

## CHEMISTRY

### BOOKS - KUMAR PRAKASHAN KENDRA CHEMISTRY (GUJRATI ENGLISH)

### ELECTROCHEMISTRY

#### Example

1. Represent the cell in which the following reaction takes place,

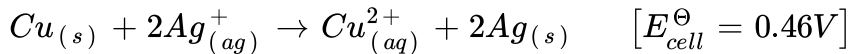


$$E_{cell}^{\ominus} = 3.17V$$



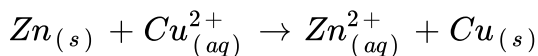
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2. Calculate the equilibrium constant of the reaction:



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3. The standard electrode potential for Daniell cell is 1.1V. Calculate the standard Gibbs energy for the reaction



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4. Resistance of a conductivity cell filled with  $0.1 \text{ mol L}^{-1}$  KCl solution is  $100 \Omega$ . If the resistance of the same cell when filled with  $0.02 \text{ mol L}^{-1}$  KCl solution is  $520 \Omega$ , calculate the conductivity and molar conductivity of  $0.02 \text{ mol L}^{-1}$  KCl solution. the conductivity of  $0.1 \text{ mol L}^{-1}$  KCl solution is  $1.29 \text{ S/m}$ .

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5. The electrical resistance of a column of  $0.05 \text{ mol L}^{-1}$  NaOH solution of diameter 1 cm and length 50 cm is  $5.55 \times 10^3$  ohm. Calculate its resistivity, conductivity and molar conductivity.

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6. The molar conductivity of KCl solutions at different concentrations at 298K are given below:

$c / \text{mol L}^{-1}$	$\Lambda_m / \text{S cm}^2 \text{mol}^{-1}$
0.000198	148.61
0.000309	148.29
0.000521	147.81
0.000989	147.09

Show that a plot between  $\Lambda_m$  and  $c^{(1/2)}$  is a straight line. Determine the values of  $\Lambda_m^\circ$  and A for KCl.

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7. Calculate  $\Lambda_m^\circ$  for  $CaCl_2$  and  $MgSO_4$ :

Value of  $\lambda_m^\circ$ :

Ions	$Ca^{2+}$	$Cl^-$	$Mg^{2+}$	$SO_4^{2-}$
$\lambda^\circ / (S\ cm^2\ mol^{-1})$	119.0	76.3	106.0	160

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8. A solution of  $CuSO_4$  is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode ?

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## Section A

1. What is electrochemistry ? Explain its application. OR explain:  
Electrochemistry is wide and interdisciplinary subject.

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2. Give chemical reaction and its potential by drawing labelled diagram of Daniell cell. Also give primary information indicating which type of cell it is ?

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3. Explain different condition when external potential is applied in opposite direction in galvanic cell (Voltaic cell) by taking suitable cell example.

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4. What is galvanic cell ? Give half cell reaction of Daniell cell and explain redox couple.

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5. Explain construction of the galvanic cell according to Daniell cell. In galvanic cell explain positive and negative electrode with suitable chemical reaction.

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6. What is electrode potential according to galvanic cell? Explain in detail.

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7. What is cell potential and emf? Explain with suitable examples.

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8. Give cell reaction, expression and formula for copper - Silver galvanic cell.

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9. What is to be done to determine cell potential ?

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10. Write a note on standard hydrogen electrode.

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11. Discuss the method to determine cell potential of any cell when standard hydrogen electrode is considered as anode with suitable example.

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12. Discuss the method to determine cell potential of any cell when standard hydrogen electrode is considered as cathode with suitable

example.

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13. Calculate the Zn-Cu cell (Daniell) potential.

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14. What is electrode and half-cell ? Explain symbolic representation by suitable example.

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15. Explain symbolic representation of galvanic cell (electrochemical cell) by suitable example.

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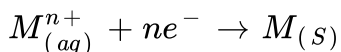
16. Give the type and examples of electrodes.

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17. What is the standard electrode (Half-cell) potential ? Give its uses.

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18. Give Nernst equation for following reaction

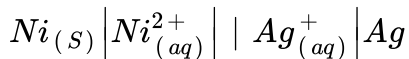


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19. Derive Nernst equation for calculating  $E_{cell}$  of Nernst equation and write the effect on  $E_{cell}$  when there is change in concentration of  $Zn^{2+}$  and  $Cu^{2+}$ .

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20. Derive Nernst equation for the following galvanic cell.



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21. For general redox reaction:



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22. Explain equilibrium state in Daniell cell and derive its equilibrium constant.

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23. Derive an equation for equilibrium constant  $K_c$  of any galvanic cell (Redox reaction) and also give its uses.

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24. Write a note on relation between Gibbs free energy and cell potential for cell reaction.

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25. What is an electric resistance ? Give note on it.

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26. Define resistance or specific resistance and write a note on it.

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27. What is conductivity ? Give note on it.

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28. Write a note on specific conductivity (k).

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29. Conductivity depends on what ?

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30. What is metallic or electronic conductivity? It depends on what basis?

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31. What is ionic conductivity ? It is dependent on which bases ?

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**32.** Write a note on classification of conductor based on mass of conductor.

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**33.** Write a note on difficulties associated with the measurement of resistivity of ionic solution.

OR

Explain difficulties with measurement of resistance of ionic solutions and how to resolve it.

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**34.** Discuss construction and uses of conductivity cell.

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**35.** What is conductivity cell constant ?

Give a note on conductivity cell constant ( $\cdot G$ ).

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**36.** Explain measurement and calculation of resistivity of electrolytic solution.

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**37.** How to obtain ionic conductivity of unknown solution ?

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**38.** Write a note on molar conductivity ( $\Lambda_m$ ) of solution.

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39. Give a note on effect on conductivity of solution when change in concentration of solution.

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40. What is strong electrolyte ? Explain relation between molar conductivity and concentration of solution with strong electrolyte.

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41. Write a note on Kohlrausch law of independent migration of ions and limiting molar conductivity ( $\Lambda_m^\circ$ ) of strong electrolyte.

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42. What is weak electrolyte ? Explain relation between concentration of weak electrolyte and molar conductivity with suitable graph.

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43. Give a note on measurement of limiting molar conductivity of solution of weak electrolyte.

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44. Derive relation between  $\kappa_a$  and  $\Lambda_m^\circ$  for solution of weak electrolyte.

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45. Explain Kohlrausch law of independent migration of ions.

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46. Write Kohlrausch law and give its importance (applications).

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47. Give graph of  $\Lambda_m \rightarrow c^{1/2}$  of aqueous solution strong and weak electrolyte, clarify their difference and uses.

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48. What is electrolyte cell ? Give its uses.

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49. Which is the simplest electrolytic cell ? Give detailed note on it.

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50. Give Faraday law and its uses.

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51. What is the use of coulometer ?

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52. Now a days, how quantity of electricity  $Q$  can be measured in electrolytic cell ?

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53. Clarify stoichiometry of reaction occurs on the electrodes of electrolytic cell and its relationship with quantity of electricity.

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54. "Products obtained near the electrodes by electrolysis depends on the electrodes"-explain by suitable examples.

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55. Explain: Reduction reaction is possible with higher  $E^\ominus$  value.

OR

Reduction of water is carried out near cathode in presence of aqueous

Na.

OR

Reduction of species is dependent on its reduction potential value.

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56. Give electrolytic reactions of molten NaCl occurred in inert electrode.

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57. Explain : Oxidation of  $Cl^-$  ion is carried out near anode when electrolysis of aqueous (Concentrated) NaCl solution is carried out using inert electrode.

OR

Oxidation of species depend upon its oxidation potential, oxidation reaction is possible for  $E^{\ominus}$  whose value is less.

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58. Give electrolytic reaction of aqueous NaCl solution (concentrated) in inert electrode.

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59. Give reaction occurred near anode of electrolysis of sulphuric acid in electrolytic cell near inert electrode.

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60. Products of electrolysis depends upon which factors? Justify with suitable examples.

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**61.** Give basic information on Battery.

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**62.** What is primary battery ? Give note on primary battery.

OR Give note on dry cell.

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**63.** Write a note on mercury cell (Zn-Hg).

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**64.** What is secondary cell ? Give examples of it.

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65. Write a note on lead storage cell (battery).

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66. Write a note on Ni-Cd cell.

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67. How to produce electricity in thermal power station ?

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68. In which cell, construction like galvanic cell can be observed ? Explain.

What is fuel cell ? Write a note on it.

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69. Write a note on hydrogen-oxygen fuel cell.

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70. What is corrosion of metal ? Give its characterization and damage.

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71. Write a note on corrosion of iron.

OR

Explain chemicals of iron corrosion.

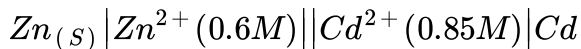
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72. Explain importance and remedies to stop metal corrosion.

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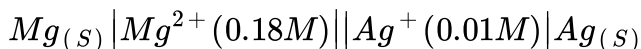
## Section A Try Yourself

1. Calculate the cell potential for



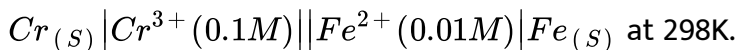
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2. Calculate the cell potential for



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3. Calculate the cell potential for



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4. Calculate the cell potential for  $Zn_{(s)} | Zn^{2+} (0.6M) || Cd^{2+} (0.2M) | Cd_{(s)}$  at 298K.

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5. Calculate the cell potential for  $Ni_{(s)} | Ni^{2+} (0.036M) || Co^{2+} (0.018M) | Co_{(s)}$  at 298K.

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6. Calculate the cell potential for  $Ag_{(s)} | Ag^+ (0.01M) || Ag^+ (0.1M) | Ag_{(s)}$  at 298K.

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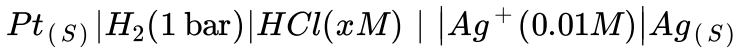
7. Calculate the equilibrium constant for the cell obtained by connecting two electrode  $E_{(Sn^{2+} | Sn)}^{\ominus} = 0.14V$  and  $E_{(Ni^{2+} | Ni)}^{\ominus} = -0.23V$  at

298K Temperature.



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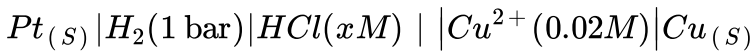
8. Calculate pH of HCl solution at 298K temperature for the following cell:



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9. Calculate pH of HCl solution at 298 K temperature for the following cell

:



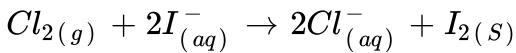
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10. If one cell has standard electrode potential of 0.0295V and n=2 then calculate its equilibrium constant at 298K temperature



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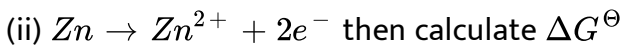
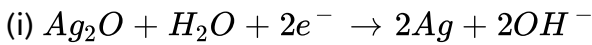
11. Calculate equilibrium constant for



$$\left[ E^\ominus_{(\text{Cl}_2|2\text{Cl}^-)} = 1.36\text{V}, E^\ominus_{(\text{I}_2|2\text{I}^-)} = 0.536\text{V} \right]$$

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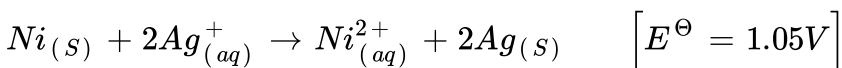
12. Following reaction is occurred in button cell.



$$\left[ E^\ominus_{\text{Zn}^{2+}|\text{Zn}} = -0.76\text{V}, E^\ominus_{(\text{Ag}^+|\text{Ag})} = 0.34\text{V} \right]$$

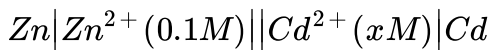
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13. Calculate the  $K_C$  and  $\Delta G^\ominus$  for the chemical reaction :



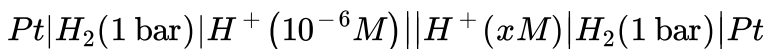
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14. Cell potential for the following reaction is 0.03305V, then find out x at 298 K temperature.



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15. If  $E_{cell} = 0.118V$  for the following reaction, then calculate  $[H^+]$  and pH at 298K temperature.



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16. Resistance of cell having 0.02 M KCl solution is 164  $\Omega$ . If 0.05 M  $AgNO_3$  is filled then resistance of cell become 75.8  $\Omega$ , then calculate following : [Conductivity of 0.02 M  $KCl = 2.768 \times 10^{-3}\Omega^{-1}cm^{-1}$ ]

(i) Conductivity of 0.05 M  $AgNO_3$ .

(ii) Molar conductivity of  $AgNO_3$  solution.

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17. Calculate molar conductivity of 0.02M solution.

$$[\Lambda_m = 10^3 \text{ S cm}^2\text{mol}^{-1}]$$

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18. If distance between two Pt electrode is 2 cm, cross intercept of  $4.0 \text{ cm}^2$  and resistance is  $25\Omega$ , then find out the molar conductivity of 0.5 M solution.

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Electrolyte :	NaCl	NaBr	KCl
$\Lambda_m^\circ (\text{S cm}^2 \text{mol}^{-1}) :$	126.5	128.2	149.5

19.

If  $\text{Br}^-$  ions having conductivity =  $78.1 \text{ S cm}^{-1}\text{mol}^{-1}$  then calculate

$$\lambda_m^\circ(\text{K}^+)$$

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**20.** Resistance of a conductivity cell at 298K for 0.0100 M KCl is  $161.8\Omega$ . Resistance become  $190\Omega$  when 0.005 M NaOH solution is filled in this cell. Then calculate (i) cell constant (ii) specific conductivity for NaOH solution and (iii) molar conductivity.

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**21.** Calculate volume of  $O_2$  liberated when 2.5 A current is passed for 1 hour through aqueous solution of  $Na_2SO_4$  having inert electrode at 1 bar pressure and 300 K temperature. [Volume of 1 mole of  $O_2$  at STP=22 Litre]

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**22.** 18.4 A current is passed for 1 hour and 42 minutes through  $CuSO_4$  solution having graphite electrode at 298K temperature and 1 bar pressure. If cell has capacity of 75% then calculate the mass of Cu and

volume of  $O_2$ .

$$[Cu = 63.5u, O = 16u, R = 0.08314]$$

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**23.** How much ampere current should be passed through the  $CuSO_4$  solution having graphite electrode to obtain 250 milliliter  $O_2$  gas per minute at 1 bar pressure and 300 K temperature. [R=0.08314]

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**24.** 5 A current is passed through electrolytic cell filled with  $AgNO_3$  solution for 2.7 hours. If 1 spoon require 0.01 g silver to get coated, so calculate how many spoon get coated by silver obtained on the cathode ?

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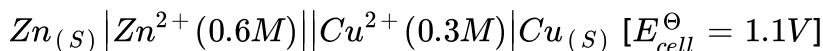
25. 7.5 A current is passed for 200 second through  $AgNO_3$  solution. If experimentally 1.08 g Ag is obtained then calculate the cell capacity.

