SNS COLLEGE OF TECHNOLOGY

Vazhiamyampalayam,Coimbatore-35

(An Autonomous institution)

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DEPARTMENT OF CHEMISTRY

COURSE NAME : 19CHB102- ENGINEERING CHEMISTRY FOR ELECTRICAL SCIENCES

I YEAR / II SEMESTER

UNIT : 1. ELECTROCHEMISTRY

TOPIC : 1. INTRODUCTION TO ELECTROCHEMISTRY

•Electrochemistry is a branch of chemistry which deals with thestudy of chemical reactions produced by passing electric currentthrough an electrolyte or the production of electrical energy bychemical reactions.

•Simply, Electrochemistry deals with inter conversion of electrical energy and chemical and vice versa.

Electrochemical Terms and Conventions

The following terms and conventions must be adopted for the electrode reaction, electrode potential and electrochemical cell.

Current

•It is the flow of electrons through a conductor.

Conductor

Conductor is a material that allows electric current to pass through it. Conductance is the ability of a material to conduct the electricity.

Examples : All metals, graphite, aqueous solution of acids and bases and fused salts. The conductors are broadly classified into two types :

I)Metallic conductors. (b) Electrolytic conductors

•Metallic Conductors or Electronic Conductors

Metallic conductors are the solid substances that conduct electricity without producing chemical reaction. conduction of electricity is only due to movement of electrons *Examples :* All metals, graphite, etc.

•Electrolytic Conductors

Electrolytic conductor is the solution that conduct electricity byproducing chemical reaction. Here, conduction of electricity is only due to movement of ions. The chemical reactions take place at the electrode surface.

Examples : Acids, bases, salts, etc.

DEFINITION

S.No	Metallic Conductors	Electrolytic Conductors
1	It involves the flow of electrons.	It involves the flow of ions.
2	Chemical reactions does not occur.	Chemical reactions occur at Electrode surface.
3	It does not involve any transfer of matters.	It involves transfer of ions From one electrode to another.
4	Conduction decreases with increase in temperature.	Conduction increases with increase in temperature

Electrolytic conductors are further classified into three types. They are as follows:

•**Strong Electrolytes:**Strong electrolytes are substances, which ionise completely almost at all dilution.

Examples : HCl, NaOH, NaCl, KCl, CH3COONa, etc.

•**Weak Electrolytes :** Weak electrolytes are substances which ionise to a very small extent even at high dilution.

Examples : CH3COOH, NH4OH, CaCO3, BaSO4,AgCl, etc.

•**Non Electrolytes :** Non electrolytes are substances whichdo not ionize at any dilution.

Examples : Glucose, sugar, alcohol, benzene, petrol, etc.

•**Non-conductor or Insulator**

Non-conductor or insulator is the materials which do not allow electricity to pass through it.

Examples : Wood, plastics, non-metals, etc

Electrolyte

Electrolyte is a water soluble substance forming ions in solution and conducts electricity.

Electrode

Electrode is a metallic rod/bar which conducts the electricity.

In electrochemical cells, there are two electrodes:

Anode where oxidation takes place.

Cathode where reduction takes place.

Anodic Compartment

It contains anode metal and its electrolytic solution whereoxidation reaction occurs.

Cathodic Compartment

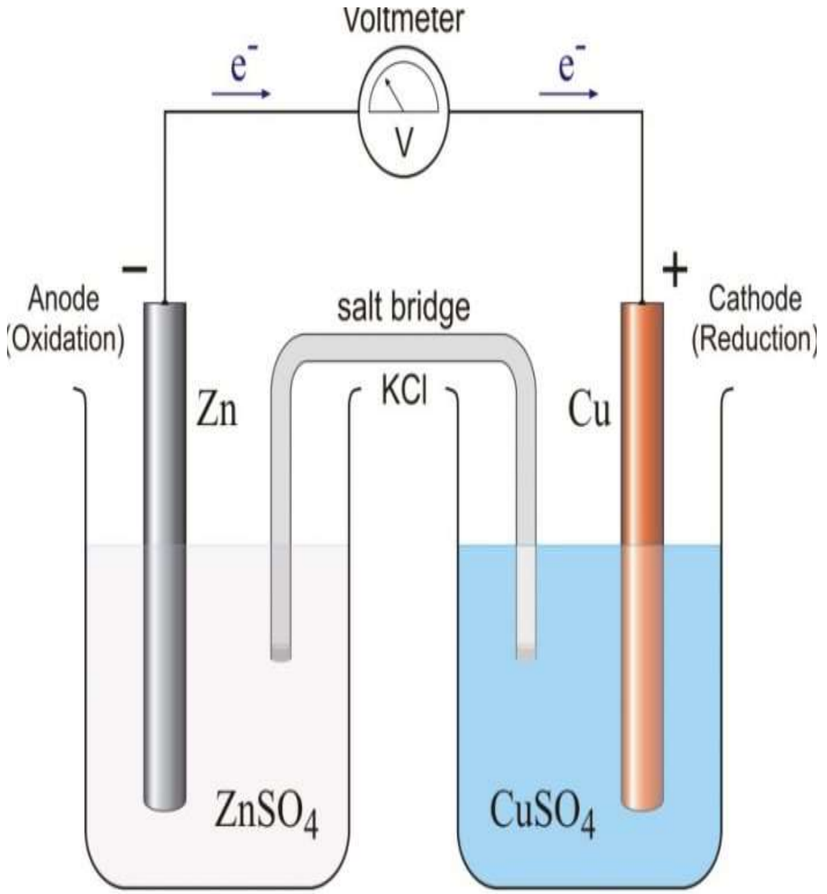
It contains cathode metal and its electrolytic solution wherereduction reaction occurs.

