



## CHEMISTRY

### BOOKS - A N EXCEL PUBLICATION

### ELECTROCHEMISTRY

#### Question Bank

1. How would you determine the standard electrode potential of the system  $(\text{Mg}^{2+}) / \text{Mg}$  ?

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

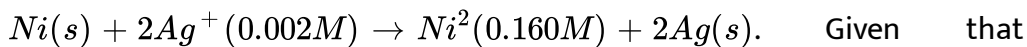
3. Consult the table of standard electrode potential and suggest three substances that can oxidise ferrous ions under suitable conditions.

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

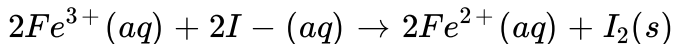
5. Calculate the emf of the cell in which the following reaction takes place:



$$E_{cell}^0 = 1.05V$$

 [Watch Video Solution](#)

6. The cell in which the following reaction occurs



has  $E_{cell}^0 = 0.236V$  at 298 K. Calculate the standard Gibbs energy and equilibrium constant of the cell reaction

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

9. The molar conductivity of  $0.025molL^{-1}$  methanoic acid (HCOOH) is  $46.1Scm^2mol^{-1}$ . Calculate its degree of dissociation and dissociation

constant.

Given

$$\lambda^{\circ}(H^{+}) = 349.6 \text{ Scm}^2 \text{ mol}^{-1}$$

and

$$\lambda(HCOO^{-}) = 54.6 \text{ Scm}^2 \text{ mol}^{-1}$$

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

11. Suggest two material other than hydrogen that can be used as fuels in fuels cells.

 [Watch Video Solution](#)

12. From the electrochemical series, Cu can displace Ag from silver nitrate solution

Represent the cell constructed with silver and copper electrodes



[Watch Video Solution](#)

13. From the electrochemical series, Cu can displace Ag from silver nitrate solution

Write down the reaction taking place at the anode



[Watch Video Solution](#)

14. From the electrochemical series, Cu can displace Ag from silver nitrate solution

Write down the reaction taking place at the cathode



[Watch Video Solution](#)

15. From the electrochemical series, Cu can displace Ag from silver nitrate solution

Write Nernst equation for the above cell reaction



[Watch Video Solution](#)

16. State the Faraday's laws of electrolysis

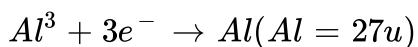
 [Watch Video Solution](#)

17. In a classroom, the teacher has explained the quantitative aspects of electrolysis by stating the Faraday's laws of electrolysis. Explain the term electrochemical equivalent

 [Watch Video Solution](#)

18. In a classroom, the teacher has explained the quantitative aspects of electrolysis by stating the Faraday's laws of electrolysis.

Calculate the quantity of electricity required to deposit 0.09 g of aluminium during the following electrode reaction:



 [Watch Video Solution](#)

19. The limiting molar conductivity of an electrolyte is obtained by adding the limiting molar conductivities of cation and anion of the electrolyte.

Name of the above law

 [Watch Video Solution](#)

20. The limiting molar conductivity of an electrolyte is obtained by adding the limiting molar conductivities of cation and anion of the electrolyte.

What is meant by limiting molar conductivity ?

 [Watch Video Solution](#)

21. Explain how conductivity measurements help to determine the ionisation constant of weak electrolyte like acetic acid

 [Watch Video Solution](#)

22. The limiting molar conductivity of an electrolyte is obtained by adding the limiting molar conductivities of cation and anion of the electrolyte.

Explain the change of conductivity and molar conductivity of a solution with dilution

 [Watch Video Solution](#)

23. The Standard electrode potentials of some electrodes are given below:

$$E^{\circ} _{-} (Zn^{2+} / Zn) = - 0.76V, E^{\circ} (Cu^{2+} / Cu) = + 0.34, E^{\circ} _{-} (Ag, Ag) =$$

can  $CuSO_4$  Solution be kept in silver vessel?

