text{gmL}^{-1}$

B.  $1.2\text{gmL}^{-1}$

C.  $1.8\text{gmL}^{-1}$

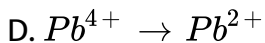
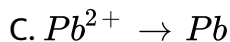
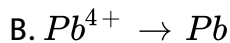
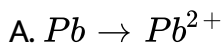
D.  $2.0\text{gmL}^{-1}$

**Answer: B**



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**85.** Which among the following equations represents the reduction reaction taking place in lead accumulator at positive electrode, while it is being used as a source of electrical energy ?

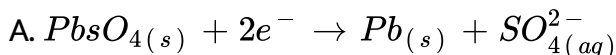


**Answer: D**

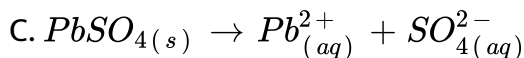
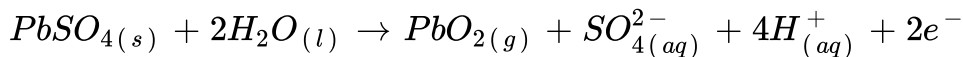


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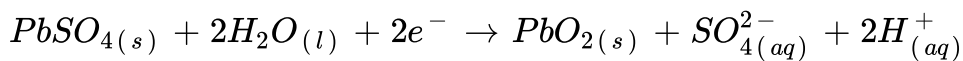
86. In lead storage battery, the anode reaction is



B.



D.



Answer: B

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87. While charging the lead storage battery:

A.  $PbSO_4$  on anode is reduced to Pb

B.  $PbSO_4$  on cathode is reduced to Pb

C.  $PbSO_4$  on cathode is oxidised to Pb

D.  $PbSO_4$  on anode is oxidised to Pb

**Answer: B**

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**88.** Which of the following is NOT used in hydrogen-oxygen fuel cell ?

A.  $H_2$

B.  $O_2$

C.  $OH^-$

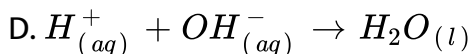
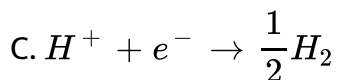
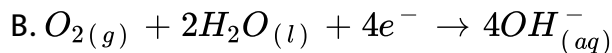
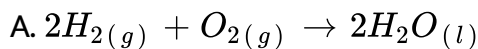
D.  $O^{-2}$

**Answer: D**

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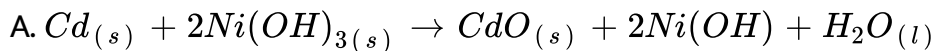
89. In  $H_2 - O_2$  fuel cell, the reaction occurring at cathode is



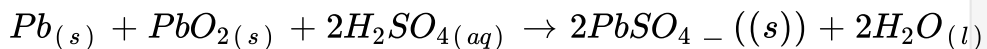
Answer: B

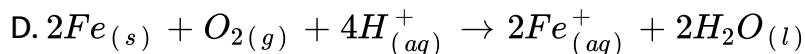
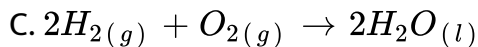
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90. Which of the following reaction is reaction is used to make a fuel cell .



B.





**Answer: C**

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**91.** A device that converts energy of combustion of fuels like hydrogen and methane, directly into electrical energy is known as .

A. fuel cell

B. electrolytic cell

C. dynamo

D. Ni-Cd cell

**Answer: A**

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92. Identify the weakest oxidising agent among the following.



**Answer: A**



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93. Reduction potentials of A,B,C and D are 0.8 V 0.79 V, 0.34 V and -2.37 V respectively which element displaces all the other three elements

A. B

B. A

C. D

D. C

**Answer: C**



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**94.** Reducing powers of A,B,C and D are  $w, x, y,$  and  $z$  respectively such that  $z > y > x > w$ . The one which will displace all others is \_\_\_\_\_.

A. A

B. B

C. C

D. D

**Answer: A**

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95. The value of  $E_{red}^{\circ}$  for metals A,B and are 0.34 Volt ,  $-0.80$  Volt and  $-0.46$  volt respectively. State the CORRECT order for their ability to act as reducing agent.

