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^0_{cell} indicate?

4. What fiows 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 cathodicprotection 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 molFeO into Fe_2O_3?

11.State the factors which influences 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 doesnot react with rust?

Ans.

1. No, Zn is more reactive thanCu .

2. ZnO and KOH
3. Negative value shows reaction is non- spontaneous
4. Ions.
5. $E^0_{cell} = 0$
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 oer 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 combines with NH_3 to form complex $[Zn(NH_3)_2]^{2+}$
15. Due to presence of salt in saline water.
16. To find the limiting molar conductivity of weak electrolyte
17. The ratio of l/a
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 $k^+/K = -2.93$ V, $Ag^+/Ag = 0.80$V, $Hg^{2+}/Hg = 0.79$V $Cr^{3+}/Cr = -0.74$V. arrange these metals in their increasing order of reducing power.
2. The conductivity of 0.20M soiution of HCl at 298K is 0.0248 SCm^{-1}.Calculate molar conductivity.
3. How much charge will be required for 1 mol Cu2+ 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 SCm^2/mol respectively .Calculate Λ^0_m for acetic acid.
6. A solution of $Ni(NO_3)_2$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.Ag< Hg<Cr<K

2. $\Lambda^0_m = K \times 1000/M$, $124 SCm^2/mol$

3.$Cu^{2+} + 2e^- \rightarrow Cu$, 2F

$MnO4^- + 8H^+ 5e^- \rightarrow Mn^{2+} + 8H_2O$, 5F

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

5.$\Lambda^0_m (HAc) = \lambda^0_{H+} + \lambda^0_{Ac} = \lambda^0_{H+} + \lambda^0_{cl-} + \lambda^0_{Ac-} + \lambda^0_{Na+} - \lambda^0_{cl-} - \lambda^0_{Na+}$

= (425.9 +91.0 – 126.4) SCm^2/mol

= 390.5SCm^2/mol

6. Q = IT, 6000C. 58.7 x6000/2 x 96500 = 1.825 gm.

7. Statement and mathematical derivation.

8. at anode

$Pbso_4 + 2H_2O \rightarrow PbO_2 + SO_4^{2-} + 4H^+ 2e^-$

At cathode

$PbSO_4 + 2e^- \rightarrow Pb + SO_4^{2-}$

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 1 -1 cm □□□□the resistance offered by this cell is 247.8 □□. Calculate the cell constant?

4.The measured resistance of a cell containing 7.5 x 10-3 M solution of KCl at 250C was 1005 □□calculate
(a) Specific conductance and
(b) Molar conductance of the solution. Cell Constant = 1.25 cm-1

5.Enlist the factors affecting corrosion?