[Ag=108u]

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## Section A Practice Questions

1. Calculate cell potential at 298K for the following cell.



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2. When copper plate is kept in 0.1 M solution of  $CuSO_4$  at 298K temperature and if 70% dissociation is occurred then calculate the potential of copper electrode.

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3. Calculate the cell potential for Cu plate kept in 0.2 M  $CuSO_4$  solution.

$$\left[ E_{Cu^+ | Cu^{2+}}^\ominus = 0.34V \right]$$

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## Section A Extra Examples For Practice

1. Resistivity of 0.5 M electrolytic solution is  $10\Omega\text{cm}$ , then find out the molar conductivity of solution.

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2. Resistance of 0.05 M electrolytic solution at 298K temperature is  $30.0\ \Omega$ . The cross sectional area of conductivity cell having Pt electrode is  $3.8\text{cm}^2$  and distance between two electrode is 1.5 cm, then what is the molar conductivity of electrolytic solution ?

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## Section B Intext Questions And Answers

1. How would you determine the standard electrode potential of the system  $Mg^{2+} | Mg$  ?

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2. Can you store copper sulphate solution in a zinc pot ?

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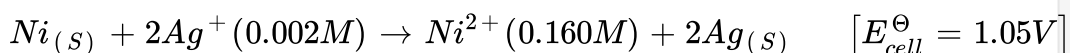
3. Consult the table of standard electrode potentials and suggest three substances that can oxidise ferrous ions under suitable conditions.

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4. Calculate the potential of hydrogen electrode in contact with a solution whose pH is 10.

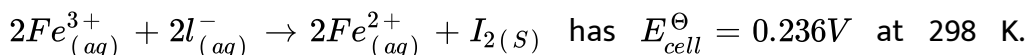
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5. Calculate the emf of the cell in which the following reaction takes place:



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6. The cell in which the following reactions occurs :



calculate the standard Gibbs energy and the equilibrium constant of the cell reaction.

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

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8. Suggest a way to determine at  $\Lambda_m^\circ$  value of water.

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

Given

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

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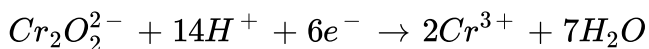
10. If a current of 0.5 ampere flows through a metallic wire for 2 hours, then how many electrons would flow through the wire ?

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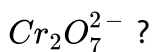
11. Suggest a list of metals that are extracted electrolytically.

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12. Consider the reaction:



What is the quantity of electricity in coulombs needed to reduce 1 mol of



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13. Write the chemistry of recharging the lead storage battery, highlighting all the materials that are involved during recharging.

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14. Suggest two materials other than hydrogen that can be used as fuels in fuel cells.

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### Section C Textual Exercise

1. Arrange the following metals in the order in which they displace each other from the solution of their salts. Al, Cu, Fe, Mg and Zn.

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2. Given the standard electrode potentials:

$$K^+ | K = -2.93V,$$

$$Ag^+ | Ag = 0.80V, \quad Hg^{2+} | Hg = 0.79V,$$

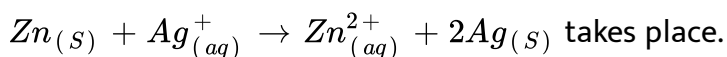
$$Mg^{2+} | Mg = -2.37V, \quad Cr^{3+} | Cr = -0.74V$$

Arrange these metals in their increasing order of reducing power.



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3. Depict the galvanic cell in which the reaction



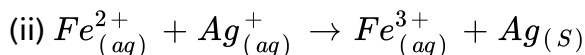
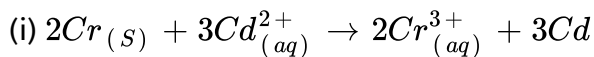
Further show:

- (i) Which of the electrode is negatively charged?
- (ii) The carriers of the current in the cell.
- (iii) Individual reaction at each electrode.



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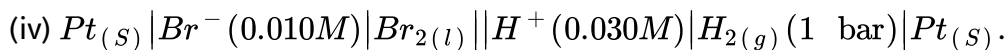
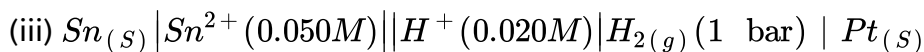
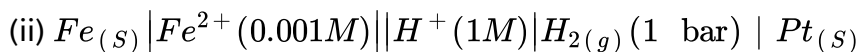
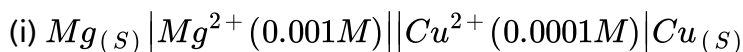
4. Calculate the standard cell potentials of galvanic cells in which the following reaction take place:



Calculate the  $\Delta_r G^\circ$  and equilibrium constant of the reactions.

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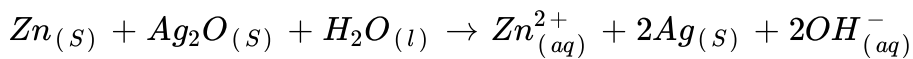
5. Write the Nernst equation and emf of the following cells at 298 K:



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6. In the button cells widely used in watches and other devices the following reaction takes place :





Determine  $\Delta_r G^\circ$  and  $E^\ominus$  cell for the reaction.

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7. The conductivity of 0.20 M solution of KCl at 298 K is  $0.0248 \text{ S cm}^{-1}$ .

Calculate its molar conductivity.

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8. The resistance of a conductivity cell containing 0.001 M KCl solution at 298 K is  $1500 \Omega$ . What is the cell constant if conductivity of 0.001 M KCl solution at 298 K is  $0.146 \times 10^{-3} \text{ S cm}^{-1}$ .

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9. The conductivity of sodium chloride at 298K has been determined at different concentrations and the results are given below:

Concentration/M	0.001	0.010	0.020	0.050	0.100
$10^2 \times k/Sm^{-1}$	1.237	11.85	23.15	55.53	106.74

Calculate  $\Lambda_m$  for all concentration and draw a plot between  $\Lambda_m$  and  $c^{\frac{1}{2}}$ .

Find the value of  $\Lambda_m^\circ$ .

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10. Conductivity of 0.00241 M acetic acid is  $7.896 \times 10^{-5} \text{ S cm}^{-1}$ .

Calculate its molar conductivity and if  $\Lambda_m^\circ$  for acetic acid is  $390.5 \text{ S cm}^{-2} \text{ mol}^{-1}$ , what is its dissociation constant ?

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11. How much charge is required for the following reductions:

(i) 1 mol of  $Al^{3+}$  to Al

(ii) 1 mol of  $Cu^{2+}$  to Cu

(iii) 1 mol of  $MnO_4^-$  to  $Mn^{2+}$ .

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**12.** How much electricity in terms of Faraday is required to produce:

(i) 20.0 g of Ca from molten  $CaCl_2$  ?

(ii) 40.0 g of Al from molten  $Al_2O_3$  ?

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**13.** How much electricity is required in coulomb for the oxidation of

(i) 1 mol of  $H_2O$  to  $O_2$  ?

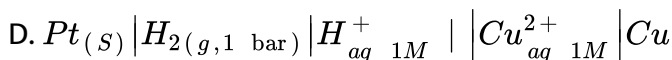
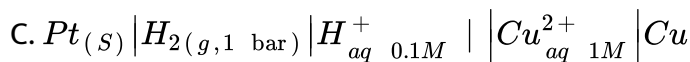
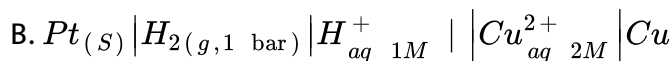
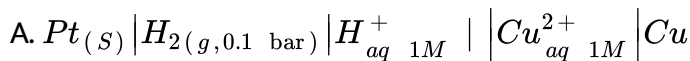
(ii) 1 mol of FeO to  $Fe_2O_3$  ?

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**14.** A solution of  $Ni(NO_3)_2$  is electrolysed between platinum electrodes using a current of 5 amperes for 20 minutes. What mass of Ni is deposited at the cathode ?

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1. Which cell will measure standard electrode potential of copper electrode ?



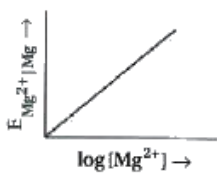
Answer: C

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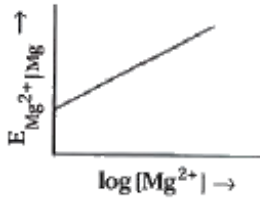
2. Electrode potential for Mg electrode varies according to the equation :

$$E_{Mg^{2+} | Mg} = E_{Mg^{2+} | Mg}^{\ominus} - \frac{0.59}{2} \log \frac{1}{[Mg^{2+}]}$$

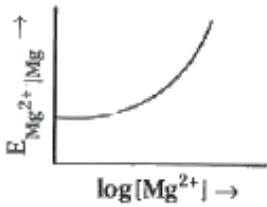
The graph of  $E_{Mg^{2+} | Mg} \rightarrow \log[Mg^{2+}]$  is



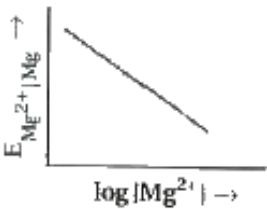
A.



B.



C.



D.

**Answer: B**



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3. Which of the following statement is correct ?

A.  $E_{cell}$  and  $\Delta_r G$  of cell reaction both are extensive properties.

B.  $E_{cell}$  and  $\Delta_r G$  of cell reaction both are specific properties.

C.  $E_{cell}$  is an specific property which  $\Delta_r G$  of cell reaction is an extensive property.

D.  $E_{cell}$  is an extensive property while  $\Delta_r G$  of cell reaction is an specific property.

**Answer: C**



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4. The difference between the electrode potential of two electrodes when no current is drawn though the cell is called \_\_\_\_\_

A. Cell potential

B. Cell emf

C. Potential difference

D. Cell voltage

**Answer: B**

 [View Text Solution](#)

5. Which of the following statement is not correct about an inert electrode is a cell ?

- A. It does not participate in the cell reaction.
- B. It provides surface either for oxidation or for reduction reaction.
- C. It provides surface for conduction of electrons.
- D. It provides surface for redox reaction.

**Answer: D**

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6. An electrochemical cell can behave like an electrolytic cell when \_\_\_\_\_.

A.  $E_{cell} = 0$

B.  $E_{cell} > E_{ext}$

C.  $E_{ext} > E_{cell}$

D.  $E_{cell} = E_{ext}$

**Answer: C**



[View Text Solution](#)

7. Which of the statements about solutions of electrolytes is not correct ?

A. Conductivity of solution depends upon size of ions.

B. Conductivity depends upon viscosity of solution.

C. Conductivity does not depend upon solvation of ions present in solution.



D. Conductivity of solution increases with temperature.

**Answer: C**

 [View Text Solution](#)

8. Using the data given below find out the strongest reducing agent.

$$E_{Cr_2O_7^{2-} | Cr^{3+}}^{\ominus} = 1.33V, E_{Cl_2 | Cl^{-}}^{\ominus} = 1.36V$$

$$E_{MnO_4^{-} | Mn^{2+}}^{\ominus} = 1.51V, E_{Cr^{3+} | Cr}^{\ominus} = -0.74V$$

A.  $Cl^{-}$

B.  $Cr$

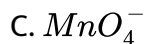
C.  $Cr^{3+}$

D.  $Mn^{2+}$

**Answer: B**

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9. Us the data given in Q.B and find out which of the following is the strongest oxidising agent.

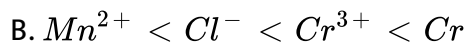
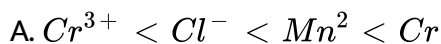


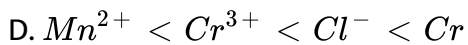
**Answer: C**



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10. Using the data given in Q.8 find out in which option the order of reducing power is correct?

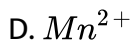




**Answer: B**

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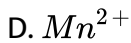
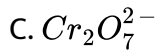
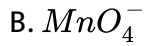
11. Use the data given in q.8 and find out most stable ion is its reduced form.



**Answer: D**

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12. Use the data of Q.8 and find out the most stable oxidised species.



**Answer: A**



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13. The quantity of charge required to obtain one mole of aluminium from

$Al_2O_3$  is \_\_\_\_\_

A. 1F

B. 6F

C. 3F

D. 2F

**Answer: C**

 [View Text Solution](#)

**14.** The cell constant of a conductivity cell \_\_\_\_\_

- A. changes with change of electrolyte
- B. changes with change of concentration of electrolyte
- C. changes with temperature of electrolyte
- D. remains constant for a cell

**Answer: D**

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**15.** Which charging the lead storage battery\_\_\_\_\_.

- A.  $PbSO_4$  anode is reduced to Pb.

B.  $PbSO_4$  cathode is reduced to Pb.

C.  $PbSO_4$  cathode is oxidised to Pb.

D.  $PbSO_4$  anode is oxidised to  $PbO_2$ .

**Answer: A**

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16.  $\Lambda_m^\circ(NH_4OH)$  is equal to \_\_\_\_\_

A.  $\Lambda_m^\circ(NH_4OH) + \Lambda_m^\circ(NH_4Cl) - \Lambda^\circ(HCl)$

B.  $\Lambda_m^\circ(NH_4Cl) + \Lambda_m^\circ(NaOH) - \Lambda^\circ(NaCl)$

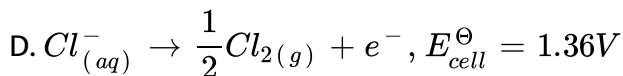
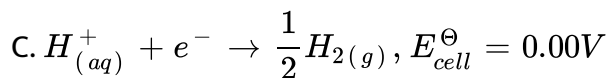
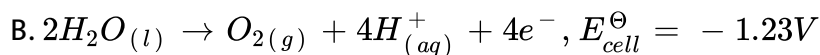
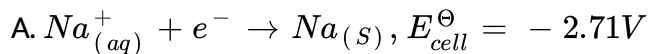
C.  $\Lambda_m^\circ(NH_4Cl) + \Lambda_m^\circ(NaCl) - \Lambda^\circ(NaOH)$

D.  $\Lambda_m^\circ(NaOH) + \Lambda_m^\circ(NaCl) - \Lambda^\circ(NH_4Cl)$

**Answer: B**

 [View Text Solution](#)

17. In the electrolysis of aqueous sodium chloride solution which of the half-cell reaction will occur at anode ?



**Answer: D**



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## Section D Ncert Exemplar Solution Mcq S More Than One Options

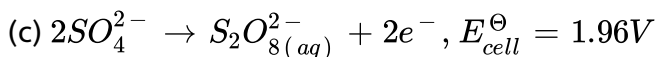
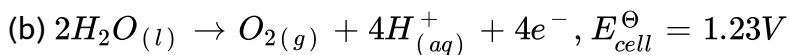
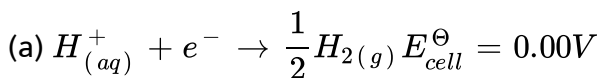
1. The positive value of the standard electrode potential of  $Cu^{2+} / Cu$  indicates that \_\_\_\_

- A. this redox couple is a stronger reducing agent than the  $H^+ / H_2$  couple.
- B. this redox couple is a stronger oxidising agent than  $H^+ / H_2$ .
- C. Cu can displace  $H_2$  from acid.
- D. Cu cannot displace  $H_2$  from acid.