A.  $C > B > A$

B.  $A > B > C$

C.  $B > C > A$

D.  $C > A > B$

**Answer: C**

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96. 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=Ni, Y=Fe

B. X=Ni, Y=Zn

C. X=Fe, Y=Zn

D. X=Zn , Y=Ni

**Answer: D**

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97. The  $E_{M^{3+}/M^{2+}}$  values for Cr, Mn, Fe and Co are 0.41, + 1.57, + 0.77 and +1, 97V respectively. For which one of these metals the change ub oxidation state from = 2 to 3 is easiest :

A. Fe

B. Mn

C. Cr

D. Co

**Answer: C**

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98. When a copper wire is placed in a solution of  $AgNO_3$ , the solution acquires blue colour. This is due to the formation of .

A.  $Cu^{2+}$  ions

B.  $Cu^+$  ions

C. soluble complex of copper with  $AgNO_3$

D.  $Cu^-$  ion by the reduction of Cu

**Answer: A**

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99. The standard oxidation potential values of A,B,C and D are  $-0.03V$ ,  $+0.108V$ ,  $+0.07V$  and  $+0.1V$  respectively. This spontaneous cell reaction takes place between \_\_\_\_\_.

A. A and B

B. B and D

C. D and A

D. B and C

Answer: D



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100. This is involved in rusting of Fe : \_\_\_\_\_.

A.  $O_2$

B.  $H_2$



C.  $N_2$

D.  $Cl_2$

**Answer: A**

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**101.** During galvanisation of iron, which metal is used for coating iron surface ?

A. Copper

B. Zinc

C. Nickel

D. Tin

**Answer: B**

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**102.** Zinc can be coated on iron to produce galvanized iron but the reverse is not possible it is because

- A. zinc has higher negative electrode potential than iron
- B. zinc is lighter than iron
- C. zinc has lower melting point than iron
- D. zinc has lower negative electrode potential than iron

**Answer: A**

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**103.** The process in which metal surface is made inactive is called

- A. passivation
- B. galvanising

C. corrosion

D. pickling

**Answer: A**



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## Evaluation Test

1. Water is a non-electrolyte but conducts electricity on dissolving a small amount of

A. oxygen

B. sugar

C. common salt

D. acetone

**Answer: C**



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2. Two electrodes are fitted in conductance cell 1.5 cm apart while the area of cross-section of each electrode is  $0.75\text{cm}^2$ . The cell constant is

A.  $0.2\text{cm}^{-1}$

B.  $0.5\text{cm}^{-1}$

C.  $0.125\text{cm}^{-1}$

D.  $2.0\text{cm}^{-1}$

**Answer: D**



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3. If the cell constant is  $0.5\text{cm}^{-1}$  and the resistance is 50 ohm , then the molar conductance of 0.1 M solution is \_\_\_\_\_.

- A.  $10\text{ohm}^{-1}\text{cm}^2\text{mol}^{-1}$
- B.  $20\text{ohm}^{-1}\text{cm}^2\text{mol}^{-1}$
- C.  $300\text{ohm}^{-1}\text{cm}^2\text{mol}^{-1}$
- D.  $100\text{ohm}^{-1}\text{cm}^2\text{mol}^{-1}$

**Answer: A**

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4. A solution of a trivalent metal ion is electrolysed by a current of 5 A for 10 minutes , during this time 1.18 g of metal was plated out . The identity of the metal is \_\_\_\_\_.

- A. Cobalt (At. Mass = 58.93 )

B. Chromium (A. mass = 52.00)

C. Indium (At. Mass = 114.82 )

D. Gallium (At. Mass = 69.72)

**Answer: C**

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

A. produces high purity water

B. creates potential difference between the two electrodes

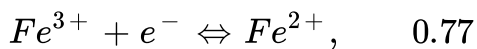
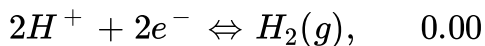
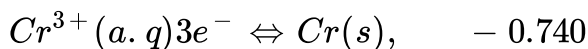
C. generates heat

D. removes adsorbed oxygen from electrode surfaces

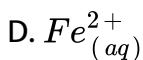
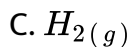
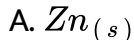
**Answer: B**

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6. The standard reduction potentials at  $25^{\circ}C$  for the following half reactions are given against each:



Which is the strongest reducing agent?



**Answer: A**

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7. Which colorless gas evolves when  $NH_4Cl$  reacts with zinc in a dry cell battery ?

A. HCl

B.  $N_2$

C.  $H_2$

D.  $Cl_2$

**Answer: C**



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8. Electrolyte can conduct electricity because \_\_\_\_\_.