 [Watch Video Solution](#)

24. The Standard electrode potentials of some electrodes are given below:

$$E^{\circ} _{-} (Zn^{2+} / Zn) = - 0.76V, E^{\circ} (Cu^{2+} / Cu) = + 0.34, E^{\circ} _{-} (Ag, Ag) =$$

Zinc or copper which can displace hydrogen from dil.  $H_2SO_4$

 [Watch Video Solution](#)



 Watch Video Solution

25. The Standard electrode potentials of some electrodes are given below:

$$E^\circ_{(Zn^{2+}/Zn)} = -0.76V, E^\circ_{(Cu^{2+}/Cu)} = +0.34, E^\circ_{(Ag, Ag^+)}$$

What is the reaction taking place at SHE when it is connected to Ag/Ag<sup>+</sup>.

Electrode to form a galvanic cell?

 Watch Video Solution

26. The Standard electrode potentials of some electrodes are given below:

$$E^\circ_{(Zn^{2+}/Zn)} = -0.76V, E^\circ_{(Cu^{2+}/Cu)} = +0.34, E^\circ_{(Ag, Ag^+)}$$

Find the value of  $K_e$  (equilibrium constant) in the Daniell cell at 298 K

 Watch Video Solution

27. Daniell cell is a galvanic cell made of zinc and copper electrodes.

Write anode and cathode reactions in Daniel cell

 [Watch Video Solution](#)

28. The cell reaction in Daniell cell is

$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$  and Nernst equation for single electrode potential for general electrode reaction

$$M^+(aq) + ne^- \rightarrow M(s) \quad \text{is} \quad E_{M^{n+}/M} = E_{M^{n+}/M}^\circ - \frac{2.303RT}{nF} \log \frac{[M]}{[M^{n+}]}$$

Derive Nernst equation for Daniell cell

 [Watch Video Solution](#)

29. Daniell cell is a galvanic cell made of zinc and copper electrodes.

Among these, Leclanche cell is a primary cells and lead storage cell is secondary cell. Write any two differences between primary cells and secondary cells.



[Watch Video Solution](#)

30. Daniell cell is a galvanic cell made of zinc and copper electrodes.

What is a fuel cell ?



[Watch Video Solution](#)

31. Daniell cell is a galvanic cell made of zinc and copper electrodes.

write the overall cell reaction in  $H_2 - O_2$  fuel cell.



[Watch Video Solution](#)

32. Innumerable number of galvanic cells can be constructed on the pattern of Daniell cell by taking combination of different half cells. What is galvanic cells?



[Watch Video Solution](#)

**33.** Daniell cell is a galvanic cell made of zinc and copper electrodes.

Write anode and cathode reactions in Daniel cell

 [Watch Video Solution](#)

**34.** Innumerable number of galvanic cells can be constructed on the pattern of Daneill cell by taking combination of different half cells. Write the name of the half represented by  $\text{Pt(s)}/\text{H}_2(\text{g})/\text{H}^+(\text{aq})$

 [Watch Video Solution](#)

**35.** Innumerable number of galvanic cells can be constructed on the pattern of Daneill cell by taking combination of different half cells. What is the potential of the above half cell at all temperatures?

 [Watch Video Solution](#)

36. Innumerable number of galvanic cells can be constructed on the pattern of Daniell cell by taking combination of different half cells. Write the use of above cell

 [Watch Video Solution](#)

37. Write the equation showing the relationship between conductivity and molar conductivity

 [Watch Video Solution](#)

38. Why does the conductivity of a solution decreases with dilution?

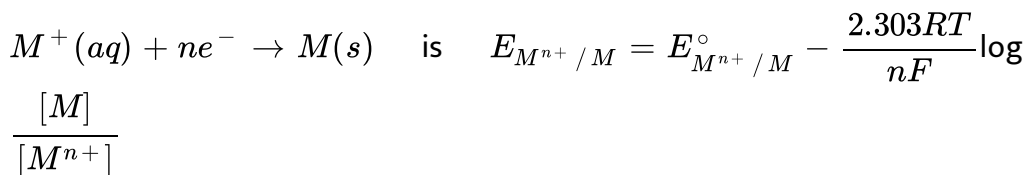
 [Watch Video Solution](#)

39. With decreases in concentration of an electrolytic solution , Conductivity ( $K$ ) decreases and molar conductivity ( $\Lambda_m$ ) increases.

Limiting molar conductivity ( $\Lambda_m^\circ$ ) of a strong electrolyte can be determined by graphical extrapolation method, Suggest a method for the determination of limiting molar conductivity of a weak electrolyte, taking acetic acid ( $CH_3COOH$ ) as example .

