

ELECTROCHEMISTRY

1. Can you store CuSO_4 solution in Zn pot ?
2. Write the name of electrolyte used in mercury cell.
3. What does the negative value of E_{cell}^0 indicate?
4. What flows in the internal circuit of the Galvanic cell?
5. What is the EMF of the cell when the cell reaction attains equilibrium ?
6. Why does an aqueous solution of NaCl in electrolysis give H_2 gas at cathode not sodium metal?
7. Which type of metal can be used in cathodic protection of iron against rusting?
8. Why does the conductivity of solution decreases on dilution ?
9. Except hydrogen, write the name of two chemical species which are used in fuel cell.
10. How many coulombs are required for conversion of 1 mol FeO into Fe_2O_3 ?
11. State the factors which influence the value of cell potential.
12. What is the relationship between the free energy change and EMF of the cell?
13. What are the products of electrolysis of molten NaCl and aqueous solution of NaCl?
14. What is the role of ZnCl_2 in dry cell?
15. Rusting of iron is quicker in saline than ordinary water. why?
16. Write one use of Kohlrausch's law.
17. What is cell constant ?
18. What is the relationship between Molar conductivity of electrolytic solution to its degree of dissociation ?
19. Which type of cell is used in wrist watch?
20. Which acid does not react with rust?

Ans.

1. No, Zn is more reactive than Cu .

2. ZnO and KOH
3. Negative value shows reaction is non-spontaneous
4. Ions.
5. $E^0_{\text{cell}} = 0$
6. Electrode potential of hydrogen is greater than Na.
7. More reactive metals than Fe. Such as Zn, Mg.
8. Due to less no. of ions per unit volume.
9. Methane and methanol.
10. 1 faraday
11. Concentration of electrolyte and no. of electron exchanged
12. $\Delta G^0 = -nFE^0$
13. Na, Cl_2 and H_2, Cl_2
14. Zn^{2+} ions combine with NH_3 to form complex $[\text{Zn}(\text{NH}_3)_2]^{2+}$
15. Due to presence of salt in saline water.
16. To find the limiting molar conductivity of weak electrolyte
17. The ratio of Λ/α
18. $\alpha = \Lambda^c_m / \Lambda^0_m$
19. Mercury cell or Button cell
20. Organic acid.

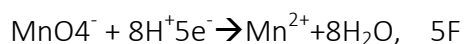
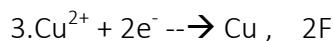
Two marks question:-

1. Consider the standard electrode potential $\text{K}^+/\text{K} = -2.93 \text{ V}$, $\text{Ag}^+/\text{Ag} = 0.80 \text{ V}$, $\text{Hg}^{2+}/\text{Hg} = 0.79 \text{ V}$, $\text{Cr}^{3+}/\text{Cr} = -0.74 \text{ V}$. arrange these metals in their increasing order of reducing power.
2. The conductivity of 0.20M solution of HCl at 298K is 0.0248 S cm^{-1} . Calculate molar conductivity.
3. How much charge will be required for 1 mol Cu^{2+} to Cu and for 1 mol MnO_4^- to Mn^{2+} ?
4. Write the Variation of conductivity and Molar conductivity with dilution.
5. Λ^0_m for NaCl, HCl and NaAc are 126.4, 425.9 and $91.0 \text{ S cm}^2/\text{mol}$ respectively. Calculate Λ^0_m for acetic acid.
6. A solution of $\text{Ni}(\text{NO}_3)_2$ is electrolyzed between Pt electrode using current of 5 amp. For 20 min. What mass of Ni will be deposited at cathode?
7. State and explain Faraday laws of electrolysis.
8. Write the cell reaction of Lead storage battery.
9. Which cell is more efficient than others. why?
10. Discuss the mechanism of protection of water supply of underground pipe line system.

Ans.

1. $\text{Ag} < \text{Hg} < \text{Cr} < \text{K}$

2. $\Lambda^0_m = K \times 1000/M$, $124 \text{ S cm}^2/\text{mol}$



4. With increase in dilution, conductivity decreases but molar conductivity increases.

$$5. \Lambda_m^0(\text{HAc}) = \lambda_{\text{H}^+}^0 + \lambda_{\text{Ac}^-}^0 = \lambda_{\text{H}^+}^0 + \lambda_{\text{Cl}^-}^0 + \lambda_{\text{Ac}^-}^0 + \lambda_{\text{Na}^+}^0 - \lambda_{\text{Cl}^-}^0 - \lambda_{\text{Na}^+}^0$$

$$= (425.9 + 91.0 - 126.4) \text{ SCm}^2/\text{mol}$$

$$= 390.5 \text{ SCm}^2/\text{mol}$$

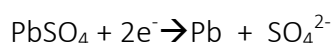
$$6. Q = IT, 6000\text{C}. \quad 58.7 \times 6000 / 2 \times 96500 = 1.825 \text{ gm.}$$

7. Statement and mathematical derivation.

8. at anode



At cathode



9. Fuel cell, as it has high efficiency and continuous source of energy .pollution free working.

10. More reactive metal is used to follow the principle of sacrificial protection.

Three marks question:-

1. Explain construction and working of standard Hydrogen electrode?
2. What is an electrochemical series? How does it predict the feasibility of a certain redox reaction?
3. The conductivity of an aqueous solution of NaCl in a cell is $92 \text{ } \Omega^{-1} \text{ cm}^{-1}$ the resistance offered by this cell is $247.8 \text{ } \Omega$. Calculate the cell constant?
4. The measured resistance of a cell containing $7.5 \times 10^{-3} \text{ M}$ solution of KCl at 25°C was $1005 \text{ } \Omega$ calculate
 - (a) Specific conductance and
 - (b) Molar conductance of the solution. Cell Constant = 1.25 cm^{-1}
5. Enlist the factors affecting corrosion?