A. their molecules contain unpaired electrons, which are mobile

B. their molecule contain loosely held electrons which gets free under the influence of voltage



C. the molecules break up into ions when a voltage is applied

D. the molecules are broken up into ions when the electrolyte is fused or is dissolved in the solvent

**Answer: D**

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9. The standard electrode potential of calomel electrode in 1 M KCl is \_\_\_\_\_ .0.28 V

A. 0.28 V

B.  $-0.33V$

C.  $-0.28V$

D. 0.242 V

**Answer: A**

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10. A current is passed through two cells connected in series. The first cell contains  $X(NO_3)_3(aq)$  and the second cell contains  $Y(NO_3)_2(aq)$ . The relative atomic masses of X and Y are in the ratio 1 : 2. What is the ratio of liberated mass of X to that of Y ?

A. 3 : 2

B. 1 : 2

C. 1 : 3

D. 3 : 1

**Answer: C**

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11. Time required to deposit 90 g of Al from an electrolytic cell containing  $Al_2O_3$  by a current of 965 A is \_\_\_\_\_. (At. Mass of Al =27)

A. 20 min.20 s

B. 16 min. 40s

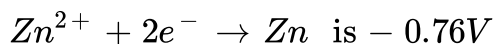
C. 40 min.20 s

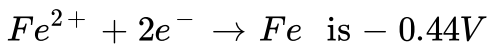
D. 26 min.40 s

**Answer: B**

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12. Standard reduction potential values for the electrodes are given below.





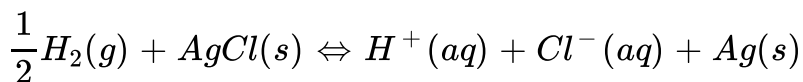
Which of the following statement is correct

- A. Zn reduces  $Fe^{2+}$
- B. Zn reduces  $Mg^{2+}$
- C. Mg oxidises Fe
- D. Zn oxidises Fe

**Answer: A**

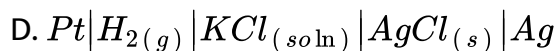
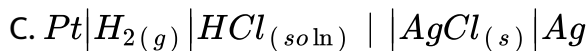
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**13.** The reaction



occurs in the galvanic cell

- A.  $Ag|AgCl(s)|KCl(soln) || AgNO_3(soln)|Ag$
- B.  $Pt|H_2(g)|HCl(soln)|AgNO_3(soln)|Ag$



**Answer: C**

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**14.** What will be the reduction potential of a hydrogen electrode which is filled with HCl solution of pH value 1.0? (at 298 Kelvin)

A.  $-59.25V$

B.  $+59.25V$

C.  $+59.25mV$

D.  $-59.25mV$

**Answer: D**

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15. Element A( atomic mass 112) and element B (atomic mass 27) form chlorides. Solutions of these chlorides are electrolysed separately and it is found that when the same quantity of electricity is passed 5.6 g of A was deposited while only 0.9 g of B was deposited. If the valency of B is 3, then the valency of A is \_\_\_\_\_.

A. 2

B. 3

C. 4

D. - 2

**Answer: A**



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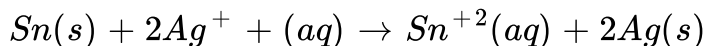
16. A current of 3.7 A is passed for six hours between Ni electrodes in 0.5 L of 2M solution of  $Ni(NO_3)_2$ . The molarity of solution at the end of electrolysis will \_\_\_\_\_.

- A. remain the same
- B. increases
- C. decreases
- D. first increases then decreases

**Answer: A**

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

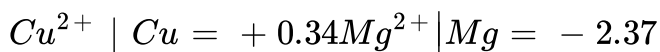


- A. Increase in size of the silver rod.
- B. Increase in the concentration of  $Sn^{2+}$  ions.
- C. Increase in the concentration of  $Ag^+$  ions.
- D. Decrease in the concentration of  $Ag^+$  ions.

**Answer: C**

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



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



A. Ag, Hg, Cu

B. Ag, Hg, Cu

C. Cu, Hg, Ag

D. Cu, Hg, Ag

**Answer: B**

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19. When the electric current is passed through a cell having an electrolyte, the positive ions move towards cathode and negative ions towards the anode. If the cathode is pulled out of the solution .

A. the positive and the negative ions both will move towards the anode.

B. the positive ions will start moving towards the anode and the negative ions will stop moving

C. the negative ions will continue to move towards the anode, the positive ions will stop moving

D. the positive ions and the negative ions will start moving randomly

**Answer: D**

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