 [Watch Video Solution](#)

**40.** The cell reaction in Daniell cell is  $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$  and Nernst equation for single electrode potential for general electrode reaction



Derive Nernst equation for Daniell cell

 [Watch Video Solution](#)

**41.** Daniell cell is a galvanic cell made of zinc and copper electrodes.

Among these, Leclanche cell is a primary cells and lead storage cell is

secondary cell. Write any two differences between primary cells and secondary cells.

 [Watch Video Solution](#)

42. Innumerable number of galvanic cells can be constructed on the pattern of Daniell cell by taking combination of different half cells. What is galvanic cells?

 [Watch Video Solution](#)

43. Fuel cells are special type of galvanic cells. Write any two advantages of fuel cells

 [Watch Video Solution](#)

44. Fuel cells are special type of galvanic cells. Write the electrode reactions is  $H_2 - O_2$  fuel cell.

 [Watch Video Solution](#)

**45.** You are supplied with the following substances:

copper rod, Zinc rod, Salt bridge, two glass beakers, a piece of wire,  
 $1M, CuSO_4$  solution,  $1M ZnSO_4$  solution

Represent the cell made using the above materials.

 [Watch Video Solution](#)

**46.** You are supplied with the following substances:

copper rod, Zinc rod, Salt bridge, two glass beakers, a piece of wire,  
 $1M, CuSO_4$  solution,  $1M ZnSO_4$  solution

Write Nernst equation for the above cell.

 [Watch Video Solution](#)

**47.** You are supplied with the following substances:

copper rod, Zinc rod, Salt bridge, two glass beakers, a piece of wire,



1M,  $CuSO_4$  solution, 1M  $ZnSO_4$  solution

Calculate the standard EMF of the cell if

$E^{\circ}$

 [Watch Video Solution](#)

**48.** Conductance (G), conductivity (K) and molar conductivity  $\Lambda_m$  are terms used in electrolytic conduction.

Write any two factors on which conductivity depends on .

 [Watch Video Solution](#)

**49.** Conductance (G), conductivity (K) and molar conductivity  $\Lambda_m$  are terms used in electrolytic conduction.

How do conductivity and molar conductivity vary with concentration of electrolytic solution?

 [Watch Video Solution](#)

50. Write any one difference between primary cell and secondary cell.

 [Watch Video Solution](#)

51. Which of the following is a secondary cell?

- A. Dry cell
- B. Leclanche cell
- C. Mercury cell
- D. None of these

**Answer: D**

 [Watch Video Solution](#)

52. What is the relationship between resistance and conductance ?

 [Watch Video Solution](#)

53. One of the fuel cells uses the reaction of hydrogen and oxygen to form water. Write down the cell reaction taking place in the anode and cathode of the fuel cell.

 [Watch Video Solution](#)

54. Daniell cell is a galvanic cell made of zinc and copper electrodes.

Among these, Leclanche cell is a primary cells and lead storage cell is secondary cell. Write any two differences between primary cells and secondary cells.

 [Watch Video Solution](#)

55. Daniell cell is a galvanic cell made of zinc and copper electrodes.

What is a fuel cell ?

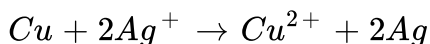
 [Watch Video Solution](#)

56. Daniell cell is a galvanic cell made of zinc and copper electrodes.

write the overall cell reaction in  $H_2 - O_2$  fuel cell.

 [Watch Video Solution](#)

57. Represent the galvanic cell based on the cell reaction given below:



 [Watch Video Solution](#)

58. Write the half cell reaction of the above cell.

 [Watch Video Solution](#)

59.  $\lambda_m^0$  for NaCl, HCl and NaAc are 126.4, 425.9 and 91.0  $S\text{cm}^2\text{mol}^{-1}$  respectively. Calculate  $\Lambda_m^0$  for HAc.

 [Watch Video Solution](#)

60. Identify the weak electrolyte from the following .

A. KCL

B. NaCl

C. KBr

D.  $CH_3COOH$

**Answer: D**



[Watch Video Solution](#)

61. Kohlrausch's law helps to determine the degree of dissociation of a weak electrolyte at a given concentration.

State Kohlrausch's law.



