## Electrochemistry T3

12th Standard

Chemistry

25 x 2 = 50

1) The electrical resistance of a column of 0.05 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 conuctivity.

2) The conductivity of 0.001028 mol L$^{-1}$ acetic acid is $4.95 \times 10^{-5} Scm^{-1}$ Calculate its dissociation constant if $\Lambda_m^o$ for acetic os 390.5 S cm$^2$ mol$^{-1}$.

3) How much charge is required for the following reduction?
(i) 1 mol of AI$^{3+}$ to AI.
(ii) 1 mol of Cu$^{2+}$ to Cu.
(iii) 1 mol of MnO$^-_4$ to Mn$^{2+}$

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

5) Represent the cell in which the following reaction takes place:
Mg(s) + 2Ag$^+$ (0.0001 M) $\longrightarrow$ Mg$^{2+}$ (0.130 M ) +2 Ag(s)
Calculate its E$_{(cell)}$ if $E^{\ominus}_{(cell)}$ = 3.17 V.

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

7) Calculate the emf of the cell in which the following reaction takes place :
$Ni(s) + 2Ag^+(0.002M) \longrightarrow Ni^{2+}(0.160M) + 2Ag(s)$
Given that E$^{\ominus}_{(cell)}$ = 1.05 V

8) Suggest a list of metals that are extracted electrolytically.

9) Consider the reaction :
$Cr_2O_7^{2-} + 14H^+ + 6e^- \longrightarrow 2Cr^{3+} + 7H_2O$
What is the quantity of electricity in coulombs needed to reduce 1 mol of $Cr_2O_7^{2-}$ ?

10) 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

11) Given the standard electrode potentials
K$^+$ /K = - 2.93 V, Ag$^+$ /Ag = 0.80 V,
Hg$^{2+}_2$/ Hg = 0.79 V,
Mg$^{2+}$ /Mg = - 2.37 V, Cr$^{2+}$ /Cr = - 0.74 V
Arrange these metals in their increasing order of reducing power.

12) The conductivity of 0.20 M solution of KCl at 298 K is 0.0248 S cm$^{-1}$ Calculate its molar conductivity.

13) The resistance of a conductivity cell containing 0.001M KCl solution at 298 K is 1500 Ω. What is the cell constant if conductivity of 0.001M KCl solution at 298 K is 0.146 x 10$^{-3}$ S cm$^{-1}$ ?

14) Conductivity of 0.00241 M acetic acid is 7.896 x 10$^{-5}$ S cm$^{-1}$ Calculate its molar conductivity and if $\wedge^0$ for acetic acid is 390.5 S cm$^2$ mol$^{-1}$ , what is its dissociation constant ?

15) Why does the conductivity of a solution decrese with dilution?

16) Calculate the equilibrium constant of the reaction: Cu(s) + 2Ag$^+$ (aq) → Cu$^{2+}$(aq) + 2Ag(s) E$^{\ominus}_{(cell )}$ = 0.46 V

17) The standard electrode potential of daniel is 1.1V. Calculate the standard Gibbs energy for the reaction:
$Zn(s) + Cu^{2+}(aq) \to Zn^{2+}(aq) + Cu(s)$

18) What is primary cell? Give an example.

19) Ezpress the relation among cell constant, resistance of the solution in the cell and conductivity of the solution. How is molar conductivity of solution related to its conductivity.

20) The molar conductivity of 1.5 M solution of an electrolyte is found to be 138.9 S cm$^2$ mol$^{-1}$ . Calculete the conductivity of this solution.

21) Define limiting molar conductivity. Why conductivity of an electrolyte solution decreases with decrease in concentration ?
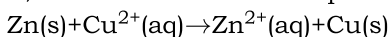
22) Give reasons for the following :
 (i) Copper displaces silver from silver nitrate solution.
 (ii) Iron pipes are usually, coated with zinc.

23) Give the relationship between equivalent and molar conductance of a given solution?

24) The standard electrode potential ($E°$)for Daniell cell is +1.1 V. Calculate the $\Delta G°$ for the reaction.
 $Zn(s)+Cu^{2+}(aq)\rightarrow Zn^{2+}(aq)+Cu(s)$

25) The chemistry of corrosion of iron is essentially an electrochemical phenomenon. Explain the reactions occurring during the corrosion of iron in the atmosphere.