

20/04/21

Corrosion

Why?

Metals (except noble metals) \rightarrow exist associated forms
 $SO_4, CO_3, Cl_2 \dots$

Metals with salts $\xrightarrow[\text{spent}]{\text{Energy}}$ pure metal
High Energy

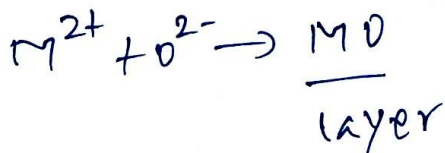
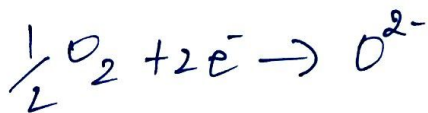
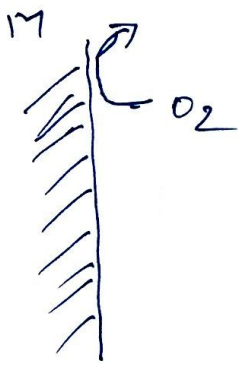
Pure metals $\xrightarrow[\text{reach}]{\text{tends to}}$ ~~salt~~ salt state
 \downarrow
corrosion

Definition: spontaneous destruction

Types and mechanism

✓
CHEMICAL
corrosion

Absence of moisture
No (H₂O)



oxide layer

stable, unstable
volatile, porous

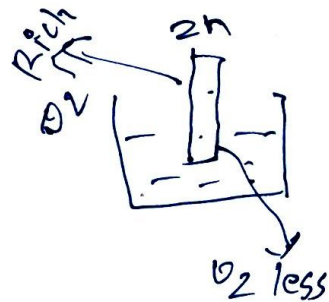
≧
Electrochem
(or)
wet
(or)
localized
corrosion

(in H₂O)

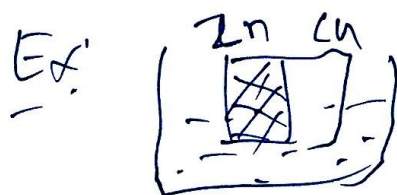
✓
Galvanic
↓

↓
Differential
Aeration

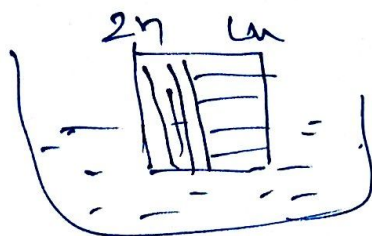
Two
dissimilar
metals



oxidative anode
Reductive cathode

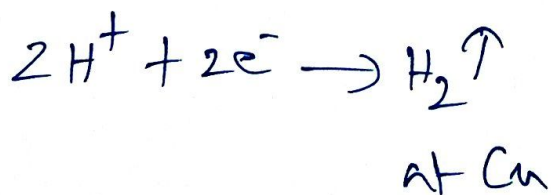


Galvanic

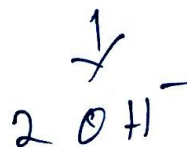
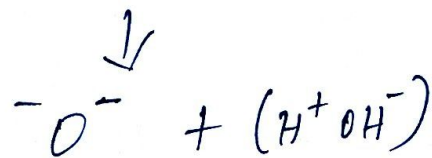
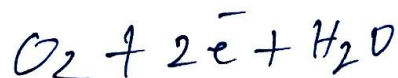


Cathodic at Reductive (Cu)

