

D. B. College (Jaynagar), Electrochemistry

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Lect. → 5 . B. Sc (II) sub.

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(b) Faraday's second law: This law states that the amounts of different substances deposited at electrodes by passage of the same quantity of electricity are proportional to their chemical equivalent (E).

If w_1 and w_2 be the amounts of two different substances deposited at electrodes and E_1 and E_2 be the equivalent weight then -

$$\frac{w_1}{w_2} = \frac{E_1}{E_2}$$

Combining the two laws

$$w \propto ItE \quad w = \frac{ItE}{F} \quad \text{where } \frac{1}{F} \text{ is proportional constant and } F \text{ is called Faraday.}$$

when $It = F$ then $w = E$

Hence Faraday (F) is quantity of charge in Coulombs required to deposit one g equivalent of any substance.

- ◆ The Faraday (F) is the quantity of charge carried by one mole of electrons.

$$F = e N = 1.6 \times 10^{-19} \times 6.023 \times 10^{23} = 96500 \text{ Coulombs}$$

EX: The same current if passed through solution of silver nitrate and cupric salt connected in series. If the weight of silver deposited is 1.08 g. Calculate the weight of copper deposited

Sol:- According to Faraday's second law

$$\frac{W_1}{W_2} = \frac{E_1}{E_2} \Rightarrow \frac{1.08}{W_2} = \frac{108}{31.75} \Rightarrow W_2 = 0.3175 \text{ g}$$

7. ELECTRO CHEMICAL CELL / GALVANIC CELL / VOLTAIC CELL:

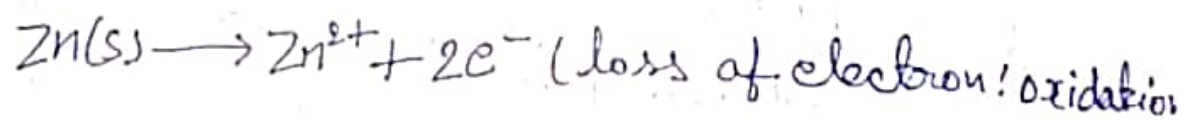
EXAMPLE - Daniel Cell

- ◆ A Cell in which the chemical energy is transformed into electrical energy.
- ◆ The chemical reaction occurring in a galvanic cell is always a redox reaction.
- ◆ During the chemical process, the reduction

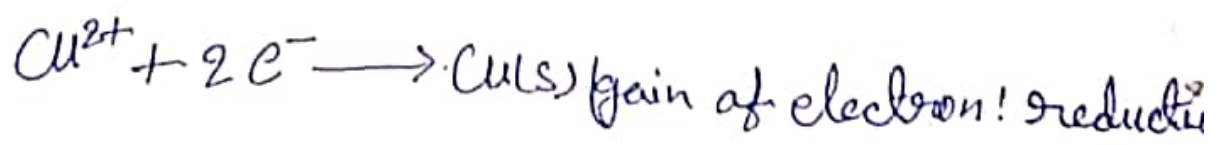
in free energy will obtain as a result in the form of electrical energy.

Galvanic Cell is made up of two half cells i.e., anodic and cathodic. The cell reaction is of redox kind. Oxidation takes place at anode and reduction at cathode. It is also known as voltaic cell. It may be represented as shown in fig. Zinc rod immersed in $ZnSO_4$ behaves as anode and copper rod immersed in $CuSO_4$ behaves as cathode.

Oxidation takes place at anode:



Reduction takes place at cathode:



Over all process:



In galvanic cell like Daniell cell; electrons flow from anode (zinc rod) to the cathode (copper rod) through external circuit; zinc dissolves as Zn^{2+} ; Cu^{2+} ion the Cathode cell picks up two electron and become deposited at cathode.