**Answer: B::D**

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2.  $E_{cell}^\ominus$  for some half-cell reactions are given below. On the basis of these mark the correct answer.



A. In dilute sulphuric acid solution, hydrogen will be reduced at cathode.



B. In concentrated sulphuric acid solution, water will be oxidised at anode.

C. In dilute sulphuric acid solution, water will be oxidised at anode.

D. In dilute sulphuric acid solution,  $SO_4^{2-}$  ion will be oxidized to tetrathionate ion at anode.

**Answer: A:C**

 [View Text Solution](#)

3.  $E_{cell}^{\ominus} = 1.1V$  for Daniel cell. Which of the following expression are correct description of state of equilibrium in this cell ?

A.  $1.1 = K_C$

B.  $\frac{2.303RT}{2F} \log K_C = 1.1$

C.  $\log K_C = \frac{2.2}{0.059}$

D.  $\log K_C = 1.1$

**Answer: B::C**

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4. Conductivity of an electrolytic solution depends on ....

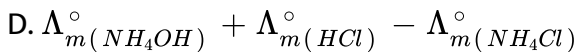
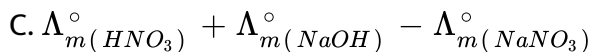
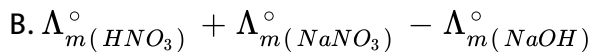
- A. nature of electrolyte.
- B. concentration of electrolyte
- C. power of AC source.
- D. distance between the electrodes.

**Answer: A::B**

 [View Text Solution](#)

5.  $\Lambda_m^\circ(H_2O)$  is equal to \_\_\_\_\_

A.  $\Lambda_m^\circ(HCl) + \Lambda_m^\circ(NaOH) - \Lambda_m^\circ(NaCl)$



**Answer: A::C**

 [View Text Solution](#)

6. What will happen during the electrolysis of aqueous solution of  $CuSO_4$  by using platinum electrodes ?

A. Copper will deposit at cathode.

B. Capper will deposit at anode.

C. Oxygen will be released at anode.

D. Copper will dissolve at anode.

**Answer: A::C**

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7. What will happen during the electrolysis of aqueous solution of  $CuSO_4$  in the presence of Cu electrodes ?

- A. Copper will deposit at cathode.
- B. Copper will dissolve at anode
- C. Oxygen will be released at anode.
- D. Copper will dissolve at anode.

**Answer: A::B**

 [View Text Solution](#)

8. Conductivity  $\kappa$ , equal to \_\_\_\_\_

A.  $\frac{1}{R} \frac{l}{A}$

B.  $\frac{G^*}{R}$

C.  $\Lambda_m$

D.  $\frac{l}{A}$

**Answer: A::B**



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9. Molar conductivity of ionic solution depends on \_\_\_\_\_

- A. Temperature
- B. Distance between electrodes
- C. Concentration of electrolytes in solution
- D. Surface area of electrodes.

**Answer: A::C**



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10. For the given cell,  $Mg|Mg^{2+}||Cu^{2+}|Cu$  \_\_\_\_\_

A. Mg is cathode

B. Cu is cathode

C. The cell reaction is  $Mg + Cu^{2+} \rightarrow Mg^{2+} + Cu$

D. Cu is the oxidising agent

**Answer: B::C**

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## Section D Ncert Exemplar Solution Short Answer Type Questions

1. Can absolute electrode potential of an electrode be measured ?

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2. Can  $E_{cell}^{\ominus}$  or  $\Delta_r G^{\ominus}$  for cell reaction ever be equal to zero ?

 [View Text Solution](#)

3. Under what condition is  $E_{cell} = 0$  or  $\Delta_r G = 0$  ?

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4. What does the negative sign in the expression  $E_{Zn^{2+} | Zn}^{\ominus} = -0.76V$  mean ?

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5. Aqueous copper sulphate solution and aqueous silver nitrate solution are electrolysed separated electrolytic cells. Will the mass of copper and silver deposited on the cathode be same different ? Explain your answer.

 [View Text Solution](#)

6. Depict the galvanic cell in which the cell reaction is :  
 $Cu + 2Ag^+ \rightarrow 2Ag + Cu^{2+}$ .





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7. Value of standard electrode potential for the oxidation of  $Cl^-$  ions is more positive than that of water, even then in the electrolysis of aqueous sodium chloride, why is  $Cl^-$  oxidised at anode instead of water ?



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8. What is electrode potential ?

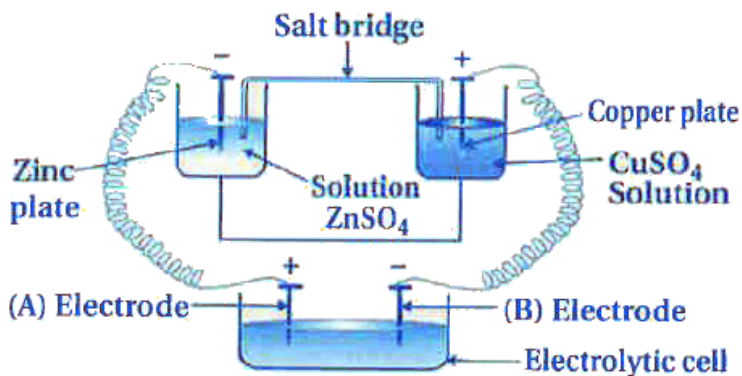


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9. Consider the following diagram in which an electrochemical cell is coupled to an electrolytic cell. What will be the polarity of electrodes A



and B in the electrolytic cell ?



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10. Why is alternating current used for measuring resistance of an electrolytic solution ?

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11. A galvanic cell has electrical potential of 1.1 V. If an opposing potential of 1.1 V is applied to this cell, what will happen to the cell reaction and current flowing through the cell ?

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12. How will the pH of brine (aq. NaCl solution) be affected when it is electrolysed ?

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13. Unlike dry cell, the mercury cell has a constant cell potential throughout its useful life. Why ?

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14. Solutions of two electrolytes 'A' and 'B' are diluted. The  $\Lambda_m$  of 'B' increases 1.5 times while that of A increases 25 times. Which of the two is a strong electrolyte ? Justify your answer.

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15. When acidulated water (dil.  $H_2SO_4$  solution) is electrolysed, will the pH of the solution be affected? Justify your answer.

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16. In an aqueous solution, how does specific conductivity of electrolytes change with addition of water?

 [View Text Solution](#)

17. Which reference electrode is used to measure the electrode potential of other electrodes?

 [View Text Solution](#)

18. Consider a cell given below  $Cu|Cu^{2+}||Cl^-|Cl_2, Pt$ , write the reactions that occur at anode and cathode.



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19. Write the Nernst equation for the  $E_{cell}$  reaction in the Daniell cell. How will the  $E_{cell}$  be affected when concentration of  $Zn^{2+}$  ions is increased ?



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20. What advantage do the fuel cells have over primary and secondary batteries ?



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21. Write the cell reaction of a lead storage battery when it is discharged. How does the density of the electrolyte change when the battery is discharged ?



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22. Why on dilution the  $\Lambda_m$  of  $CH_3COOH$  increases drastically, while that of  $CH_3COONa$  increases gradually?

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### Section D Ncert Exemplar Solution Match The Columns

1. Match the terms given in Column-I with items given in Column-II.

Column-I	Column-II
(A) $\Lambda_m$	(1) $S\text{ Cm}^{-1}$
(B) $E_{\text{cell}}$	(2) $\text{m}^{-1}$
(C) $k$	(3) $S\text{ cm}^2\text{ mol}^{-1}$
(D) $G^*$	(4) $V$

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2. Match the terms given in Column-I with the items given in Column-II.

Column-I	Column-II
(A) $\Lambda_m$	(1) intensive property
(B) $E_{\text{cell}}^\ominus$	(2) depends on number of ions/volume
(C) $k$	(3) extensive property
(D) $\Delta_r G_{\text{cell}}$	(4) increases with dilution

 [View Text Solution](#)

3. Match the items of Column-I and Column-II.

Column-I	Column-II
(A) Lead storage battery	(1) maximum efficiency
(B) Mercury cell	(2) prevented by galvanisation
(C) Fuel cell	(3) gives steady potential
(D) Rusting	(4) Pb is anode, $\text{PbO}_2$ is cathode

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4. Match the items of Column I and Column II.

Column-I	Column-II
(A) $k$	(1) $i \times t$
(B) $\Lambda_m$	(2) $\Lambda_m / \Lambda_m^0$
(C) $\alpha$	(3) $\frac{k}{C}$
(D) $Q$	(4) $\frac{G^*}{R}$

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5. Match the items of Column I and Column II.

Column-I	Column-II
(A) Leclanche cell	(1) cell reaction : $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
(B) Ni-Cd cell	(2) does not involve any ion in solution and is used in hearing aids.
(C) Fuel cell	(3) rechargeable
(D) Mercury cell	(4) reaction at anode, $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$
	(5) converts energy of combustion into electrical energy



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6. Match the items of Column-I and Column-II on the basis of data given below:

$$E_{F_2|F^-}^\ominus = 2.87V, E_{Li^+|Li}^\ominus = -3.5V,$$

$$E_{Au^{3+}|Cu}^\ominus = 1.4V, E_{Br_2|Br^-}^\ominus = 1.09V$$

Column-I	Column-II
(A) $F_2$	(1) metal is the strongest reducing agent
(B) Li	(2) metal ion which is the weakest oxidising agent
(C) $Au^{3+}$	(3) non-metal which is the best oxidising agent
(D) $Br^-$	(4) unreactive metal
(E) Au	(5) anion that can be oxidised by $Au^{3+}$
(F) $Li^+$	(6) anion which is the weakest reducing agent
(G) $F^-$	(7) metal ion which is an oxidising agent



[View Text Solution](#)



1. Assertion: Cu is less reactive than hydrogen.

Reason :  $E_{Cu^{2+}/Cu}^{\ominus}$  is negative.

- A. Both assertion and reason are true and the reason is the correct explanation of assertion.
- B. Both assertion and reason are true and the reason is not the correct explanation of assertion.
- C. Assertion is true but the reason is false.
- D. Both assertion and reason are false.

**Answer: C**



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2. Assertion :  $E_{cell}^{\circ}$  should have a positive value for the cell to function.

Reason :  $E_{Cathode} < E_{Anode}$

- A. Both assertion and reason are true and the reason is the correct explanation of assertion.
- B. Both assertion and reason are true and the reason is not the correct explanation of assertion.
- C. Assertion is true but the reason is false.
- D. Both assertion and reason are false.

**Answer: C**



[View Text Solution](#)

**3. Assertion :** Conductivity of all electrolytes de-creases on dilution.

**Reason:** On dilution number of ions per unit volume decreases.

- A. Both assertion and reason are true and the reason is the correct explanation of assertion.

B. Both assertion and reason are true and the reason is not the correct explanation of assertion.

C. Assertion is true but the reason is false.

D. Both assertion and reason are false.

**Answer: A**

 [View Text Solution](#)

4. Assertion :  $\Lambda_m$  for weak electrolytes shows a sharp increase when the electrolytic solution is diluted.

Reason: For weak electrolytes degree of dissociation increases with dilution of solution.

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

B. Both assertion and reason are true and the reason is not the correct explanation of assertion.

C. Assertion is true but the reason is false.

D. Both assertion and reason are false.

**Answer: A**



[View Text Solution](#)

5. Assertion : Mercury cell does not give steady potential.

Reason : In the cell reaction, ions are not involved in solution.

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

B. Both assertion and reason are true and the reason is not the correct explanation of assertion.

C. Assertion is true but the reason is false.

D. Assertion is false but reason is true

**Answer:**

6. Assertion : Electrolysis of NaCl solution gives chlorine at anode instead of  $O_2$ .

Reason: Formation of oxygen at anode requires over voltage.

- A. Both assertion and reason are true and the reason is the correct explanation of assertion.
- B. Both assertion and reason are true and the reason is not the correct explanation of assertion.
- C. Assertion is true but the reason is false.
- D. Both assertion and reason are false.

**Answer: A**

7. Assertion : For measuring resistance of an ionic solution an AC source is used.

Reason : Concentration of ionic solution will change if DC source is used.

- A. Both assertion and reason are true and the reason is the correct explanation of assertion.
- B. Both assertion and reason are true and the reason is not the correct explanation of assertion.
- C. Assertion is true but the reason is false.
- D. Both assertion and reason are false.

**Answer: A**



[View Text Solution](#)

8. Assertion : Current stops flowing when  $E_{cell} = 0$ .

Reason: Equilibrium of the cell reaction is attained.

- A. Both assertion and reason are true and the reason is the correct explanation of assertion.
- B. Both assertion and reason are true and the reason is not the correct explanation of assertion.
- C. Assertion is true but the reason is false.
- D. Both assertion and reason are false.

**Answer: A**



[View Text Solution](#)

9. Assertion :  $E_{Ag^+ | Ag}^\ominus$  increases with increases in concentration of  $Ag^+$  ions.

Reason :  $E_{Ag^+ | Ag}^\ominus$  has a positive value.

- A. Both assertion and reason are true and the reason is the correct explanation of assertion.

B. Both assertion and reason are true and the reason is not the correct explanation of assertion.

C. Assertion is true but the reason is false.

D. Both assertion and reason are false.

**Answer: B**

 [View Text Solution](#)

**10.** Assertion : Copper sulphate can be stored in zinc vessel.

Reason : Zinc is less reactive than copper.

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

B. Both assertion and reason are true and the reason is not the correct explanation of assertion.

C. Assertion is true but the reason is false.



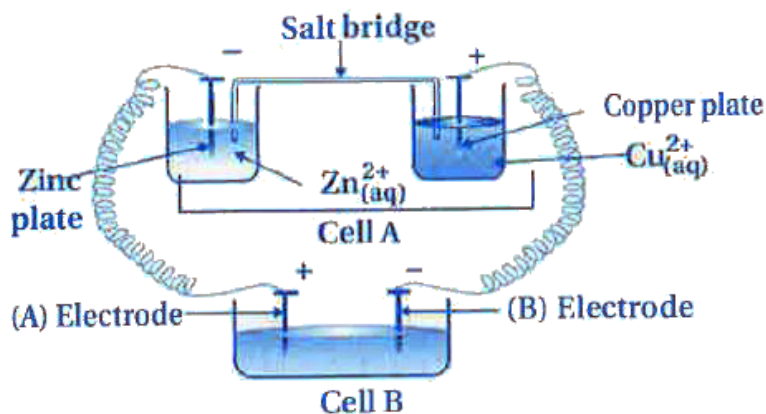
D. Both assertion and reason are false.