Half Cell

It is a part of the cell. It containing electrode dipped in electrolytic solution.If oxidation occurs at the electrode then it is called oxidationhalf cell.If reduction takes place at electrode then it is called reductionhalf cell.

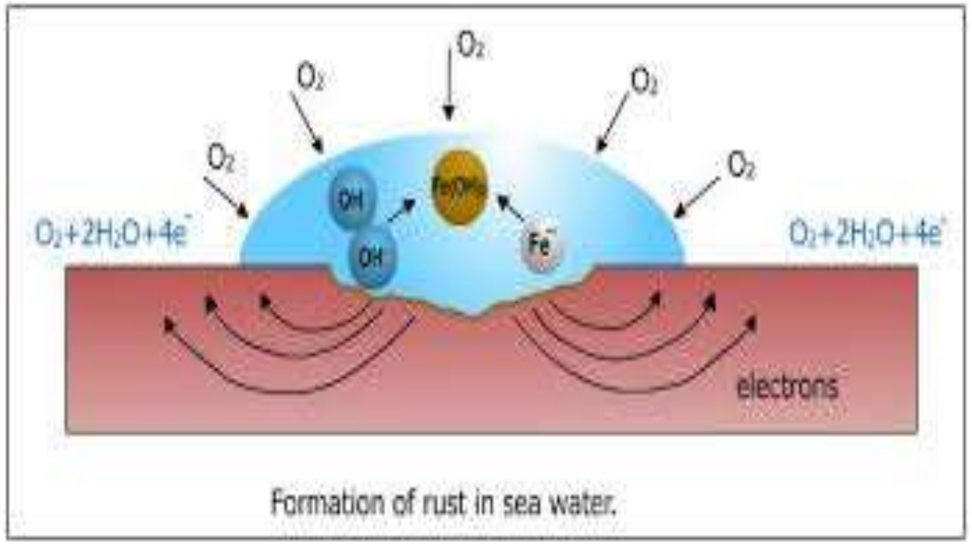
Cell

A cell is a single arrangement of two electrodes and anelectrolytic solution capable of yielding electricity due to chemica lreaction within the cell or producing chemical reaction by passing Electricity through the cell.