[Watch Video Solution](#)

**62.** Kohlrausch's law helps to determine the degree of dissociation of a weak electrolyte at a given concentration.

The molar conductivity  $\Lambda_m$  of .001M acetic acid is  $4.95 \times 10^{-5} \text{Scm}^2 \text{mol}^{-1}$

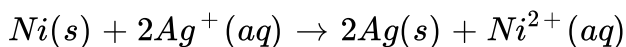
. Calculate the degree of dissociation ( $\alpha$ ) at this concentration if limiting

molar conductivity  $\lambda_m^0$  for  $\text{H}^+$  is  $340 \times 10^{-5} \text{Scm}^2 \text{mol}^{-1}$  and  $\text{CH}_3\text{COO}^-$

$50.5 \times 10^{-5} \text{Scm}^2 \text{mol}^{-1}$

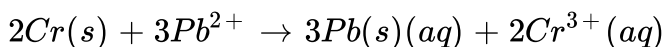
 [Watch Video Solution](#)

**63.** Represent the electrochemical cells corresponding to the following cell reaction



 [Watch Video Solution](#)

**64.** Represent the electrochemical cells corresponding to the following cell reaction





[Watch Video Solution](#)

65. What will be the standard EMF of the cell with reaction (i) if  $E_{red}^0$  of nickel electrode is  $-0.25V$  and that of silver electrode is  $0.8V$ ?



[Watch Video Solution](#)

66. What is resistivity? Give its unit.



[Watch Video Solution](#)

67. How is specific conductivity related to resistivity?



[Watch Video Solution](#)

68. The limiting molar conductivity of an electrolyte is obtained by adding the limiting molar conductivities of cation and anion of the electrolyte.

Explain the change of conductivity and molar conductivity of a solution with dilution

 [Watch Video Solution](#)

69. Calculate the molar conductivity of 1M solution of sulphuric acid if its conductivity is  $26 \times 10^{-2} \text{ohm}^{-1} \text{cm}^{-1}$

 [Watch Video Solution](#)

70. It is not possible to determine the molar conductivity of weak electrolyte at infinite dilution ( $\Lambda_m^\circ$ ) graphically by extrapolation. Justify the statement giving reason.

 [Watch Video Solution](#)

71. It is not possible to determine the molar conductivity of weak electrolyte at infinite dilution ( $\Lambda_m^\circ$ ) graphically by extrapolation.



How can this problem be solved? Discuss the principle involved in the method.

 [Watch Video Solution](#)

**72.** It is not possible to determine the molar conductivity of weak electrolyte at infinite dilution ( $\Lambda_m^\circ$ ) graphically by extrapolation.

Calculate the molar conductivity of  $NH_4OH$  at infinite dilution if  $\Lambda_m^\circ$  of

$Ba(OH)_2$ ,  $BaCl_2$  and  $NH_4Cl$  are  $523.4$ ,  $280$  and  $130$

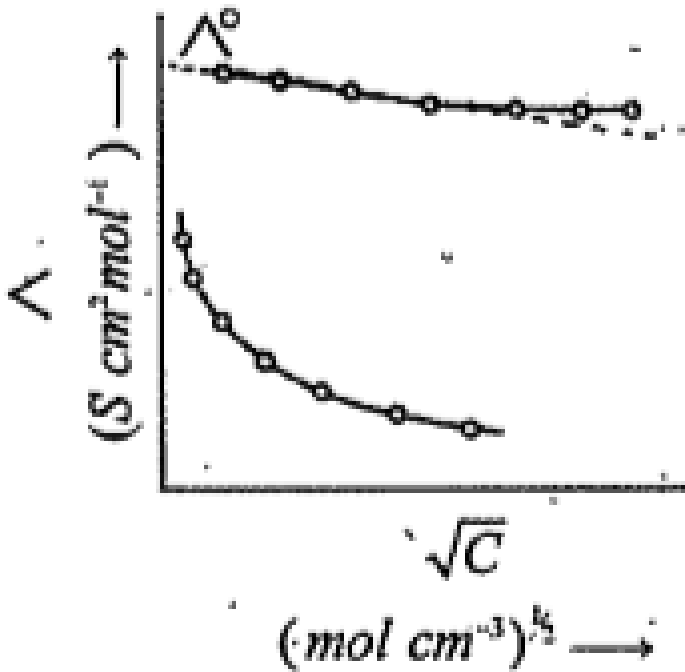
$ohm^{-1}cm^{-2}mol^{-1}$  respectively.