Answer: D

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## Section D Ncert Exemplar Solution Long Answer Type Questions

1. Consider the figure and answer the following questions.

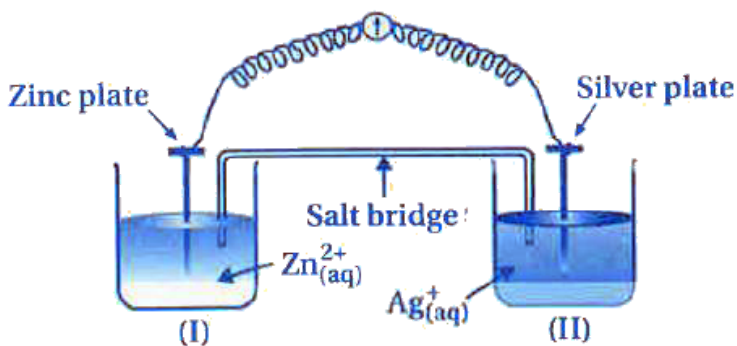


(i) Cell 'A' has  $E_{cell} 2V$  and cell 'B' has  $E_{cell} = 1.1V$  which of the two cells 'A' or 'B' will act as an electrolytic cell. Which electrode reactions will occur in this cell ?

(ii) If cell 'A' has  $E_{cell} = 0.5V$  and cell 'B' has  $E_{cell} = 1.1V$  then what will be the reaction at anode and cathode ?

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2. Consider the figure and answer the questions (i) to (vi) gives below.



- Redraw the diagram to show the direction of electron flow.
- Is silver plate the anode or cathode ?
- What will happen if salt bridge is removed ?
- When will the cell stop functioning ?
- How will concentration of  $Zn^{2+}$  ions and  $Ag^+$  ion be affected when the cell functions ?
- How will the concentration of  $Zn^{2+}$  ions and  $Ag^+$  ions be affected after the cell becomes 'dead' ?



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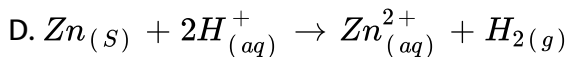
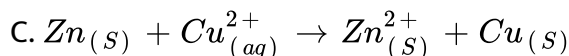
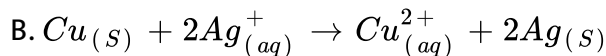
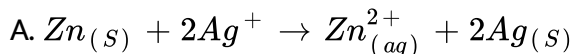
3. What is the relationship between Gibbs free energy of the cell reaction is a galvanic cell and the emf of the cell ? When will the maximum work be obtained from a galvanic cell ?



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### Section E Darpan S Exam Oriented Mcqs

1. Which of the following reaction is of Daniell cell ?



**Answer: C**



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2. Which of the following cell is different in terms of principle ?

- A. Storage cell
- B. Electrolytic cell
- C. Fuel cell
- D. Leclanche cell

**Answer: B**



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3. Which of the following situation is not occur in Daniell cell ?

- A. Increase in weight of Cu plate.
- B. Transformation of current through salt bridge.
- C. Increase in weight of Zn plate.

D. No colour change in  $ZnSO_4$  solution.

**Answer: C**

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4. To measure accurate cell potential of electrode of electrochemical cell, which instrument is used ?

A. Galvanometer

B. Ammeter

C. Potentiometer

D. voltmeter

**Answer: C**

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5. If standard potential of M,N,O,P and Q half cells are in increasing order in standard condition, then on attaching which two half cells will produce maximum potential ?

A. M and N

B. M and Q

C. M and P

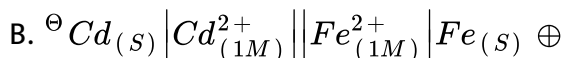
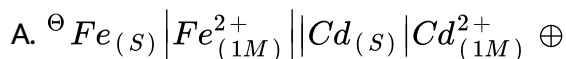
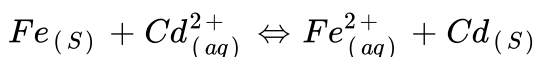
D. M and O

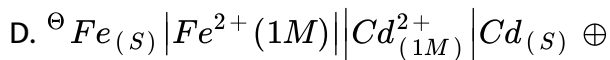
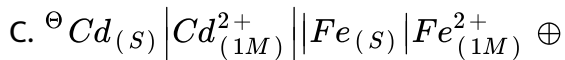
**Answer: B**



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6. What is symbolic representaiton of given following reaction.

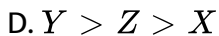
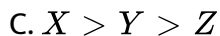
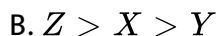
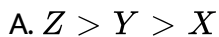




**Answer: D**

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7. Standard reduction potential of metals X, Y and Z are 0.34 V, 0.80 V and -0.45V then give their order of strength of reduction potential.



**Answer: B**

 [View Text Solution](#)

8. Resistance of any equal conductor is . . . .

- A. Inversely proportional to its length
- B. Directly proportional to its length.
- C. Inversely proportional to square of its cross-sectional area.
- D. Directly proportional to its cross-sectional area.

**Answer: B**



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9. Which instrument is used to measure electrical resistance ?

- A. Voltmeter
- B. Wheatstone bridge
- C. Galvanometer
- D. Ammeter



**Answer: B**



[View Text Solution](#)

**10.** At which temperature, ceramic matters are known as super conductor ?

A. 0K

B. 200K

C. 150K

D. 15K

**Answer: C**



[View Text Solution](#)

**11.** If  $l$ =length,  $R$ =resistance and  $A$ =cross sectional area, then . . . .

A.  $R \propto \frac{l}{A}$

B.  $R \propto \frac{A}{l}$

C.  $R \propto \frac{l}{Al}$

D.  $R \propto lA$

**Answer: A**



**View Text Solution**

**12.** Between 0.1 M KCl and 0.1 M NaCl, 0.1 M KCl is least conductor, because

....

A. Size of  $Na^+$  is smaller than  $K^+$ .

B. Size of  $Na^+$  is bigger than  $K^+$ .

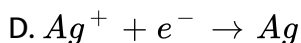
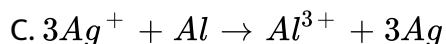
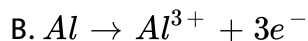
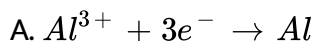
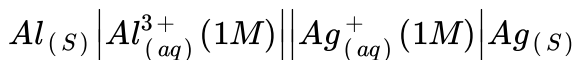
C. Ionization of NaCl is more than KCl.

D. None of above.

**Answer: A**

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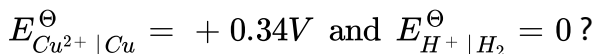
13. Which of the following reaction does not occur in the given galvanic cell.

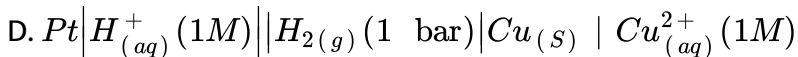
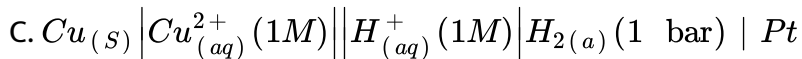
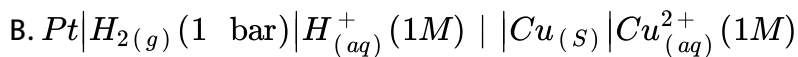
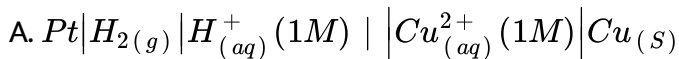


**Answer: A**

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14. Which of the following is true for construct cell by





**Answer: A**

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15. If unknown electrode is on right side and hydrogen electrode on left side of galvanic cell, then hydrogen electrode is . . . .

A. Positive electrode

B. Negative electrode

C. Anode

D. Cathode

**Answer: A::B::C::D**

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16. Galvanic cell is formed by attaching two electrodes by salt bridge in standard condition. Then which of the following is anode electrode ?

- A. Electrodes with high  $E_{cell}^{\ominus}$  value.
- B. Electrodes with less  $E_{cell}^{\ominus}$  value.
- C. Standard hydrogen electrode.
- D. None of above.

**Answer: B**

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17. If galvanic cell is formed by standard hydrogen electrode with by  $E_{Cu^{2+} | Cu}^{\ominus} = + 0.34V$  in standard condition, so what is  $Cu^{2+} | Cu$  electrode ?

- A. Anode electrode, negative electrode
- B. Cathode electrode, positive electrode
- C. None of above
- D. Anode positive electrode

**Answer: B**

 [View Text Solution](#)

**18.** Relation between non standard cell potential and concentration of solution at constant temperature is given by . . . . Scientist.

- A. Faraday
- B. Daniell
- C. Leclanche
- D. Nernst

**Answer: D**



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19.  $AgNO_3$  solution can't be stored in copper vessels, because . . . .

A.  $E_{Ag^+ | Ag}^\ominus > E_{Cu^{2+} | Cu}^\ominus$

B.  $E_{Ag^+ | Ag}^\ominus < E_{Cu^{2+} | Cu}^\ominus$

C.  $E_{Ag^+ | Ag}^\ominus \neq E_{Cu^{2+} | Cu}^\ominus$

D. Ag is precious metal.

**Answer: A**



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20. What is the value of  $\frac{2.303RT}{F}$  at 298K temperature ?

A. 0.0296

B. 0.59

C. 0.0831

D. 0.059

**Answer: D**

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21. When potential of any half cell is measured with respect to hydrogen electrode, then potential of such galvanic cell is known as . . . .

- A. Potential of concentration cell
- B. emf of any cell (Electromotive force)
- C. Zero potential
- D. Steady potential

**Answer: B**

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22. Potential of electrochemical cell does not depend on which of the following ?

- A. Concentration of solution
- B. Temperature
- C. Nature of electrode
- D. Volume of solution

Answer: D



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23. What is the Nernst formula of calculate reduction potential of non standard electrode of  $Zn | Zn^{2+}$ ?

A.  $E_{Zn^{2+} | Zn} = E_{Zn^{2+} | Zn}^{\ominus} - \frac{0.059}{2} \log [Zn^{2+}]$

B.  $E_{Zn^{2+} | Zn} = E_{Zn^{2+} | Zn}^{\ominus} - \frac{0.059}{2} \log \left[ \frac{1}{Zn^{2+}} \right]$

C.  $E_{Zn^{2+} | Zn} = E_{Zn^{2+} | Zn}^{\ominus} + \frac{0.059}{n} \log [Zn^{2+}]$

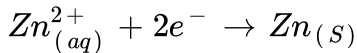
$$D. E_{Zn^{2+} | Zn} = E_{Zn^{2+} | Zn}^{\ominus} + \frac{0.059}{2} \log [Zn^{2+}]$$

Answer: A



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24. What is the correct Nernst formula of calculate potential of reaction



$$A. E_{Zn^{2+} | Zn} = E_{Zn^{2+} | Zn}^{\ominus} - \frac{0.059}{2} \log [Zn_{(aq)}^{2+}]$$

$$B. E_{Zn^{2+} | Zn} = E_{Zn^{2+} | Zn}^{\ominus} - \frac{0.059}{2} \log \frac{1}{[Zn_{(aq)}^{2+}]}$$

$$C. E_{Zn^{2+} | Zn} = E_{Zn^{2+} | Zn}^{\ominus} + \frac{0.059}{2} \log [Zn_{(aq)}^{2+}]$$

$$D. E_{Zn^{2+} | Zn} = E_{Zn^{2+} | Zn}^{\ominus} + \frac{0.059}{2} \log \frac{1}{[Zn_{(aq)}^{2+}]}$$

Answer: A::B::C::D



View Text Solution

25.  $Ni_{(s)} | Ni^{2+}_{(aq)} || Ag^+_{(aq)} | Ag_{(s)}$  is a non-standard cell, in which concentration of ion is less than 1 M, then determine correct formula to calculate potential of non-standard cell.

A.  $E_{cell} = E_{cell}^{\ominus} - \frac{0.059}{2} \log \frac{[Ag^+]}{[Ni^{2+}]}$

B.  $E_{cell} = E_{cell}^{\ominus} - \frac{0.059}{2} \log \frac{[Ni^{2+}]}{[Ag^+]}$

C.  $E_{cell} = E_{cell}^{\ominus} - \frac{0.059}{2} \log \frac{[Ni^{2+}]^2}{[Ag^+]^2}$

D.  $E_{cell} = E_{cell}^{\ominus} - \frac{0.059}{2} \log \frac{[Ni^{2+}]}{[Ag^+]^2}$

**Answer: D**

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26. What is the  $E_{cell}$  value of galvanic cell of redox reactions at equilibrium condition ?

A. More than zero volt

B. Less than zero volt

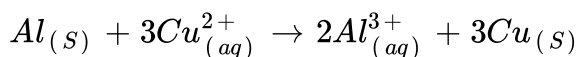
C. Zero volt

D. None of above

**Answer: C**

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27. When redox reaction stops by achieving equilibrium then what will be true for  $E_{cell}^{\ominus}$  of following reaction ?



A.  $E_{cell}^{\ominus} = \frac{0.059}{2} \log \frac{[Al^{3+}]^2}{[Cu^{2+}]^2}$

B.  $E_{cell}^{\ominus} = \frac{0.059}{6} \log \frac{[Al^{3+}]}{[Cu^{2+}]}$

C.  $E_{cell}^{\ominus} = \frac{0.059}{6} \log \frac{[Al^{3+}]^2}{[Cu^{2+}]^3}$

D.  $E_{cell}^{\ominus} = 0.059 \log \frac{[Al^{3+}]^2}{[Cu^{2+}]^{3+}}$

**Answer: C**

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28. For strong reducing agent which of the following is true statement ?

- A. Its reduction potential is less.
- B. Its reduction potential is high.
- C. Its oxidation potential is high
- D. All of above

**Answer: B**



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29. emf value of spontaneous redox reaction will be . . . .

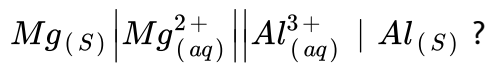
- A. Zero
- B. Negative
- C. Positive

D. none of above

**Answer: C**

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**30.** What is the value of n for



A. 1

B. 2

C. 3

D. 6

**Answer: D**

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31. In electrolytic cell, if  $Cl_2$  gas at anode and  $H_2$  gas at cathode liberated, then in such cell . . . . Solution is present.

- A. Aqueous solution of  $FeCl_3$
- B. Concentrated solution of NaCl
- C. Solution of  $CuCl_2$
- D. Solution of  $ZnCl_2$

**Answer: B**



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32. 0.1 mole Ni is obtained on electrolysis of  $NiSO_4$  solution in neutral solution, how much faraday electricity should be pass through the cell ?

