CLASS: XII

CHEMISTRY

ASSIGNMENT NO: 2 **MONTH: April-May 2008**

Electro chemistry

1. Give difference between electronic conductance and electrolytic conductance.
2. Define resistivity and give its SI unit.
3. Define conductivity. How does it vary with concentration of an electrolyte?
4. What are super conductors? What types of materials behave as super conductors?
5. For strong electrolytes variation of molar conductivity follows the equation –

   $\wedge_m = \wedge_m^{\infty} - AC^{\frac{1}{2}}$ on what factor does "A" depend?
6. NaCl and $MgSO_4$ have different values of A. Justify.
7. Define over voltage.
8. A mercury cell gives a cell potential of 1.35 V which remains constant during its life. Justify.
9. How much faraday of charge is consumed per 1 mole of H_2SO_4 when lead storage battery is in use?
10. Give relevant points for the following:-
    (a) Similarities between galvanic cell and fuel cell
    (b) Dissimilarities between galvanic and fuel cell.
    (c) Advantages of fuel cell.
    (d) Disadvantages of fuel cell.
11. Explain the following observations:-
    (a) Electrolysis of NaCl (aq) gives H_2 at cathode & Cl_2 at anode.
    (b) Electrolysis of $CuBr_2$ (aq) gives Cu at cathode & Br_2 at anode.
    (c) A bromide or iodide on electrolysis gives Br_2 and I_2 at anode whereas electrolysis of fluoride doesn't give F_2 at the anode.
12. Give reasons for the following:-
    (a) Rusting is enhanced due to presence of dissolved gases like CO2.
    (b) Rusting is inhibited in alkaline medium.
    (c) Galvanisation is a better method of prevention of rusting as compared to tinning.
13. What is the potential of the cell:-

    Pt / Cl_2 (2 atm) // Cl^- (0.1 M) E $^0_{Cl_2/Cl^-}$ **= 1.36 V**
14. The reduction potentials of Cu^{2+} / Cu & Ag^+ / Ag are 0.34 V and 0.80V respectively. For what conc^n of Ag^+ ions will be the EMP of cell at 25^0C is zero? $[Cu^{2+}] = 0.01$ M.
15. Calculate potential of the cell in which the given reaction occurs:-

    Sn^{+4} (105M) + Zn (s) $\longrightarrow$ Zn^{2+} (2.0 M) + Sn^{+2} (0.50 M)

    $E^{\Theta}_{cell} = 0.89$ V

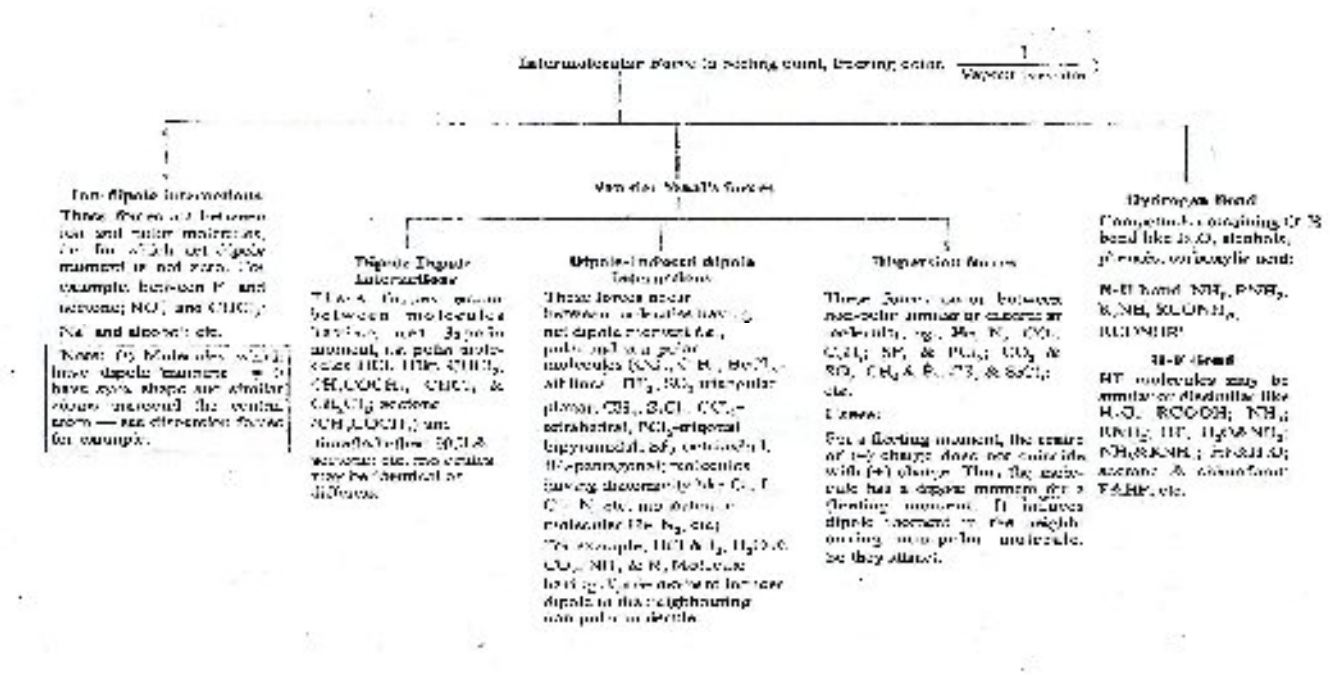
    Will the potential increase or decrease if concentration of Sn+4 is increased in cell?
16. Calculate EMF of the cell

