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Introduction:

Metals and alloys undergo rusting and corrosion. The process by which some metals when exposed to atmospheric condition i.e., moist air, carbon dioxide form undesirable compounds on the surface is known as corrosion, The compounds formed are usually oxides.Rusting is also a type of corrosion but the term is restricted to iron or products made from it .Iron is easily prone to rusting making its surface rough. Chemically, rust is a hydrated ferric oxide

Titanic's bow exhibiting microbial corrosion damage in the form of 'rusticles'

Rusting an Electrochemical Mechanism ; Rusting may be explained by an electrochemical mechanism. In the presence of moist air containing dissolved oxygen or carbon dioxide, the commercial iron behave as if composed of small electrical cells. At anode of cell, iron passes into solution as ferrous ions. The electron moves towards the cathode and form hydroxyl ions. Under the influence of dissolved oxygen the ferrous ions and hydroxyl ions interact to form rust, i.e., hydrated ferric oxide.

Methods of Prevention of Corrosion and Rusting

Some of the methods used to prevent corrosion and rusting are discussed here :

- Barrier Protection ; In the method , a barrier film is introduced between iron surface and atmospheric air. The film is obtained by painting, varnishing etc.
- Galvanization ; The metallic iron is covered by a layer of more reactive metal such as zinc. The active metal losses electrons in preference of iron. Thus, protecting from rusting and corrosion.

Galvanized Metals

Aim of the project;

In this project the aim is to investigate effect of the metals coupling on the rusting of iron. Metal coupling affects the rusting of iron . If the nail is coupled with a more electro-positive metal like zinc, magnesium or aluminium rusting is prevented but if on the other hand, it is coupled with less electro – positive metals like copper , the rusting is facilitated.

Requirement:

1. Two Petri dishes
2. Four test – tube
3. Four iron nails
4. Beaker
5. Sand paper
6. Wire gauge
7. Gelatin
8. Copper, zinc & magnesium strips
9. Potassium ferricyanide solution
10. Phenolphthalein

Procedure;

1. At first we have to clean the surface of iron nails with the help of sand paper.

2. After that we have to wind zinc strip around one nail, a clean copper wire around the second & clean magnesium strip around the third nail. Then to put all these three and a fourth nail in Petri dishes so that they are not in contact with each other.
3. Then to fill the Petri dishes with hot agar agar solution in such a way that only lower half of the nails are covered with the liquids .Covered Petri dishes for one day or so.
4. The liquids set to a gel on cooling. Two types of patches are observed around the rusted nail, one is blue and the other pink. Blue patch is due to the formation of potassium ferro-ferricyanide where pink patch is due to the formation of hydroxyl ions which turns colourless phenolphthalein to pink.

Observation;

S.No.	Metal Pair	Colour of the patch	Nails rusts or not
1.	Iron- Zinc		
2.	Iron – Magnesium		
3.	Iron- Copper		
4.	Iron – Nail		

Conclusion :

It is clear from the observation that coupling of iron with more electropositive metals such as zinc and magnesium resists corrosion and rusting of iron. Coupling of iron with less electropositive metals such as copper increases rusting.