What do you mean corrosion? Indicate causes of corrosion?

When metals are opened exposed to atmospheric conditions, they react with air or water present in the surrounding medium to form undesirable compounds (usually, oxides). This process is called Corrosion.

Example:-

All metal except noble metals.

Silver tarnishes, Copper develops a green coating, Lead or stainless steel lose their lustre due to corrosion.

Corrosion causes very big damage to buildings, bridges, ships and many other articles made of Iron.

(*) Causes of corrosion:-

most of the metals occurs in nature in the combined state form of oxides, sulphides and carbonates. The chemically combined states of metals known as ores have lower energy and are stable. During extraction of metals from their ores energy is supplied. The extracted metals can be

Metals try to go back to their original state by combining with the components, present in the environment i.e gases, moisture, and liquid etc.

Q What do you mean by corrosion? How it is harmful for civilisation?

This is the process corrosion occurs and oxides, sulphides, chlorides, sulphate etc. are formed.

Metallic ore + Energy $\underset{\text{Corrosion metal}}{\overset{\text{Extraction of metal}}{\rightleftharpoons}}$ Pure metal

(Combined state of metal) (Reaction with atmosphere)

Although corroded metal is more stable than pure metal but due to corrosion useful properties of metal such as malleability, ductility and electrical conductivity are lost.

Q What do you mean by corrosion? How it is harmful for civilisation? or Indicate Effect of corrosion.

→ Harmful for civilisation because of corrosion of metal are as follows below:—

(1) metal loses its useful properties because of corrosion

(ii) Corroded pipes may lead to leakage of inflammable and toxic gases resulting to fire hazards, toxic gases lead to environmental pollution and affect the civilisation adversely.

(iii) Food packed in metal container maybe spoiled.

(iv) Frequent replacement of corroded parts in machine decreases the efficiency and increases the cost of production.

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Mechanism of Corrosion:—

Types of Corrosion: — mechanism of

There are two types of corrosion:—

(1) Atmospheric corrosion or Direct Chemical Corrosion or Dry corrosion:—

This type of corrosion occurs when metals come directly in contact with atmospheric gases ~~like O_2, CO_2, Cl_2 or H_2S etc. These~~ like O_2, CO_2, Cl_2, H_2S etc in the absence of moisture, therefore, it is also called as ~~These are of three~~ dry corrosion.

$M \longrightarrow M^{2+} + 2e$

$\frac{1}{2}O_2 + 2e^- \longrightarrow O^{2-}$

$M^{2+} + O^{2-} \longrightarrow MO$

metal ion oxygen ion (metal oxide)

Oxide formation takes place first at the surface of the metal. Further corrosion of metal depends upon the nature of the metal.

→ In case of alkali and alkalin earth metal like Na, Ca, Mg etc. a thin oxide film is formed on the metal surface. This film is porous in nature.

→ In case of heavy metal like Cu, Pb, Sn etc, a thick and non-porous oxide film is produced on the metal surface.

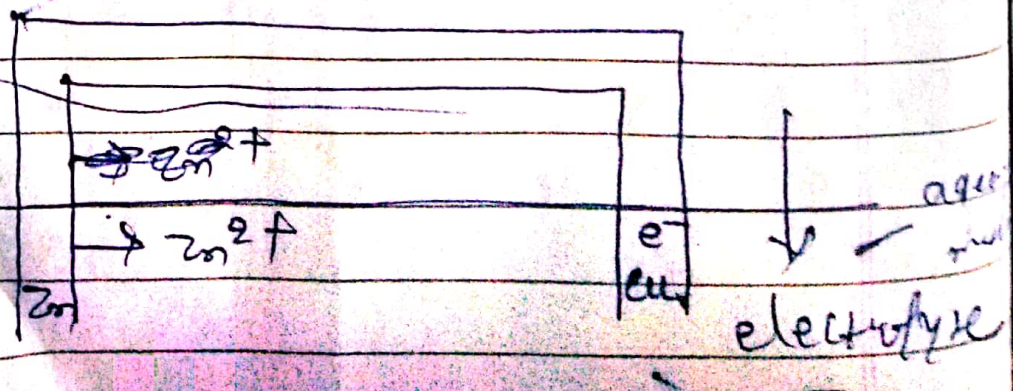
→ Chlorine forms a layer of AgCl on the surface of metal.