    Pb(s) / Pb $(NO_3)_2$ (M1) // HCl (M_2) / H_2 (I) / Pt(s)

Given $M_1 = 0.100$ $M_2 = 0.200$ $pH_2 = 1$ atm $E^{\Theta}_{Pb^{+2}/Pb} = -0.13$ V

(A13) 1.428V (A14) 1.65×10^{-9} M (A15) 0.8952 V

TYPES OF INTERMOLECULAR FORCES



Q. What are the intermolecular forces in each of the following:-

(a) I_2 and $CHCl_3$ (b) CO_2 and CS_2 (c) H_2O and NH_3 (d) CH_3OH and CH_2Cl_2

(e) C_6H_6 and CH_4 (f) I_2 and CCl_4 (g) KIO_3 and H_2O (h) CH_3COOH

PRODUCTS OF ELECTROLYSIS

From above discussion important points for product formation in electrolysis (aqueous) are:

(a) If SO_4^{2-}, CO_3^{2-}, NO_3^-, F^- or PO_4^{3-} ions are present in the aqueous solution, then oxidation of water is preferred (O_2 is evolved).

(b) If Cl^-, Br^- or I^- ions are present in the aqueous solution, then oxidation of If Cl^-, Br^- or I^- ions is preferred. Because, due to overvoltage, reduction potential of water becomes higher than that of halogen, therefore **release of halogens** at anode becomes more favourable. As reduction potential of F^- is the highest, therefore **oxidation of F^- ions is not possible** in this reaction.

(c) If metal ions (Na^+, Li^+, K^+, Ca^{2+}, Mg^{2+}, Al^{3+}, etc.) having reduction potential less than that of water (0.83V) are present in the aqueous solution, then **reduction of water** (H_2 is evolved) is preferred to metal ions. Thus we get **metal hydroxides**, i.e. NaOH, LiOH, KOH, etc.

If solution contains metal ions (Cu2+, Ag+, Hg_2^{2+}, etc) with higher reduction potentials than that of water reduction of metal ions is preferred to water. Thus we get deposition of metals i.e., Cu, Ag, etc.

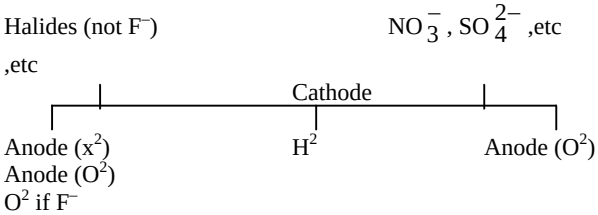
(INERT ELECTRODES)

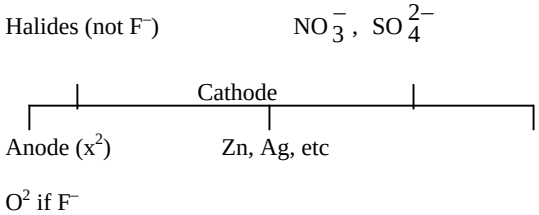
Electrolysis of aqueous metal salt solutions

Reactive metal (Li, Na, K, Mg, Ca, Al, etc)

Understand carefully

Less reactive metal (Cu, Zn, Ag, Sn, etc)





(d) If electrolysis of salt solutions containing electrodes of metal present in the salt is done, then both reduction and oxidation of the metal take place.

On the basis of $E^{\ominus}$reduction values remember—

(a) At cathode, the ion with mathematically higher $E^{\ominus}$ red value undergoes reduction.

(b) At anode, the ion with mathematically lower $E^{\ominus}$ red value undergoes oxidation.

(c) $H^2O \rightarrow 2H^+ + \frac{1}{2} O_2 + 2\ e^- = E^{\ominus}$ red = + 1.23 V but due to overvoltage actual $E^{\ominus}$ = + 1.66 V $\therefore O_2$ is not liberated if X^- are present.