- A. 1F
- B. 0.1 F
- C. 0.2 F

D. 0.01 F

**Answer: C**



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**33.**..... Is measured by Wheatstone bridge.

A. Conductivity

B. Resistance

C. Quantity of electricity

D. emf

**Answer: B**



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**34.** Inversion of resistance is known as:



- A. Conductivity
- B. Resistance
- C. Molar conductivity
- D. Limiting molar conductivity

**Answer: A**

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**35.** Instrument in which fuel energy is converted into electrical energy is known as .....

- A. Voltmeter
- B. Electrochemical cell
- C. electrolytic cell
- D. Fuel cell

**Answer: D**

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36. How much quantity of electricity present on 1 electron in coulomb ?

A.  $6.02 \times 10^{23}$

B.  $6.02 \times 10^{19}$

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

D.  $0.1602 \times 10^{-20}$

**Answer: D**

 [View Text Solution](#)

37. What is the formula showing relation between Gibb's free energy and cell potential ?

A.  $\Delta G^\circ = nF E_{cell}^\ominus$

B.  $\Delta G^\circ = \Delta G^\circ - T\Delta S^\circ$

$$C. \Delta G^\circ = -nF_{E_{cell}^\ominus}$$

$$D. \Delta G^\circ = -KF_{E_{cell}^\ominus}$$

**Answer: C**



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**38.** What is the unit of specific conductivity ?

A. S

B.  $\Omega m$

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

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

**Answer: D**



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39. Which of the following is not conductor ?

A. Cu

B. Glass

C.  $NaCl_{(aq)}$

D. Silicon

**Answer: B**



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40. Conductivity of 1 mol electrolytic solution present between two electrode having unity cross sectional area and unit length is known as . .

..

A. Specific conductivity

B. Specific resistance

C. Limiting molar conductivity

D. Molar conductivity

**Answer: D**

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**41.** Corrosion process is basically which type of process ?

A. Conversion of reaction in presence of  $H_2O$

B. Electrochemical reaction

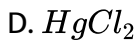
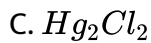
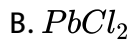
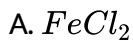
C. Inter reaction

D. Bonding reaction between light metal and heavy metal

**Answer: B**

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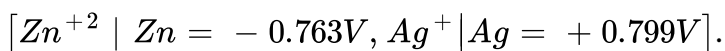
**42.** Which of the following is most corrosive salt chemical ?



**Answer: D**

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**43.** If given are following standard electrodes potential, then find out standard potential of cell.



A. 0.562 V

B. 1.562V

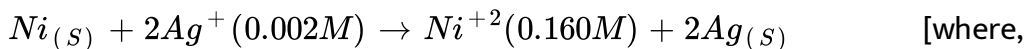
C. 2.560V

D. 1.560V

**Answer: B**

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**44.** Calculate emf of cell for the following reaction.



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

A. 1.9142

B. 9.142

C. 0.9142

D. 91.42

**Answer: C**

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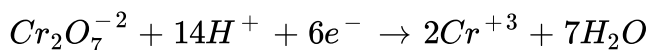
**45.** Why conductivity of solution decreases on dilution ?

- A. Due decrease in number of ions.
- B. Due to increase in number of ions.
- C. Due to number of ions remain constant.
- D. None of the above

**Answer: A**

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**46.** How much current in columb is required to decrease 1 mol of  $Cr_2O_7^{-2}$  from the following reaction ?



- A. 5,80,000 columb
- B. 5,79,500 columb
- C. 5,80,500 columb
- D. 5,79,000 columb



**Answer: D**



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**47.** Give two name of fuels other than hydrogen used in fuel cell.

A. Methane, Carbon monoxide

B. Ethane, Carbon dioxide

C. Methane, Carbon dioxide

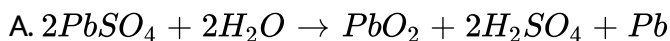
D. Ethane, Carbon monoxide

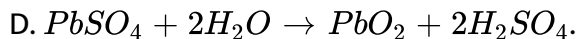
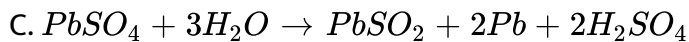
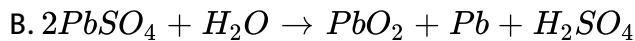
**Answer: A**



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**48.** Write chemical reaction occurred in lead storage cell.





**Answer: A**

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**49.** If conductivity of 0.020 M KCl solution at 298 K temperature is  $0.0248 \text{ S cm}^{-1}$ , then find out its molar conductivity.

A.  $124\Omega^{-1} \text{ cm}^2 \text{ mol}^{-1}$

B.  $224\Omega^{-1} \text{ cm}^2 \text{ mol}^{-1}$

C.  $24\Omega^{-1} \text{ cm}^2 \text{ mol}^{-1}$

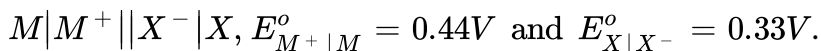
D.  $1.24\Omega^{-1} \text{ cm}^2 \text{ mol}^{-1}$

**Answer: A**

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## Section E Mcq S Asked In Competitive Exam

1. What conclusion can be obtained on the basis of following electrochemical cell



A.  $M^+ + X^- \rightarrow M + X$  is spontaneous reaction

B.  $M + X \rightarrow M^+ + X^-$  is spontaneous reaction

C.  $E_{cell} = 0.11V$

D.  $E_{cell} = -0.11V$ .

**Answer: A**

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2. Reaction :  $2Fe^{3+} + Zn \rightarrow Zn^{2+} + 2Fe^{2+}$ , is carried out in electrochemical cell, then on increasing concentration of  $Fe^{2+}$  what will

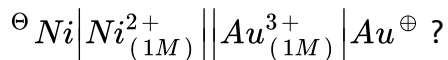
be observed ?

- A. Cell potential increases
- B. Cell potential decreases
- C. Increase in current.
- D. pH of solution decreases

**Answer: B**

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**3. What is cell potential of cell**



$$\left[ E_{\text{Ni}^{2+} | \text{Ni}}^{\circ} = -0.25V, E_{\text{Au}^{3+} | \text{Au}}^{\circ} = 1.5V \right]$$

- A. +1.75V
- B. +1.25V
- C. 3.25V

D.  $-1.75V$

**Answer: A**



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4. What is to be done to stop corrosion of iron metal ?

- A. It should be stored in saltless water
- B. It should be stored in salted water
- C. Iron should be attached with cathode
- D. Iron should be kept as anode

**Answer: C**



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5. Specific conductivity of 0.1 M NaCl aqueous solution is  $1.06 \times 10^{-2} \text{ ohm}^{-1} \text{ cm}^{-1}$ , then what is its molar conductivity in  $\text{ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$  ?

A.  $1.06 \times 10^2$

B.  $1.06 \times 10^3$

C.  $1.06 \times 10^4$

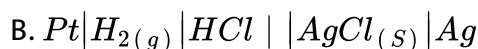
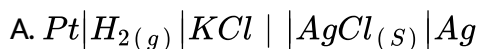
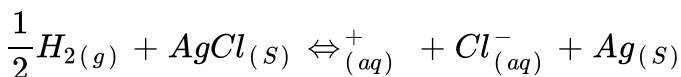
D. 53

**Answer: A**



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6. Which galvanic cell can be obtained by following redox reaction ?





**Answer: B**



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7. What is emf of Daniell cell having 0.1 M  $ZnSO_4$  and 0.01 M  $CuSO_4$  solution ?

$$[E_{Cu}^{\circ} = 0.34V \text{ and } E_{Zn}^{\circ} = -0.76V].$$

A. 1.10V

B. 1.04 V

C. 1.16V

D. 1.07V

**Answer: D**



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8. To reduce 1 mol  $MnO_4^{-1}$  into  $Mn^{2+}$ , how much coulomb electricity is required ?

A. 96500 C

B.  $1.93 \times 10^5 C$

C.  $4.83 \times 10^5 C$

D.  $9.65 \times 10^6 C$

**Answer: C**



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9. How long 10 milliampere current should be passed through dilute aqueous solution of NaCl, so that 0.01 mol  $H_2$  gas can be liberated ? [

$1F = 96500C$ ]

A.  $9.65 \times 10^4 S$



B.  $19.3 \times 10^4 S$

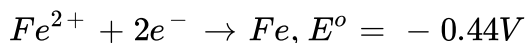
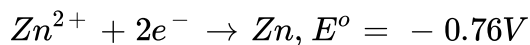
C.  $28.95 \times 10^4 S$

D.  $38.6 \times 10^4 S$

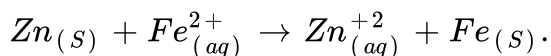
**Answer: B**

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**10.** Standard reduction potential of half-cells are given as follows :



What is the emf of following reactions ?



A.  $- 1.20V$

B.  $+ 1.20V$

C.  $+ 0.32V$

D.  $- 0.32V$

**Answer: C**



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11. Some current should be passed for 2 hours to liberated 0.504 gm  $H_2$  gas. For same time if same current is passed then how much gram of oxygen is liberated ?

A. 2.0 gm

B. 0.4 gm

C. 4.0 gm

D. 8.0 gm

**Answer: C**



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12. Standard emf of 0.59 V of galvanic cell in which 3 mole electron taking part in redox reaction. So for such reaction find out value of equilibrium constant ?

A.  $10^{25}$

B.  $10^{20}$

C.  $10^{15}$

D.  $10^{30}$

**Answer: D**



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13. How much Pt is deposited on cathode when 0.80F current is pass through 1.0 M solution of  $Pt^{4+}$  ?

A. 1.0 mole

B. 0.20 mole

C. 0.40 mole

D. 0.80 mole

**Answer: B**

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14. What is the ratio of Al, Cu and Na when 3F current is pass through different electrolytic solution of molten  $Al_2O_3$ , aqueous  $CuSO_4$  and molten NaCl ?

A. 3 : 4 : 6

B. 2 : 1 : 6

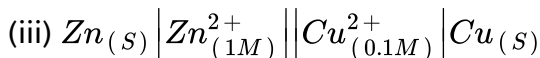
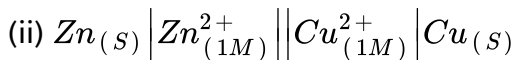
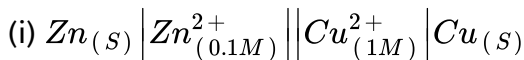
C. 3 : 2 : 1

D. 2 : 3 : 6

**Answer: D**

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15. Three galvanic cell having negative emf of  $E_1$ ,  $E_2$  and  $E_2$  are given as follows :



A.  $E_2 > E_1 > E_3$

B.  $E_1 > E_2 > E_3$

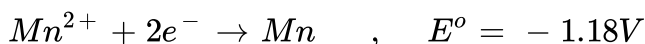
C.  $E_3 > E_1 > E_2$

D.  $E_3 > E_2 > E_1$ .

**Answer: B**

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16. Standard reduction potential of following reactions is given below :



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

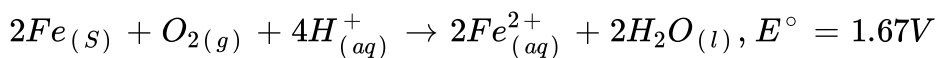
then what is the redox potential of reaction  $Mn^{3+} + 3e^{-} \rightarrow Mn$  ?

- A.  $0.33V$
- B.  $1.69V$
- C.  $-0.28V$
- D.  $-0.85V$

**Answer: C**

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**17. Cell reaction :**



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

- A.  $1.47V$
- B.  $1.77V$

C. 1.87 V

D. 1.57 V

**Answer: D**



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18. Two electrolytic cell are attached in series and current is passing through them. First electrolytic cell  $X(NO_3)_{3(aq)}$  and second electrolytic cell posses  $Y(NO_3)_2$  and molecular mass of X and Y are 1:2 respectively.

Hence what is the ratio of lierated mass ?

A. 3:2

B. 1:2

C. 1:3

D. 3:1

**Answer: C**



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19. Statement (A): Determination of cathode and anode is done with the help of thermometer.

Reason (R) : High and less value of reduction potential is strong reducing agent.

- A. Both statement and reasons are true. And reason is correct explanation of statement.
- B. Both statement and reasons are true, but reason is not the correct explanation of statement.
- C. But reason is not correct explanation of statement. (Statement is true but reason is false).
- D. Statement is false but reason is true.

**Answer: D**





20. Statement (A) : Zinc will free Cu metal from copper sulphate solution.

Reason (R) : At 288 K temperature,

$$E_{Zn^{2+} | Zn}^{\circ} = - 0.76 \text{ volt and } E_{Cu^{2+} | Cu}^{\circ} = 0.34 \text{ Volt}$$

- A. Both statement and reasons are true. And reason is correct explanation of statement.
- B. Both statement and reasons are true, but reason is not the correct explanation of statement.
- C. But reason is not correct explanation of statement. (Statement is true but reason is false).
- D. Statement is false but reason is true.

**Answer: A**



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21. Statement (A) : Corrosion of galvanized iron is not possible.

Reason (R) : Electrode potential of zinc is more negative than of iron.

A. Both statement and reasons are true. And reason is correct explanation of statement.

B. Both statement and reasons are true, but reason is not the correct explanation of statement.

C. But reason is not correct explanation of statement. (Statement is true but reason is false).

D. Statement is false but reason is true.

**Answer: A**



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22. To thin coat of silver on metal surface of  $80\text{cm}^2 \times 5 \times 10^{-3}\text{cm}$ , how long current of 3 ampere should be passed from silver nitrate solution

(Density  $1.05 \text{ gm cm}^{-3}$ ) ?

- A. 115 second
- B. 125 second
- C. 135 second
- D. 145 second

**Answer: B**



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23. Hydrofluoric acid is a weak acid. Molar conductivity of 0.02 M HF solution at  $25^\circ \text{C}$  is  $176.2 \Omega^{-1} \text{ cm}^2 \text{ mol}^{-1}$ . If its  $\Lambda^\circ m = 405 \Omega^{-1} \text{ cm}^2 \text{ mol}^{-1}$ , then find out its equilibrium constant at given concentration.

- A.  $6.7 \times 10^{-4} M$
- B.  $3.2 \times 10^{-4} M$
- C.  $6.4 \times 10^{-5} M$

D.  $3.2 \times 10^{-5} M$

**Answer: A**



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24. In a factory, 40 kg of calcium is produced in 2 hours. If capacity of flow of current is 50%, then how much aluminium can be obtained by passing same current for 2 hours ?

A. 22 kg

B. 18 kg

C. 9 kg

D. 27 kg

**Answer: B**



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1. Molar conductivity of  $Ba^{2+}$  and  $Cl^{-1}$  ions present in aqueous solution of  $BaCl_2$  are  $127.32\text{ S cm}^2\text{mol}^{-1}$  and  $76.34\text{ S cm}^2\text{mol}^{-1}$  respectively, then what is  $\Lambda_m$  of  $BaCl_2$  solution ?