RUSTING

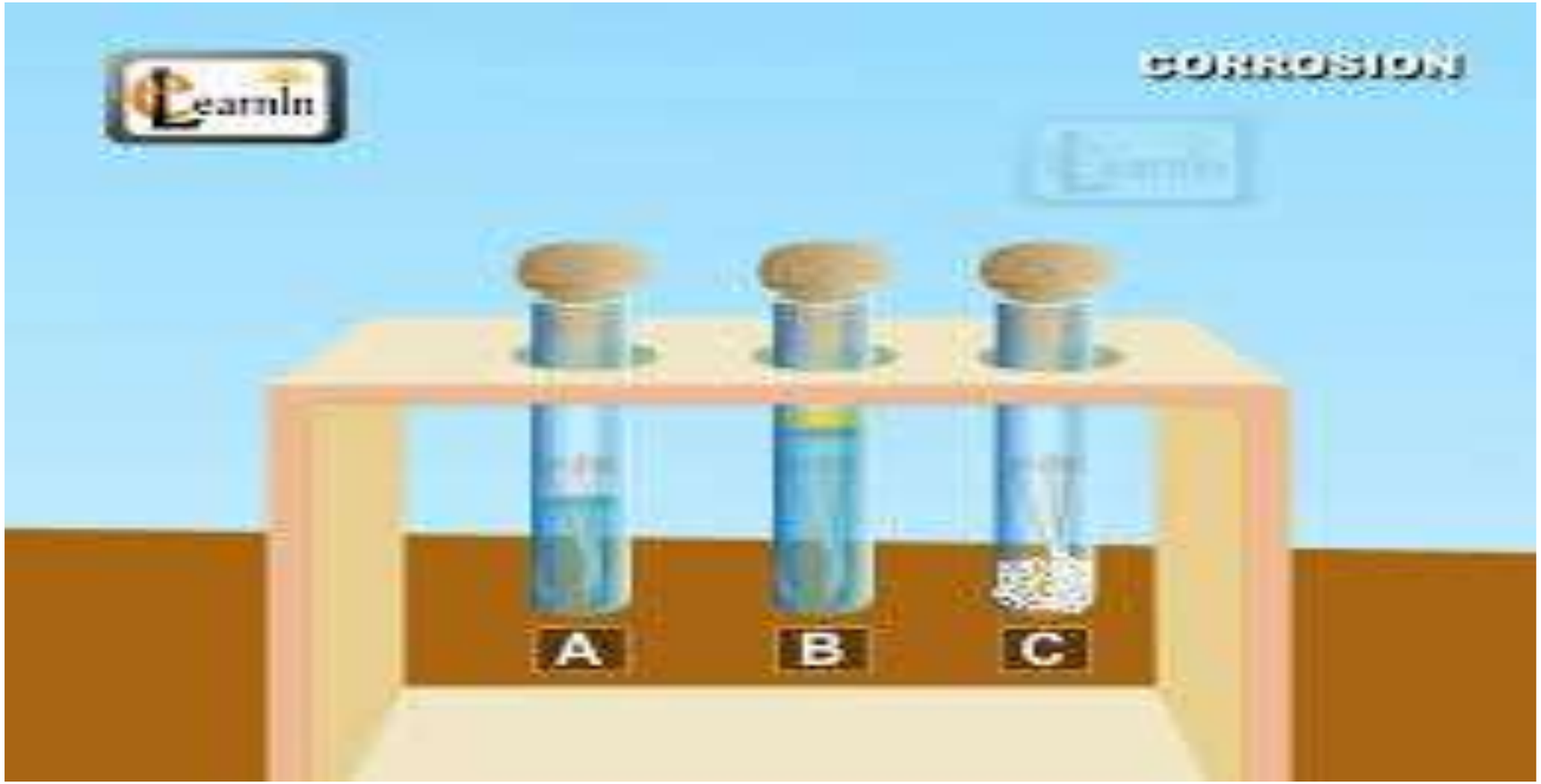
- The special name given to corroded Fe.
- Chemically it is $Fe_2O_3.x\ H_2O$



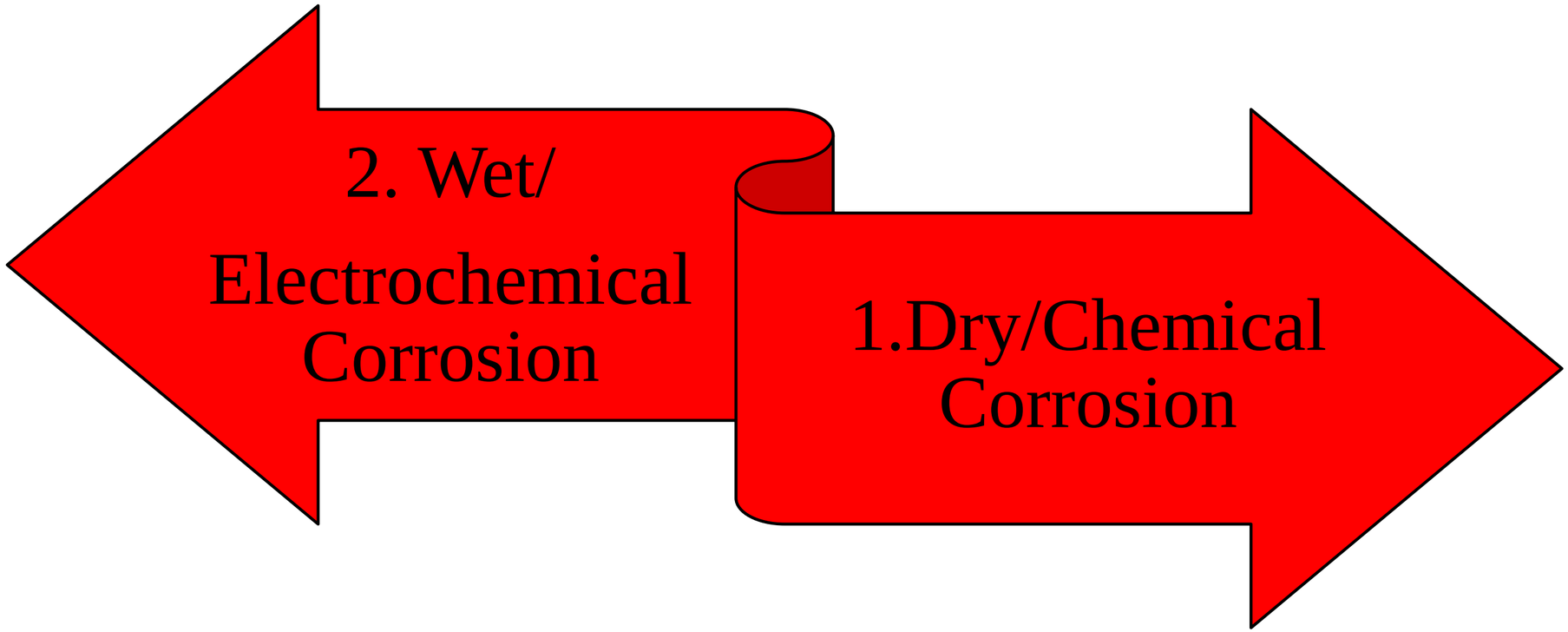
Formation of rust in sea water.

