

**DEPARTMENT OF CHEMISTRY****PART – A****1. Define Corrosion. What are the consequences of corrosion**

Corrosion is defined as the gradual destruction of metals or alloys by chemical or electrochemical reaction with its environment.

1. Efficiency of the machine is lost due to corrosion products
2. Products get contaminated due to released toxic products
3. Corroded equipment must be replaced frequently
4. Failure of plants
5. Necessary of over designing to compensate corrosion.

2. List out the differences between dry corrosion and wet corrosion

S. No	Chemical corrosion	Electrochemical corrosion
1	It occurs only in dry condition	It occurs in the presence of moisture or electrolyte
2	It is due to the direct chemical attack of the metal by the environment	It is due to the set up of large number of cathodic and anodic areas.
3	Even a homogeneous metal surface get corroded	Heterogeneous surface (or) Bimetallic contact is the condition.
4	Corrosion of the product accumulate in the same place where corrosion occurs	Corrosion occurs at the anode, while products formed elsewhere.
5.	Chemical corrosion is self-controlled	Electrochemical corrosion is continuous process.
6	It follows absorption mechanism	It follows electrochemical mechanism.
7.	Formation of mild scale on the iron surface	Rusting of the iron on the moist surface.

3. Define inhibitors. Mention their types

A corrosion inhibitor is a substance which reduces the corrosion of a metal, when it is added to the corrosive environment.

Types of Inhibitors

1. Anodic Inhibitors
2. Cathodic Inhibitors
3. Vapour Phase Inhibitors

4. What is Pilling-Bedworth rule?

The ratio of the volume of the oxide formed to the volume of the metal consumed is called "Pilling-Bedworth ratio"

5. What are vapour phase corrosion inhibitors? Give an example



Vapour Phase Inhibitors (VPI) are organic inhibitors which readily vapourise and form a protective layer on the metal surface. VPI are used in the protection of storage containers, packing materials, etc.

Examples: Dicyclohexylammonium nitrate, benzotriazole etc

6. What are paints?

Paint is a viscous, opaque (not clear), mechanical dispersion mixture of one or more pigments (dye) in a vehicle (drying oil).

7. What are fire retardant paints?

Fire retardant paints are protective, decorative coating designed to reduce the spread of flames in the event of a fire.

Fire retardant paint is formulated with special additives that help slow the spread of flames in the event of a fire. These additives are typically based on phosphorus or nitrogen compounds, which react when exposed to heat and flame, creating an oxygen-starved environment that slows down or stops the spread of fire

8. Comparison of Sacrificial anode method and impressed current cathodic current method

S.No	Sacrificial anode method	Impressed current method
1	External power supply is not required	External power supply is required
2	The cost of investment is low.	The cost of investment is high.
3	This requires periodical replacement of sacrificial anode	Replacement is not required as anodes are stable
4	Soil and microbiological corrosion effects are not considered	Soil and microbiological corrosion effects are taken into account.
5	This is the most economical method especially when short term protection is required	This is well suited for large structures and long term operations.
6	This is a suitable method when the current requirement and the resistivity of the electrolytes are relatively low.	This is a suitable method when the current requirement and the resistivity of the electrolytes are relatively high.

9. What is meant by Nanochemistry?

It is defined as the study of phenomena and manipulation of materials at atomic, molecular and macromolecular scales.

10. What are nanoparticles?

Nanoparticles (NPs) are solid particles or particulate dispersions with a size in the range between 1 and 100 nm. Example: ZnO, CdS, SiO₂

11. How do nanomaterials differ from bulk materials ?

Nano-particles	Bulk particles
Size is less than 100nm	Size is larger in micron size
Collection of few molecules	Collection of thousands of molecules
Surface area is more	Surface area is less
Strength, hardness are more	Strength, hardness are less



12. What is top-down approach? Give an example

It involves conversion of larger particles into smaller particles of nano-scale structure.

This method is carried out by the following process.

1. Laser ablation
2. Chemical Vapour Deposition (CVD)
3. Electro-deposition

13. What is Bottom up approach? Give an example

It involves building-up of materials from the bottom by atom by atom, molecule by molecule or cluster by cluster. This method is carried out by the following process

1. Chemical precipitation method
2. Thermolysis
 - (a) Solvothermal method
 - (b) Hydrothermal method
3. Solgel method