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

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

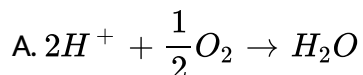
C.  $90.98\text{ S cm}^2\text{mol}^{-1}$

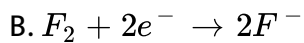
D.  $203.6\text{ S cm}^2\text{mol}^{-1}$

**Answer: A**

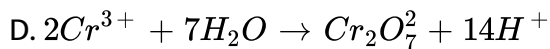
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2. Which of the following reaction is possible at anode ?





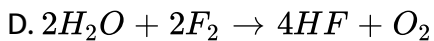
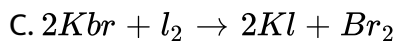
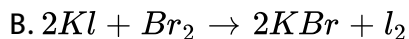
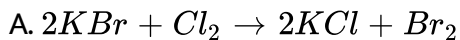
C. Both (A) and (B)



**Answer: D**

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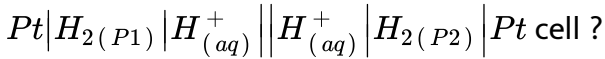
**3. Which of the following reaction is not possible ?**



**Answer: C**

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4. What is emf of



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

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

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

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

**Answer: B**



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5. If emf of standard cell during cell reaction is 0.295 V at 298 K and  $n=2$ , then what is the equilibrium constant of such reaction ?

$$[F = 96500, \quad R = 8.314 \text{ KJ}^{-1} \text{ mol}^{-1}]$$

A.  $4.0 \times 10^{12}$

B.  $1.0 \times 10^2$

C.  $1.0 \times 10^{10}$

D.  $2.0 \times 10^{11}$

**Answer: C**

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6. Emf of given Daniell cell at 298 K is  $E_1$ .  
 $Zn|ZnSO_4(0.01M)||CuSO_4(1.0M)|Cu$ . The emf changed to  $E_2$  when concentration of  $ZnSO_4$  solution is 1.0 M and  $CuSO_4$  solution is 0.01 M, then what is the relation between  $E_1$  and  $E_2$  ?

A.  $E_1 > E_2$

B.  $E_1 < E_2$

C.  $E_1 = E_2$

D.  $E_2 = 0 \neq E_1$

**Answer: A**

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7. How much gm of Ag is obtained on cathode by passing 9650 Coulomb electricity through aqueous solution of  $AgNO_3$  using inert electrode ?

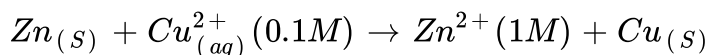
$$(Ag = 108 \text{ gm mol}^{-1})$$

- A. 108 gm
- B. 10.8 gm
- C. 1.08 gm
- D. 32.4 gm

**Answer: B**

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8. If  $E_{cell}^\circ$  of electrochemical cell = 1.1 V for possessing following chemical reaction, then what is  $E_{cell}$  ?



A. 2.12 V

B. 1.8 V

C. 1.07 V

D. 0.84 V

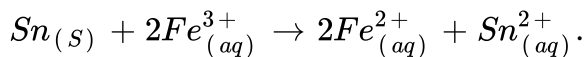
**Answer: C**

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9.  $E^\circ$  value of following half-cell in standard conditions are given as follows :

$\left[ E^\circ_{Fe^{3+} | Fe^{2+}} = 0.77V, E^\circ_{Sn^{2+} | Sn} = -0.14V \right]$  by using such value

calculate potential of given reaction ?



A. 0.91V

B. 1.40V

C. 1.68V

D. 0.63V

**Answer: A**



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10. If  $E^\circ$  value of given cell is 1.1 V at 298 K temperature, then what is the value of equilibrium constant ?

A.  $10^{-37}$

B.  $10^{-37}$

C.  $10^{-73}$

D.  $10^{73}$

**Answer: B**



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11.

If

 $\lambda_{ClCH_2COONa} = 224.0 \text{ ohm}^{-1} \text{ cm}^2 \text{ gm}^{-1} \text{ equ}^{-1}$ ,  $\lambda_{NaCl} = 38.2 \text{ ohm}^{-1} \text{ cm}^2 \text{ gm}^{-1} \text{ equ}^{-1}$ and  $\lambda_{HCl} = 203.0 \text{ ohm}^{-1} \text{ cm}^2 \text{ gm}^{-1} \text{ equ}^{-1}$ , then what is the value of $\lambda_{ClCH_2COOH}$ ?

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

B.  $289.5 \text{ ohm}^{-1} \text{ cm}^2 \text{ gm}^{-1} \text{ equ}^{-1}$

C.  $388.5 \text{ ohm}^{-1} \text{ cm}^2 \text{ gm}^{-1} \text{ equ}^{-1}$

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

**Answer: C**[View Text Solution](#)

12. What is true for spontaneity of cell ?

A.  $\Delta G = 0, \Delta H = 0$

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

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

D.  $\Delta G = -ve$

**Answer: D**



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13. On combustion of hydrogen in hydrogen fuel cell ...

A. More pure water generated.

B. Potential difference produced between two electrodes.

C. More heat is produced.

D. Not given

**Answer: B**



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14. The values of  $E_{M^{3+}/M^{2+}}^{\circ}$  of metals Cr, Mn, Fe and Co are -0.41, 0.57, +0.77 and +1.97 respectively. Then whose oxidation state easily converted into +2 to +3 ?

A. Cr

B. Mn

C. Fe

D. Co

**Answer: A**



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15. 4.5 gm of aluminium (atomic mass 27 amu) get deposited on cathode by passing fixed amount of electricity through  $Al^{3+}$  solution. So what is the volume of hydrogen gas at STP by passing same amount of electricity through  $H^+$  solution.

A. 44.8 L

B. 22.4 L

C. 11.2 L

D. 5.6 L

**Answer: D**



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**16.** Which elements can be obtained as anode mud in purification reaction of copper by electrolysis ?

A. Al, Ni

B. Ag, Au

C. Sn, Pb

D. Pb, Ni

**Answer: B**

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17. Which of the following aqueous solution has maximum conductivity ?

- A. 0.01 M difluoroacetic acid
- B. 0.01 M fluoro acetic acid
- C. 0.01M chloro acetic acid
- D. 0.01 M acetic acid

**Answer: A**

 [View Text Solution](#)

18. What is the values of  $\Delta G$ , equilibrium constant K and  $E_{cell}^{\circ}$  for the spontaneous reaction

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



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

D.  $-ve, < 1, -ve$

**Answer: B**



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19. If  $\Lambda_{NaOAc}^{\circ} = 91$  and  $\Lambda_{HCl}^{\circ} = 496.2 \text{ S cm}^2\text{mol}^{-1}$  then what is required to find out  $\Lambda_{HOAc}^{\circ}$  ?

A.  $\Lambda_{ClCH_2COOH}$

B.  $\Lambda_{CH_3COOH}$

C.  $\lambda_{H^+}^{\circ}$

D.  $\Lambda_{NaCl}^{\circ}$

**Answer: D**



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20. State required quantity of electricity to produce 5.12 kg of Al. (atomic weight of Al=27 gm  $mol^{-1}$ )

A.  $1.83 \times 10^6$  coulomb

B.  $5.49 \times 10^5$  Coulomb

C.  $1.83 \times 10^7$  Coulomb

D.  $5.49 \times 10^7$  coulomb

Answer: D



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21. If  $E_{(Fe^{2+} | Fe)}^{\circ} = -0.441V$  and  $E_{(Fe^{3+} | Fe^{2+})}^{\circ} = 0.771V$ , then what is emf for following reaction ?  $[Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}]$ .

A. 1.653

B. 1.212 V

C. 0.111 V

D. 0.330 V

**Answer: B**



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22. Capacity of fuel cell is . . . . .

A.  $\frac{\Delta G}{\Delta S}$

B.  $\frac{\Delta G}{\Delta H}$

C.  $\frac{\Delta S}{\Delta G}$

D.  $\frac{\Delta H}{\Delta G}$

**Answer: B**



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23.

If

$$\Lambda^{\circ} CH_3COONa = 91 \text{ S cm}^2 \text{ mol}^{-1}, \quad \Lambda^{\circ} HCl = 462.2 \text{ S cm}^2 \text{ mol}^{-1}$$

, then choose correct option to determine  $\Lambda^{\circ} CH_3COOH$ .

A.  $\lambda^{\circ} Cl^{-}$

B.  $\Lambda^{\circ} NaCl$

C.  $\Lambda^{\circ} H^{+}$

D.  $\Lambda^{\circ} ClCH_2COOH$

**Answer: B**



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24. Reaction :



equilibrium constant for this reaction ? ( $E^{\circ} = 0.46V$  at  $298K$

Temperature).

A.  $2.0 \times 10^{10}$

B.  $4.0 \times 10^{10}$

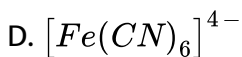
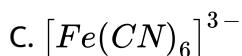
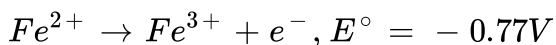
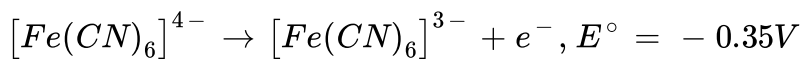
C.  $4.0 \times 10^{15}$

D.  $2.4 \times 10^{10}$

**Answer: C**

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**25.** Which is the strong oxidizing agent on the basis of  $E^\circ$  value by following value :



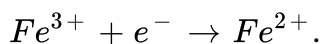
**Answer: B**



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**26.** What is the electrode potential for following reaction ?

$$E_{Fe^{+3}|Fe}^{\circ} = -0.036V, E_{Fe^{2+}|Fe}^{\circ} = -0.439V$$



A.  $-0.072V$

B.  $0.385V$

C.  $0.770V$

D.  $-0.270V$

**Answer: C**



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27. Reduction of  $Al_2O_3$  is occurred at low potential and high current through electrolysis. If  $4.0 \times 10^4$  ampere current is pass through molten  $Al_2O_3$  solution for 6 hours then how much aluminium is obtained ?

(atomic mass of aluminium is 27 gm/mol at 100% efficiency)

A.  $8.1 \times 10^4 gm$

B.  $2.4 \times 10^5 gm$

C.  $1.3 \times 10^4 gm$

D.  $9.0 \times 10^3 gm$

**Answer: A**

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28. Equivalent conductivity of dilute monovalent acidic solution  $\frac{M}{32}$  is 8.0 mol  $cm^2$  and at infinite dilution equivalent conductivity is 400 mol  $cm^2$  then the dissociation constant for acid is

A.  $1.25 \times 10^{-6}$

B.  $6.25 \times 10^{-4}$

C.  $1.25 \times 10^{-4}$

D.  $1.25 \times 10^{-5}$

**Answer: D**

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**29.** Increase in equivalent conductivity of strong electrolyte increase on dilution is due to . . . . Reasons.

A. Increase in kinetic of ionic moveemtn of ions

B. 100% ionization of electyrolYTE occur at usual dilution.

C. Both increases. E.g., increase in numbers and kinetics of ions.

D. Increase in numbers of ions.

**Answer: A**



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30. If pH of hydrogen electrode is 10, then what is the potential of it ...

- A. 0.59 V
- B. 0.00 V
- C.  $-0.59V$
- D.  $-0.059V$

**Answer: C**

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31. If reduction of silver ion on copper electrode is carried out at 298K temperature and having standard potential is +0.46 V, then what is the value of standard free energy ( $\Delta G^\circ$ ) ?

- A.  $-44.5kJ$

B.  $-98.0kJ$

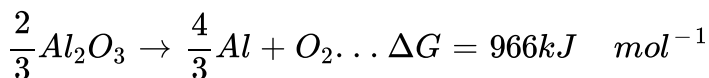
C.  $-89.0kJ$

D.  $-89.0J$

**Answer: C**

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**32.** If decomposition of  $Al_2O_3$  at  $500\text{ }^\circ C$  temperature gives following reaction and gives Gibb's free energy :



then what is the difference of minimum required electrical energy for the reduction of  $Al_2O_3$  by electrolysis ?

A. 5.0V

B. 4.5V

C. 2.5V

D. 3.0V

**Answer: C**



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**33.** When standard half-cell reduction potential of hydrogen would be negative ?

A.  $p(H_2) = 2$  atmosphere and  $[H^+] = 1.0M$

B.  $p(H_2) = 2$  atmosphere and  $[H^+] = 2.0M$

C.  $p(H_2) = 1$  atmosphere and  $[H^+] = 2.0M$

D.  $p(H_2) = 1$  atmosphere and  $[H^+] = 1.0M$

**Answer: A**



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**34.** Standard electrode potential of three metals x,y and z are -1.2 V,+0.5 V and -3.0 V. The order of reducing agent of three metals are ...

A.  $y > z > x$

B.  $y > x > z$

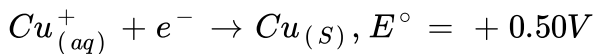
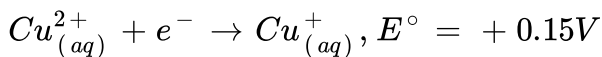
C.  $z > x > y$

D.  $x > y > z$

**Answer: C**

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**35.** Electrode potential is,



then what is the value of  $E_{\text{Cu}^{2+}|\text{Cu}}^{\circ}$  ?

A. 0.550V

B. 0.325 V

C. 0.650 V

D. 0.150V

**Answer: B**



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36. One solution contains  $Fe^{2+}$ ,  $Fe^{3+}$  and  $I^-$  ions. Such solution is reacted with iodine solution at  $35^\circ C$ . If  $E^\circ$  of  $Fe^{3+} / Fe^{2+}$  is  $+0.77V$  and for  $I_2 / 2I^-$ ,  $E^\circ = 0.535V$ . So what is probable redox reaction ?

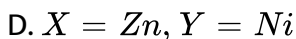
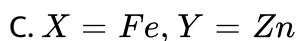
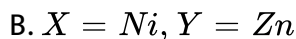
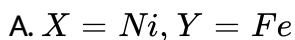
- A.  $I^-$  will be reduced in  $I_2$
- B. There will be no redox reaction.
- C.  $I^-$  will be oxidized in  $I_2$
- D.  $Fe^{2+}$  will be oxidized in  $Fe^{3+}$ .

**Answer: C**



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37. Standard reduction potential of  $Zn^{2+} / Zn$ ,  $Ni^{2+} / Ni$  and  $Fe^{2+} / Fe$  are  $-0.76\text{ V}$ ,  $-0.23\text{ V}$  and  $-0.44\text{ V}$  respectively. So in which condition reaction  $X + Y^{2+} \rightarrow Y + X^{2+}$  would be spontaneous ?