 [Watch Video Solution](#)

**73.** The following is a plot of molar conductivity of electrolytes A and B against square root of concentration.

Write the mathematical relation between  $\Lambda_m$  and  $\Lambda_m^\circ$  for strong

electrolyte(A)

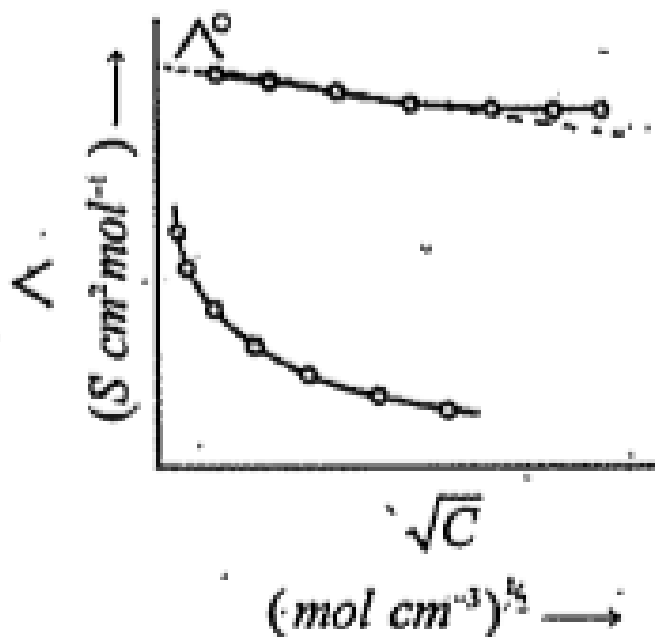


[▶ Watch Video Solution](#)

74. The following is a plot of molar conductivity of electrolytes A and B against square root of concentration.

Identify the curves represented by strong electrolyte (A) and weak

electrolyte(B).

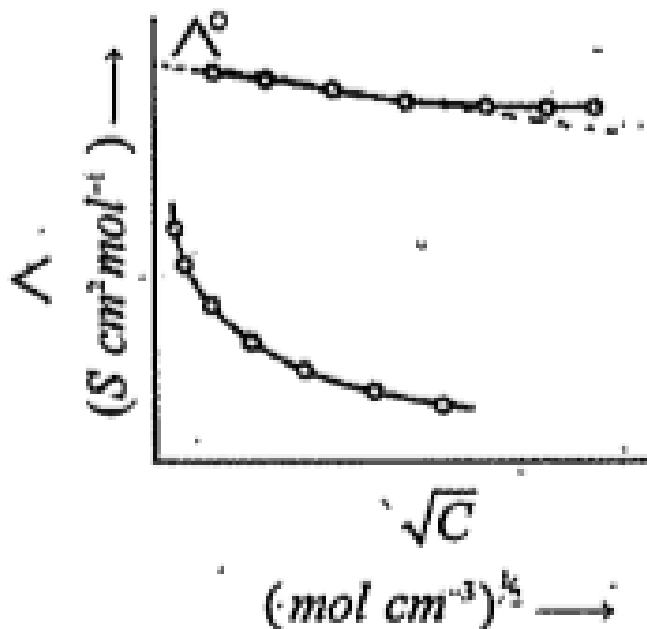


[▶ Watch Video Solution](#)

75. The following is a plot of molar conductivity of electrolytes A and B against square root of concentration.

What does  $(\Lambda_m^{\circ})$  represent? Give one method for determining  $(\Lambda_m^{\circ})$  of the

electrolyte B.



[Watch Video Solution](#)

76. Dry cell is a compact version of Leclanche cell and provides voltage between 1.25V and 1.5V.

Why is dry cell regarded as a primary cell?

[Watch Video Solution](#)

77. Dry cell is a compact version of Leclanche cell and provides voltage between 1.25V and 1.5V.

Explain the anodic and cathodic reactions taking place in a dry cell.

 [Watch Video Solution](#)

78. Dry cell is a compact version of Leclanche cell and provides voltage between 1.25V and 1.5V.

Name a primary cell used in digital watches and hearing aids.

 [Watch Video Solution](#)

79. KCL cannot be used in salt bridge in  $Zn/Zn^{+2} // Ag^{+} / Ag$ . Give reason.

 [Watch Video Solution](#)

80. What happens to pH when aq NaCl is subjected to electrolysis?



[Watch Video Solution](#)