

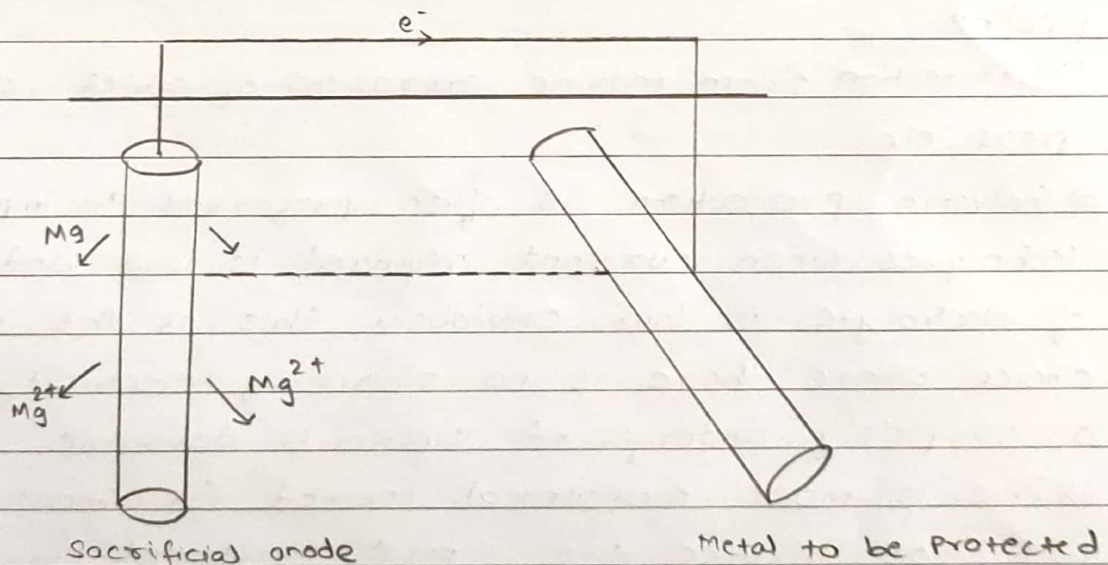
05/08/21

Engineering Chemistry

Corrosion - Tutorial 3

- 1.) Explain cathodic protection by sacrificial anode method with the help of a neat labeled diagram.

Ans 1.) In galvanic protection, a more active metal is connected to the metal structure to be protected so that all the corrosion is concentrated at the more active metal and thus saving the metal structure from the corrosion. The more active metal itself gets corroded slowly while the parent structure is protected. The more active metal so employed is called 'sacrificial anode'.



Cathodic Protection using Sacrificial anode

The corroded sacrificial anode block is replaced by a fresh one, when consumed completely.

Examples of sacrificial Anodic metal:

- 2) Metals commonly used as sacrificial anodes are magnesium, zinc, aluminium and their alloys. Magnesium has the most negative potential and can provide highest current output and hence is widely used in high resistivity electrolytes such as soil.
- 3) Zinc is used as sacrificial anode in good electrolytes such as sea water. Aluminium anodes are also used but the more noble oxides films formed on them may create problems in some cases.
- 4) Important Applications of cathodic protection include:
 - (i) Protection from soil corrosion of underground cables and pipeline.
 - (ii) Protection from marine corrosion of cables, ship hulls, piers etc.
- 5) Galvanic protection is often preferred to impressed current techniques when current required is low and resistivity of electrolyte is low. Obviously, this is the method of choice where there is no source of electricity and when a completely underground system is desirable.
- 6) This is most economical method for short term protection because the capital investment is low.

2) Distinguish between anodic coating and cathodic coating.

Ans

Anodic Coating

Cathodic Coating.

1) Protects the underlying base metal sacrificially.

1) Protects the underlying base metal due to its noble character and higher corrosion resistance.

2) Electrode potential of coating metal is lower than that of the base metal.

2) Electrode potential of coating metal is higher than that of base metal.

3) If pores, breaks or discontinuities occur in such a coating, the base metal is not corroded, till all the coating metal is consumed.

3) If pores, breaks or discontinuities occur in such a coating, the corrosion of the base metal is speeded up.

4) Coating of zinc on iron is an example of anodic coating.

4) Coating of tin on iron is an example of cathodic coating.

3) Define Paint and give the requirements of a good paint.

Ans. Paint is defined as a mechanical dispersion or mixture of one or more pigment in a vehicle. It is a viscous suspension of finely divided solid pigment in a fluid medium which on drying yields an impermeable film having considerable hiding or obliterating power. The medium or vehicle consists of non-volatile film forming materials like drying oils and resins in a suitable volatile solvents called thinners. When a paint is applied to a properly treated metal surface, the thinner evaporates leaving behind the film forming materials and the pigments on the surface. Driers like metallic soaps are added in case of drying oil to accelerate film formation.

2) Requirements of a good paint:

- (1) It should form a good, impervious and uniform film on the metal surface so that effective protection from corrosion is achieved.
- (2) It should have high covering power.
- (3) The film should not crack on drying.
- (4) It should have good resistance to the atmospheric conditions in which it is used.
- (5) It should have the required consistency for the required purpose so that it can be spread on the metal surface easily.
- (6) It should give a glossy film.
- (7) It should give a stable and decent colour on the metal surface.
- (8) The film produced should be washable.