**Answer: D**

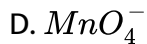
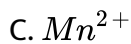
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38. Given,  $E^0_{Cr^{3+} / Cr} = -0.74\text{V}$ ,  $E^0_{MnO_4^- / Mn^{2+}} = 1.51\text{V}$ ,

$E^0_{Cr_2O_7^{2-} / Cr^{3+}} = 1.33\text{V}$ ,  $E^0_{Cl / Cl^-} = 1.36\text{V}$ , from above given information

decide which is strong oxidizing agent ?





**Answer: D**

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**39.** Resistance of 0.2 M electrolytic solution is  $50\Omega$ . And its specific conductivity is  $1.4 \text{ S m}^{-1}$ . If specific resistance of 0.5 M same electrolytic solution is  $280\Omega$ . Then what is the molar conductivity of 0.5 M electrolytic solution in  $\text{S m}^2$ ?

A.  $5 \times 10^3$

B.  $5 \times 10^2$

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

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

**Answer: B**

 [View Text Solution](#)

40. Equivalent conductivity and infinite dilution of NaCl at C concentration is  $\lambda_C$  and  $\lambda_\infty$  respectively. So, for  $\lambda_C$  and  $\lambda_\infty$ , which relation is true ? (where, constant B is solid).

A.  $\lambda_C = \lambda_\infty (B)\sqrt{c}$

B.  $\lambda_C = \lambda_\infty + (B)\sqrt{c}$

C.  $\lambda_C = \lambda_\infty + (B)C$

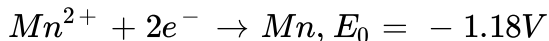
D.  $\lambda_C = \lambda_\infty - (B)C$

**Answer: A**

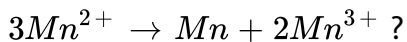
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41. Half-cell reactions are given below :



$2(Mn^{3+} + e^{-} \rightarrow Mn^{2+}), E_0 = +1.51V$  then what is  $E_0$  for



- A.  $-0.33V$ , no reaction
- B.  $-0.33V$ , reaction can be possible
- C.  $-2.69V$ , no reaction
- D.  $-2.69V$ , no reaction

Answer: A::B::C



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42. Which of the following metal does not obtained by electrolysis of its aqueous salt solution ?

- A. Ag

B. Ca

C. Cu

D. Cr

**Answer: B**

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**43.** How much electric charge is required for complete oxidation of 0.1 mole of  $MnO_4^{2-}$  ?

A. 96500 C

B.  $2 \times 96500C$

C. 9650C

D. 96.50C

**Answer: C**

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44. 5600 ml of  $O_2$  is obtained by electrolysis at STP, then how much Ag is obtained by same electricity ? (atomic mass of Ag=108)

- A. 5.4gm
- B. 10.8gm
- C. 54.0gm
- D. 108.0gm

**Answer: D**

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45. If 2 faraday current is pass through  $CuSO_4$  solution then find out how much copper can be deposited on cathode ? [Cu=63.5 gm mole<sup>-1</sup>]

- A. 0 gm
- B. 2 gm

C. 63.5 gm

D. 127 gm

**Answer: C**

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**46.** Which of the following aqueous solution is ideal for conductivity of current ?

A. Ammonia,  $NH_3$

B. Fructose,  $C_6H_{12}O_6$

C. Acetic acid,  $C_2H_6O_2$

D. Hydrochloric acid, HCl

**Answer: D**

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47. The instrument in which combustion energy of fuel like hydrogen and methane is directly converted to electrical energy is known as ...

- A. Fuel cell
- B. Electrolytic cell
- C. Dynamo
- D. Ni-Cd cell

**Answer: A**



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48. In which of the following reaction oxidation of iron is not possible ?

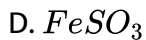
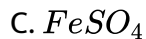
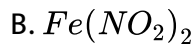
- A. Reaction in which rusting of iron plates.
- B. Removal of colour of  $CuSO_4$  solution by iron
- C. Liberation of  $H_2$  gas from water vapour by iron at high temperature.

D. Production of  $Fe(CO)_5$  from Fe.

**Answer: D**

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49. Which of the following compound require least amount of acidic  $KMnO_4$  for complete oxidation of its 1 mole ?



**Answer: C**

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50. Specific conductivity of  $0.5 \text{ mol/dm}^3 \text{ AgNO}_3$  solution at 298 K temperature is  $5.76 \times 10^{-3} \text{ S cm}^{-1}$ , then molar conductivity is ...

- A. 0.086
- B. 28.8
- C. 2.88
- D. 11.52

**Answer: D**



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51. How long 3 ampere current should be pass to obtain 0.1 mol  $\text{Cl}_2$  gas through electrolysis of molten NaCl ?

- A. 220 minute
- B. 330 minute
- C. 55 minute

D. 110 minute

Answer: D

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52. If for any given reaction if  $E_{cell}^{\circ}$  value is negative, then choose correct option for  $\Delta G^{\circ}$  and K.

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: C

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53. Number of electrons liberated on cathode by passing 1 ampere current for 60 second during electrolysis is . . . .(Charge on electron =  $1.60 \times 10^{-19} C$ )

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

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

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

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

**Answer: A**



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54. At 298 K temperature, how much pressure of  $H_2$  is required to make hydrogen electrode potential of pure water be zero ?

A.  $10^{-12}$  atm

B.  $10^{-10}$  atm

C.  $10^{-4}$  atm

D.  $10^{-14}$  atm

**Answer: D**

 [View Text Solution](#)

55. Which of the following is used as layer in galvanization ?

A. Pb

B. Cr

C. Cu

D. Zn

**Answer: D**

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56. For given,

$$E_{Cl_2/Cl^-}^\circ = 1.36V, E_{Cr^{3+}/Cr}^\circ = -0.74V$$

$$E_{Cr_2O_7^{2-}/Cr^{3+}}^\circ = 1.33V, E_{MnO_4^-/Mn^{2+}}^\circ = 1.51V$$

then which of the following is strongest reducing agent ?

A. Cr

B.  $Mn^{2+}$

C.  $Cr^{3+}$

D.  $Cl^-$

**Answer: A**



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57. Find out molar conductivity of AgCl at infinite dilution. Given,

$$\Lambda_m^\alpha = 133.4(AgNO_3), \Lambda_m^\alpha = 149.9(KCl),$$

$$\Lambda_m^\alpha = 144.9 \text{ S cm}^2\text{mol}^{-1}(KNO_3).$$

A.  $140 \text{ S cm}^2 \text{ mol}^{-1}$

B.  $138 \text{ S cm}^2 \text{ mol}^{-1}$

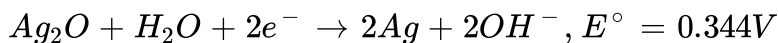
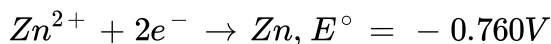
C.  $134 \text{ S cm}^2 \text{ mol}^{-1}$

D.  $132 \text{ S cm}^2 \text{ mol}^{-1}$

**Answer: B**

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**58.** In electronic watch zinc/silver oxidation cell is used, which gives following reactioni :



If  $F=96500 \text{ C mol}^{-1}$  then find out  $\Delta G^{\circ}$  of cell.

A.  $113.072 \text{ kJ mol}^{-1}$

B.  $213.072 \text{ kJ mol}^{-1}$

C.  $313.082 \text{ kJ mol}^{-1}$

D.  $413.021 \text{ kJ mol}^{-1}$

**Answer: B**

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59. How long 100 amp current should be pass for electrolysis of water which liberate oxygen which is sufficient for complete combustion of 27.66 gm diborane ? (atomic weight of B=10.8 u)

A. 6.4 hours

B. 0.8 hours

C. 3.2 hours

D. 1.6 hours

**Answer: C**

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60. Cell potential of

$Pt_{(s)} | H_2(g, 1 \text{ bar}) | HCl_{(aq)} | AgCl_{(s)}$  is 0.92 V.

Concentration of HCl solution is  $10^{-6}$  molal, then find out standard potential of  $(AgCl/AgCl^-)$  electrode. (at 298K temperature,  $\left(\frac{2.303RT}{F} = 0.06V\right)$ ).

A. 0.94 V

B. 0.20 V

C. 0.76 V

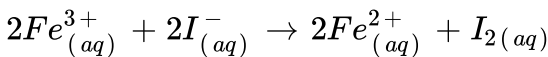
D. 0.40 V

Answer: B



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61. For the cell reaction



$E_{cell}^{\ominus} = 0.24V$  at 298K. The standard Gibbs energy  $(\Delta_r G^{\ominus})$  of the cell

reaction is :

[Given that Faraday constant  $F=96500 \text{ C mol}^{-1}$ ]

A.  $23.16 \text{ kJ mol}^{-1}$

B.  $-46.32 \text{ kJ mol}^{-1}$

C.  $-23.16 \text{ kJ mol}^{-1}$

D.  $46.32 \text{ kJ mol}^{-1}$

**Answer: B**



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62. Given that the standard potential,  $E^\circ$  of  $\text{Cu}^{2+} | \text{Cu}$  and  $\text{Cu}^+ | \text{Cu}$  are 0.340 V and 0.522 V respectively. The  $E^\circ$  of  $\text{Cu}^{2+} | \text{Cu}^+$  is:

A. 0.158 V

B.  $-0.158 \text{ V}$

C. 0.182 V

D.  $-0.182V$

Answer: A

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63. What will be the electrode potential for the given half cell reaction at pH=5 ?



( $R = 8.314 \text{ J mol}^{-1}K^{-1}$ , temp.=298 K, oxygen under std. atm. Pressure of 1 bar.)

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## Section E Mcq S Asked In Gujcet Board Exam

1. If for  $Ag|Ag^+_{(0.01M)}||Ag^+_{(0.1M)}|Ag$ , cell  $E^\circ_{Ag^+|Ag} = 0.80V$ , then ...

A.  $E^\circ_{cell} = 0.80V$



B.  $E_{cell} = 0.0296V$

C. Cell will not work as both electrodes are same

D.  $E_{cell} = 0.059V$

**Answer: D**

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2. If  $Fe|Fe^{2+}(xM)||Cu^{2+}(0.01M)|Cu$  has cell potential of 0.78V then

$x = \dots$

$$E_{Fe^{2+}/Fe}^{\circ} = -0.44V, E_{Cu^{2+}/Cu}^{\circ} = +0.34V).$$

A.  $x > 0.01M$

B.  $x = 0.01M$

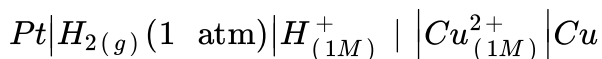
C.  $x < 0.01M$

D. No prediction regarding x

**Answer: B**

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3. At  $25^\circ\text{C}$  temperature, if for given unknown half cell has 0.34 Volt potential, then calculate standard reduction potential for copper :



A.  $-0.34$  Volt

B.  $-3.4$  Volt

C.  $+0.34$  Volt

D.  $+3.4$  Volt

**Answer: C**

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4. Resistance of 1 N  $\text{CH}_3\text{COOH}$  is 250 ohm. This conductive cell has constant value of  $1.15 \text{ cm}^{-1}$ , then what is equivalent conductivity of 1N  $\text{CH}_3\text{COOH}$  ? ( $\text{Ohm}^{-1} \text{ cm}^2 \text{ equ}^{-1}$ ).

A. 18.4

B. 4.6

C. 9.2

D. 2.3

**Answer: B**



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### 5. Electrochemical cell

$Mg_{(s)} \mid Mg_{(aq)}^{2+} (xM) \parallel Fe^{2+} (0.01M) \mid Fe_{(l)}$  has electric charge of 1.92 V

then  $x = \dots M$

$$E_{Mg \mid Mg^{2+}}^{\circ} = 2.37V, E_{(Fe \mid Fe^{2+})}^{\circ} = 0.45V$$

A.  $x < 0.01M$

B.  $x = 0.01M$

C.  $x > 0.01M$

D. No prediction regarding x

**Answer: B**

 [View Text Solution](#)

6. Which of the following relation is true for standard gibbs free energy change ( $\Delta G^\circ$ ) and equilibrium constant  $K_p$ ?

A.  $K_p = e^{-\Delta G^\circ / RT}$

B.  $K_p = -RT \ln \Delta G^\circ$

C.  $K_p = \left(\frac{e}{RT}\right)^{\Delta G^\circ}$

D.  $K_p = \frac{\Delta G^\circ}{RT}$

**Answer: A**

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7. If 2.7 gm aluminum metal is deposited on electrodes when two different electrolytic cell having molten  $Cu(NO_3)_2$  and  $Al(NO_3)_3$

respectively are arranged in series, then how much copper metal is produced ? ( $Cu = 63.5$ ,  $Al = 27.0 \text{ gm mol}^{-1}$ ).

A. 9.525 gm

B. 31.75 gm

C. 63.5 gm

D. 190.5 gm

**Answer: A**



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8. If electrolysis of aqueous solution of  $CuSO_4$  is carried out using graphite electrode, then what is the pH of solution of electrolytic cell ?

A. pH=14.0

B.  $pH = 9.0$

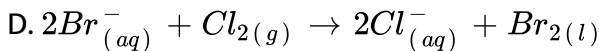
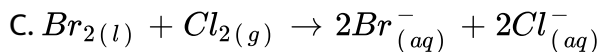
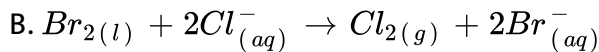
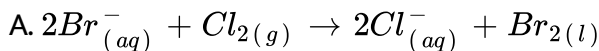
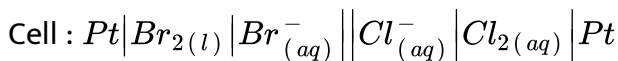
C.  $pH = 7.0$

D.  $pH < 7.0$

Answer: D

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9. Which of the following reaction is true at  $25^\circ C$  for given cell ?



Answer: A

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10. 22.2 gm Sn is deposited on electrode when 2 ampere current is pass through molten tin salt solution for 2 hours. So what is the oxidation state of Sn in salt ? (Sn=119 gm  $mol^{-1}$ )

A. -2

B. +2

C. +3

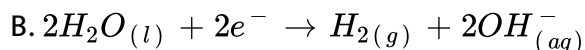
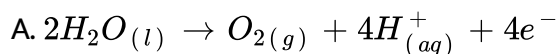
D. +4

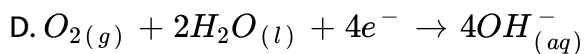
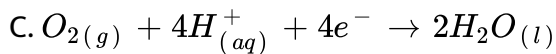
**Answer: B**



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11. Which of the following reaction shows metal corrosion reaction in presence of  $H_3O^+$  ?





**Answer: C**

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12. Product of electrolytic cell does not depend on which of the following matter ?

A. Nature of solvent

B. Temperature

C. Nature of electrode

D. Concentration of solution

**Answer: A**

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13. Which of the following gives  $H_2$  on cathode and  $O_2$  on anode on electrolysis by using platinum electrode ?

