

Type: MCQ

Q1. Which of the following is a characteristic feature of polycatenar liquid crystal? (0.5)

2. ** Elongated shape with half disc on the extreme ends

Q2. The micellar assemblies in lyotropic liquid crystals lead to the formation of either (0.5)

3. **Hexagonal or lamellar phase

Q3. The role of complexing agent in electrodeposition process is to (0.5)

1. **Maintain low metal ion concentration

Q4. The throwing power in an electrodeposition process is a measure of the tendency of the plating bath to (0.5)

4. ** Give uniform coating irrespective of the shape of the object

Q5. Liquid metal corrosion is due to (0.5)

1. **Corrosion of a solid metal due to the flow of a liquid metal at higher temperature

Q6. Which is TRUE in case of sacrificial anode protection? (0.5)

- 3.**The metal to be protected is converted in to the cathodic part of the corrosion cell

Q7. Which combination shows minimum rate of galvanic corrosion? (0.5)

2. **Zn and Fe

Q8. Identify the corrosion product formed when ferrous hydroxide is exposed to an environment with limited supply of oxygen (0.5)

1. ** $2\text{Fe}_3\text{O}_4 \cdot 6\text{H}_2\text{O}$

Q9. An example of a neutral refractory material is (0.5)

3. ** Cr_2O_3

Q10. Which among the following is TRUE for a structural composite? (0.5)

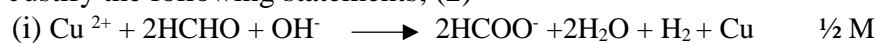
4. **The strength increases with each successive layer in laminar composite

Q1. Identify the type of corrosion –Pitting corrosion $\frac{1}{2}$ M

Explanation for pitting corrosion- Formation of small pits/holes on the surface of metal. Characterized by small anodic and large cathodic area. Autocatalytic nature of pitting corrosion $\frac{1}{2}$ M

The factor which is responsible for enhancement of corrosion- **relative anodic and cathodic area**. Smaller the anodic area and larger the cathodic area, higher will be the corrosion rate. Small number of electrons released at the anodic region are easily consumed by the large cathodic region. This leads to increase in the rate of cathodic reaction which in turn increases the rate of anodic reaction **1 M**

Q2. Justify the following statements; (2)



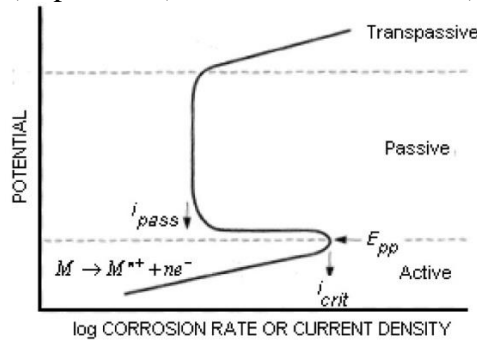
Since OH^- are used up continuously, optimum pH is maintained during electroless plating with copper $\frac{1}{2}$ M

(ii) In chromium plating the metal going into the solution is five times of the metal getting deposited, resulting in the building up of excessive chromic acid (Cr-III) concentration.

Chromium metal becomes passive in the strongly acidic bath and a black deposit is formed on the cathode. 1 M

Q3. Definition of passivity- certain metals/alloys loses its activity and undergo passivation in the surrounding environment under specific conditions ½ M

Plot of oxidising power (or potential) VS corrosion current (or corrosion rate) ½ M



Explanation for the graph 1 M

Q4. (i) Any two difference between, 1 M

Continuous aligned fiber reinforced

- i. Possesses maximum load bearing capacity
- ii. Strength is maximum along the orientation of fiber than perpendicular
- iii. Anisotropic in nature

Discontinuous randomly aligned

- i. Comparatively less load bearing capacity
- ii. Bears the uniform load from all the direction
- iii. Isotropic in nature

(i) Any two differences between, 1 M

Large particle:

- i. The dispersion phase is harder and stiffer than matrix phase
- ii. Particle size is large and present in large conc.
- iii. The dispersed phase bears the major portion of the applied load

Dispersion strengthened

- i. Particle size is very small and hard are uniformly dispersed within the matrix phase
- ii. Particle size is small and present in small conc.
- iii. The matrix bears the major portion of an applied load and the small dispersed particles hinder the motion of dislocations.

Q5. Name the specific type of liquid crystal used in a numeric display system -Chiral nematic or twisted nematic (TND) liquid crystal ½ M

On state OR off state diagram ½ M

working principle of numeric display system 1 M

A numeric display consists of seven segments for each digit. Light from the area of each of the seven segments is controlled independently and is used to create any one of the ten digits.

In twisted nematic displays (TND), the nematic LC is sandwiched between two ITO coated glass plates with parallel (homogeneous) alignment of its molecular director with the glass walls. However, the two glass plates are twisted by 90° relative to each other.

When the electric field OFF= The LC molecules rotate the plane polarized by 90° and it pass through the second polarizer and hence display appears bright

When the electric field in ON= The LC molecules orient themselves along the direction of applied field. The plane polarized light is not rotated by the LC molecules and it will not pass through the second polarizer and hence display appears dark.