Activity

EFFECTS / CONSEQUENCES OF CORROSION



CLASSIFICATION



1.DRY/CHEMICAL CORROSION

DRY CORROSION

- It takes place due to direct chemical action of atmospheric gases like CO_2 , SO_2 .

It is of three types

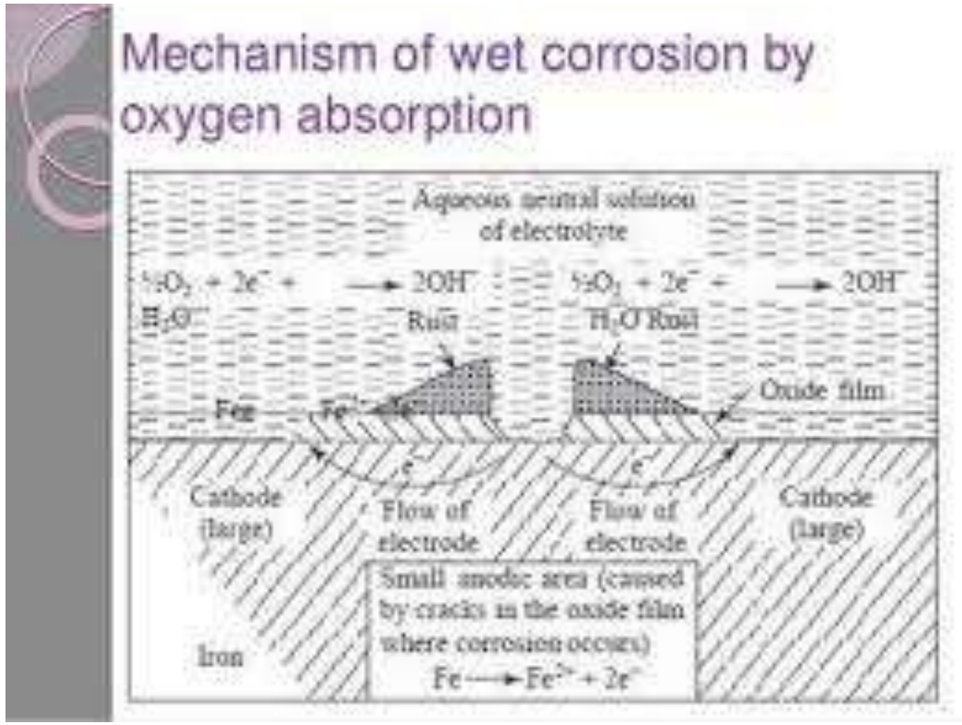
1) *Oxidation corrosion* :- It takes place by direct action of oxygen on metal. It occurs in absence of moisture . It mostly occur at ordinary temperature.

2.WET (OR) ELECTROCHEMICAL CORROSION

It occurs in the following 2 Conditions:

❖When 2 dissimilar Metals /alloys contact with each other in Aq. Soln. / moisture.

❖Metal exposed to varying conc. of O_2/ any electrolyte.



ASSESSMENT

1. Corrosion of metals involves

(a) Physical reactions (b) Chemical reactions (c) Both (d) None

2. Corrosion causes

(a) Economic problem (b) safety problem (c) both a & b (d)none

3.Rusting is

(a) Corrosion of Al (b) Corrosion of Cu (c) Corrosion of Fe (d) Corrosion of Sn

4.The metal which does not undergo corrosion is

(a) Gold (b) Aluminium (c) Iron (d) none of these

5.Corrosion can be prevented by

(a) Painting (b) Selecting proper metal (c) Alloying (d) all of these

SUMMARY

REFERENCES

1. O.G. Palanna, “Engineering Chemistry ”Tata McGraw-Hill Pub. Co. Ltd, New Delhi.2017.
2. Wiley, “Engineering Chemistry”, John Wiley & Sons. InC, USA.
3. P.C.Jain & Monicka Jain, “Engineering Chemistry” , Dhanapat Rai Publising Company Pvt. Ltd. 2017.

THANK YOU