- A. Molten NaCl
- B. Dilute solution of NaCl
- C. Concentration solution of NaCl
- D. Solid NaCl.

**Answer: B**

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14. Which of the following statement is wrong with respect to metallic or electronic conductivity ?

- A. metallic conductivity is depend on struction and its characteristic.
- B. Conductivity increases with increase in temperature.

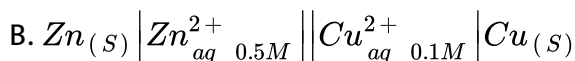
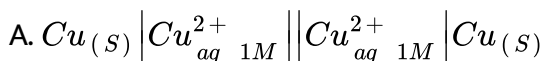
C. Metallic conductivity depends on number of valence electron present in valence cell.

D. No change is observed in struction of metal during conduction of current.

**Answer: B**

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15. Which of the following cell is concentration cell ?



**Answer: D**

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16. Resultant solution of electrolysis of concentrated NaCl solution is ...

- A. Do not change colour of red or blue litmus paper.
- B. It converts blue litmus to red.
- C. It remains colourless with phenolphthaleine.
- D. It converts red litmus to blue.

**Answer: D**



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17. Metal A, B and C has reduction potentials, 0.34 volt, -0.80 volt and -0.46 volt respectively. So give order of their capacity as reducing agent.

A.  $C > A > B$

B.  $A > B > C$

C.  $B > C > A$

$$D. C > B > A$$

**Answer: C**



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**18.** Electrolytic cell containing molten nickel chloride and aluminium chloride solutions are arranged in a series. If on passing same current through both the solution, if 18 gm Al is obtained then how much Ni is obtained ? (Atomic mass of Al=27 and Ni=58.5 gm  $mol^{-1}$ )

A. 58.5 gm

B. 29.25 gm

C. 117 gm

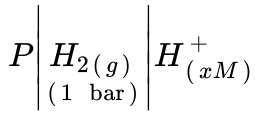
D. 5.85 gm

**Answer: A**



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19. Oxidation potential of given hydrogen half cell at  $25^{\circ}C$  is 0.118V then what is the pH of  $H^{+}$  ion solution ?



- A. 1
- B. 2
- C. 3
- D. 4

**Answer: B**



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20. Standard reduction potential of x,y and z are 0.75,-0.80 and -0.25 volt respectively. Then which of the following statement is not true ?

- A. Oxidation of y is carried out by x and y.
- B. Oxidation of x and reduction of z is carried out by y.

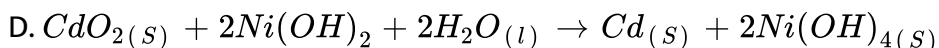
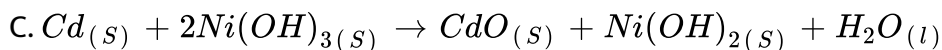
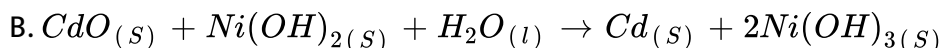
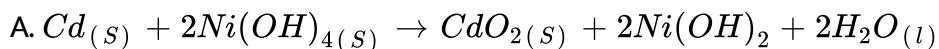
C. Reduction of x and oxidation of y is carried out by z.

D. Reduction of x is carried out by y and z.

**Answer: B**

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21. What is the complete charging reaction of Ni-Cd storage cell ?



**Answer: B**

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22. How much moles of oxidizing agents are reduced by complete reaction of 63.5 gm of Cu with concentrated  $HNO_3$  solution ? (Atomic weight of Cu=63.5 gm  $mol^{-1}$ )

A. 8

B. 4

C. 2

D. 1

**Answer: C**



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23. Which of the following aqueous solution does not show straight line graph of  $\sqrt{C} \rightarrow \Lambda_m$  ?

A. NaCN

B. HCN

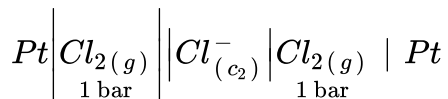
C. NaCl

D. HCl

**Answer: B**

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**24.** Choose correct optio for working given cell :



A.  $C_2 > C_1$

B.  $C_1 > C_2$

C.  $E_{cell}^\circ = 0$

D.  $\Delta G = -ve$

**Answer: A**

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25. During electrolysis of dilute aqueous  $CuSO_4$  solution by inert electrode, the pH of solution is ...

- A. Decreases
- B. Increases
- C. Remains constant
- D. Decreases after increases.

**Answer: A**

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26. In which metal vessels aqueous  $CuSO_4$  solution can be store ?

$$E_{Cu^{2+}/Cu}^{\circ} = 0.34V$$

$$E_{Fe/Fe^2}^{\circ} = 0.44V, E_{Al/Al^{3+}}^{\circ} = 1.66V$$

$$E_{Ni/Ni^{2+}}^{\circ} = 0.25V, E_{Ag^+/Ag}^{\circ} = 0.80V$$

- A. Ag

B. Ni

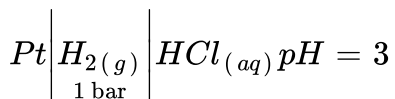
C. Fe

D. Al

**Answer: B**

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27. What is the oxidation potential of given hydrogen half cel at 1 bar pressure and  $25^{\circ}C$  temperature?



A.  $0.059V$

B.  $0.188V$

C.  $0.177V$

D.  $0.000V$

**Answer: C**

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28. To obtain 5.85 gm nickel how long 10 ampere current should be passed through dilute solution of  $NiSO_4$  during electrolysis by inert electrodes ? (atomic weight of Ni=58.5 gm)

- A. 965 second
- B. 3860 second
- C. 1930 second
- D. 9650 second

**Answer: C**

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29. What is the density of  $H_2SO_4$  solution when lead storage cell stop producing electricity ?

A.  $1.25 - 1.30 \text{ gm/ml}$

B.  $1.20 - 1.25 \text{ gm/ml}$

C.  $1.10 - 1.15 \text{ gm/ml}$

D.  $1.15 - 1.20 \text{ gm/ml}$

**Answer: C**

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**30.** When value of equilibrium constant is more than 1, then for spontaneous reaction ...

A. Concentration of reactant and product is same. (a)  $> 1$ .

B. Less product is obtained. (b) 0

C. More product is obtained. (c)  $< 1$

D. No product is possible. (d)  $< 0$

**Answer: C**

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31. The electrochemical cell in which electrodes are same but their electrolytic solutions had different concentrations, then such solutions are known as . . .

- A. Electrochemical cell
- B. Concentration cell
- C. Daniell cell.
- D. Lead storage cell.

**Answer: B**

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32. Which of the following is responsible for transportation of negative ions in galvanic cell ?

- A. Electrodes
- B. Salt bridge
- C. External path with copper wire.
- D. None of above

**Answer: B**

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**33.** Which products are obtained on anode and cathode respectively when electrolysis of concentrated NaCl solution is carried out using graphite as electrodes ?

- A.  $Cl_2$  and  $H_2$
- B.  $O_2$  and  $Na$
- C.  $O_2$  and  $H_2$
- D.  $Cl_2$  and  $Na$

**Answer: A**



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**34.** Molar conductivity of  $KCl$ ,  $NaCl$  and  $KNO_3$  are 150, 126 and 109  $S\ cm^2\ mol^{-1}$  respectively, then what is the molar conductivity of  $NaNO_3$  ?

A.  $385\ S\ cm^2\ mol^{-1}$

B.  $133\ S\ cm^2\ mol^{-1}$

C.  $167\ S\ cm^2\ mol^{-1}$

D.  $85\ S\ cm^2\ mol^{-1}$

**Answer: D**



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**35.** What is the composition of electroconductive pest used in mercury cell ?

A. Zn-Hg and HgO

B. KOH and Zn-Hg

C. KOH and ZnO

D. HgO and ZnO

**Answer: C**



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**36.** Calculate cell potential of electrochemical cell made up of Cr and Na.

$$E_{Cr^{+3}/Cr}^{\circ} = -0.74V, E_{Na^{+}/Na}^{\circ} = -2.71V$$

A. 3.45 V

B. -1.97 V

C. -3.45V

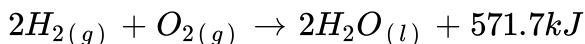
D. 1.97 V

**Answer: D**



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37. Which of the following cell has following reaction ?



- A. Voltaic cell
- B. Galvanic cell
- C. Fuel cell
- D. Leclanche cell

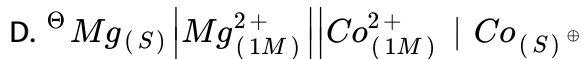
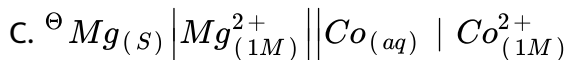
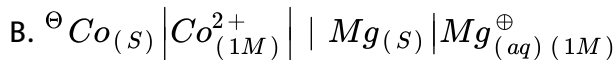
**Answer: C**

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38. Give symbolic representation of following reaction :



- A.  ${}^{\ominus}Co_{(s)} \mid Co_{(1M)}^{2+} \mid \mid Mg_{(s)}^{2+} \mid Mg_{(s)}^{\oplus}$



**Answer: D**

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**39.** Which products are obtained on electrolysis of concentrated NaCl solution by using graphite as inert electrode ?

A.  $H_2$  on anode,  $Cl_2$  on cathode and NaOH in solution.

B.  $O_2$  on anode and  $H_2$  on cathode

C.  $Cl_2$  on anode, Na on cathode and NaOH in solution.

D.  $Cl_2$  on anode,  $H_2$  on cathode and NaOH in solution.

**Answer: D**

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40. Resistance of conductor having unit meter length and 1 square meter cross sectional area is known as . . .

- A. Specific resistance
- B. Conductivity
- C. Specific conductivity
- D. Molar conductivity

**Answer: A**



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41. When 6 faraday electricity is pass through aqueous solution of silver nitrate, copper sulphate and gold chloride ( $AuCl_3$ ), then what ratio of mole of metals obtained at cathode ?

- A. 1 : 1 : 1

B. 3:2:1

C. 1:2:3

D. 6:3:2

**Answer: D**

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42. How much faraday current is required for reduction of 1.5 mol  $Cr_2O_7^{-2}$  to  $Cr^{3+}$  ?

A. 15F

B. 9F

C. 6F

D. 3F

**Answer: B**

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43. 1.234 gm gold is deposited on electrode when 3 ampere current is pass through solution containing  $AuCl_4^-$  ions. So calculate for how long such current should be passed ? (Atomic weight of Au=197 gm/mol)

A. 20 min. 8 sec.

B. 10 min. 4 sec.

C. 30 min. 12 sec.

D. 10 min. 40 sec.

**Answer: B**



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44. 3 gm of copper metal in cathode is deposited on electrode when 3 ampere current is pass for 2 hours through aqueous solution of  $CuSO_4$ . Then what is the efficiency of current ? (Atomic weight of Cu=63.5 gm/mol)

A. 0.33

B. 48.7 %

C. 42.2 %

D. 54.4 %

**Answer: C**



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**45. What is the SI unit of specific conductivity ?**

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

B.  $S\text{m}^{-2}$

C.  $S\text{m}^{-1}$

D.  $S\text{m}^3$

**Answer: C**



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46. How much chlorine is obtained when 0.5 Faraday current is pass through aqueous solution of NaCl ?

(Atomic weight of Cl=35.5 gm/mol)

A. 71.0 gm

B. 35.5 gm

C. 142.0 gm

D. 17.75 gm

**Answer: D**



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47. Determine true statement for Zn-Cu electrochemical cell.

$$\left[ E_{Zn^{+2}|Zn}^{\circ} = -0.76V, E_{Cu|Cu^{+2}}^{\circ} = -0.34V \right]$$

A. Zinc act at cathode and copper act as anode.

- B. Conduction of electron from copper to zinc electrode.
- C. Zinc act as anode and copper act as cathode.
- D. Standard reduction potential of zinc is more than copper.

**Answer: C**

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**48.** Which solution is filled in salt bridge ?

- A. Solution of dilute  $CuCl_2$
- B. Solution of aqueous copper nitrate
- C. Solution of dilute KCl
- D. Solution of aqueous ammonium nitrate

**Answer: D**

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49. Which electrode is reactive ?

- A. Graphite
- B. Carbon
- C. Platinum
- D. Silver

**Answer: D**



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50. Electrolysis of aqueous solution of  $Na_2SO_4$  is carried out in presence of graphite electrode.

- A. Na is obtained at cathode.
- B.  $O_2$  gas is obtained at cathode.
- C.  $H_2$  gas is obtained at anode.
- D.  $O_2$  gas is obtained at anode.

**Answer: D**



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51. Ionic conductivity of electrolyte in water is not depending on which of the following ?

- A. Concentration of electrolyte
- B. Temperature
- C. Type of solvent and its viscosity
- D. Pressure

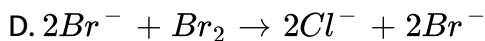
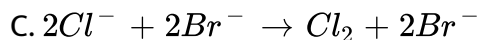
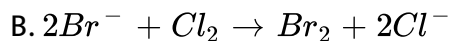
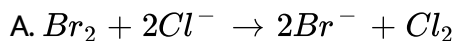
**Answer: D**



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52. Which of the following reaction can be possible with electrochemical cell by using

$$E_{Cl_2|2Cl^-}^\circ = 1.36V \text{ and } E_{Br_2|2Br^-}^\circ = 1.09V$$



**Answer: B**



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53. Ionic conductivity of solution does not depend on which of the following parameter ?

A. Nature of electrolyte

B. Nature of solvent

C. Concentration of electrolyte

D. Size of particle obtained in solution.

Answer: D



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54. On charging lead storage cell ...

- A. Pb of electrode utilize.
- B. Solution becomes diluted
- C.  $H_2SO_4$  of solution is utilized.
- D.  $PbO_2$  is deposited on one electrode.

Answer: D



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55. What is true for  $\Lambda_m^\circ(NH_4OH)$  ?

A.  $\Lambda_m^\circ(NaOH) + \Lambda_m^\circ(NH_4Cl) - \Lambda_m^\circ(HCl)$

$$\text{B. } \Lambda_m^\circ(\text{NH}_4\text{Cl}) + \Lambda_m^\circ(\text{NaOH}) - \Lambda_m^\circ(\text{NaCl})$$

$$\text{C. } \Lambda_m^\circ(\text{NH}_4\text{Cl}) + \Lambda_m^\circ(\text{NaCl}) - \Lambda_m^\circ(\text{NaOH})$$

$$\text{D. } \Lambda_m^\circ(\text{NH}_4\text{Cl}) + \Lambda_m^\circ(\text{NH}_4\text{Cl}) - \Lambda_m^\circ(\text{NaOH})$$

**Answer: B**



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