(II) Wet or Electrochemical corrosion or Immersed corrosion:-

some aqueous solutions. The system involves the formation of electrolytic cells either galvanic or concentration cell depending upon the nature of the metal and surrounding medium, which ultimately promote the corrosion of metal.

(1) Galvanic corrosion:—

When two dissimilar metals eg. zinc and copper are electrically connected and exposed to an electrolyte. In this cell more active metal like Zn behaves as anode and the less active metal like Cu behaves as cathode.

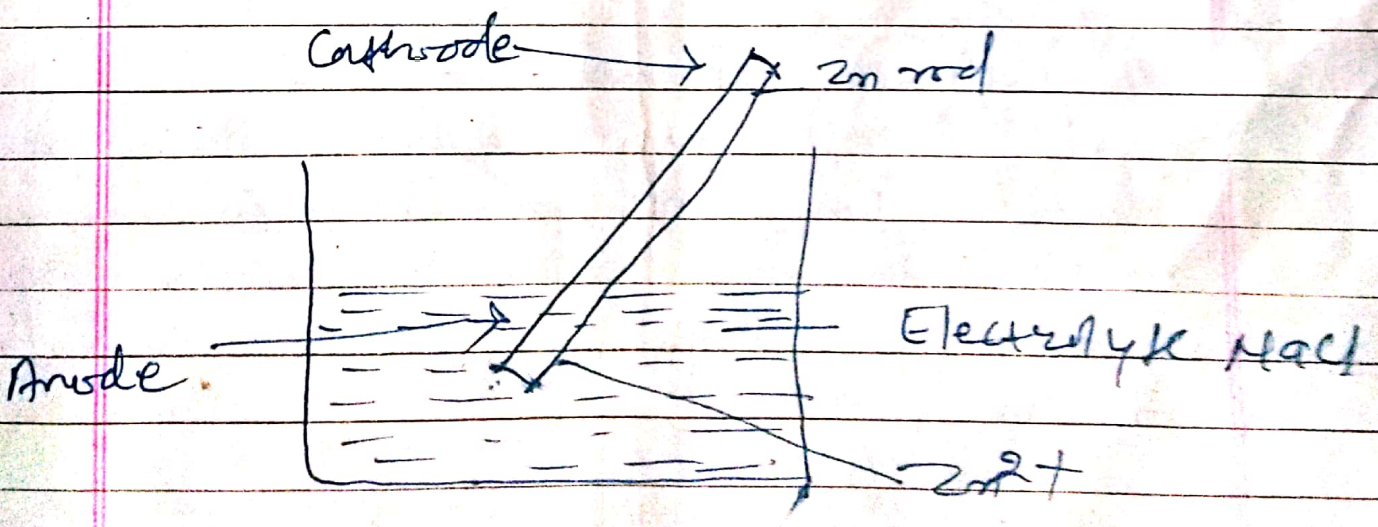


Mechanism:— The electron current flows from the anodic metal zinc, which undergoes corrosion, to the cathodic metal (copper). Thus corrosion occurs at the anodic metal, while the cathodic part is protected from the attack.

(11) Concentration cell Action:— This type of corrosion occurs when a metal surface is exposed to an electrolyte of varying conc^{n} or varing aeration.

For Example:—

When a metallic surface is partially immersed in an electrolyte and partially exposed to air, concentration cell corrosion takes place.



Poor oxygenated metallic part becomes anode and undergoes oxidation

$$Zn \longrightarrow Zn^{2+} + 2e^-$$

Well oxygenated metallic part becomes cathode where reduction take place.

$$\frac{1}{2}O_2 + H_2O + 2e^- \longrightarrow 2OH^-$$

$$Zn^{2+} + 2OH^- \longrightarrow Zn(OH)_2$$

Hence corrosion occurs at anode.

(*) Preventions and control of corrosion:-

Ans:- Corrosion can be controlled and Prevented are as follows:-

1. Internal measure
   (I) purification of metal
   (II) By alloy formation

(I) Purification of metals:-
pure metals are better corrosion resistant. Impurities present in a metal make it more prone to corrosion. So metals are purified to prevent them from corrosion.
For example:-
metal like mg and Al in their pure state form a adherent protective oxide film which behaves to