Acidic

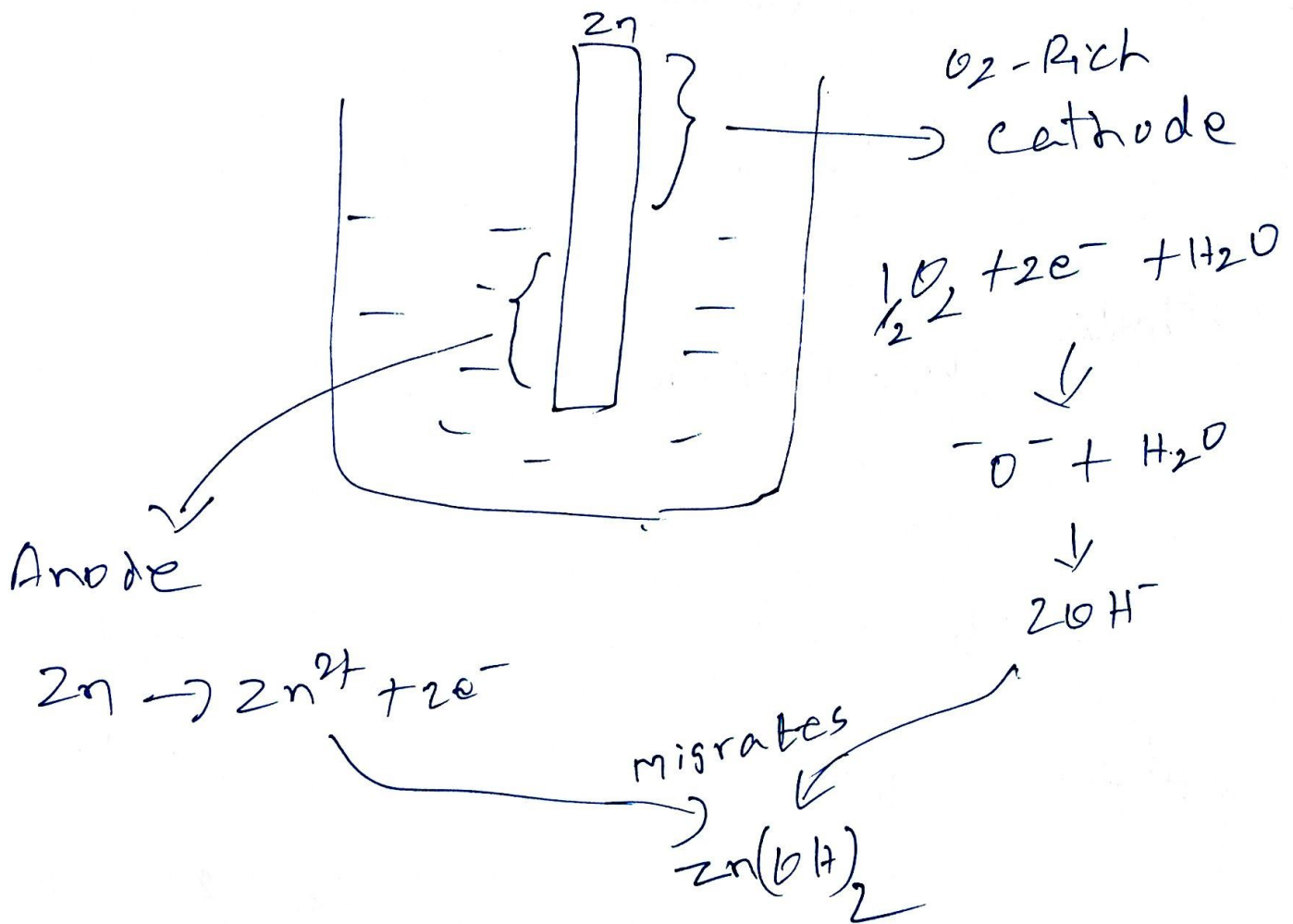


neutral (or)
alkaline



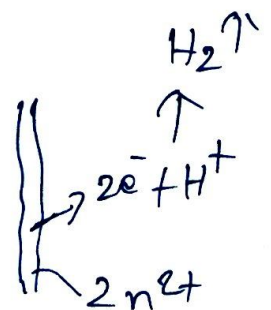
Differential aeration

Difference in O_2 concentration

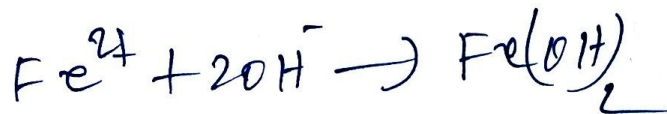
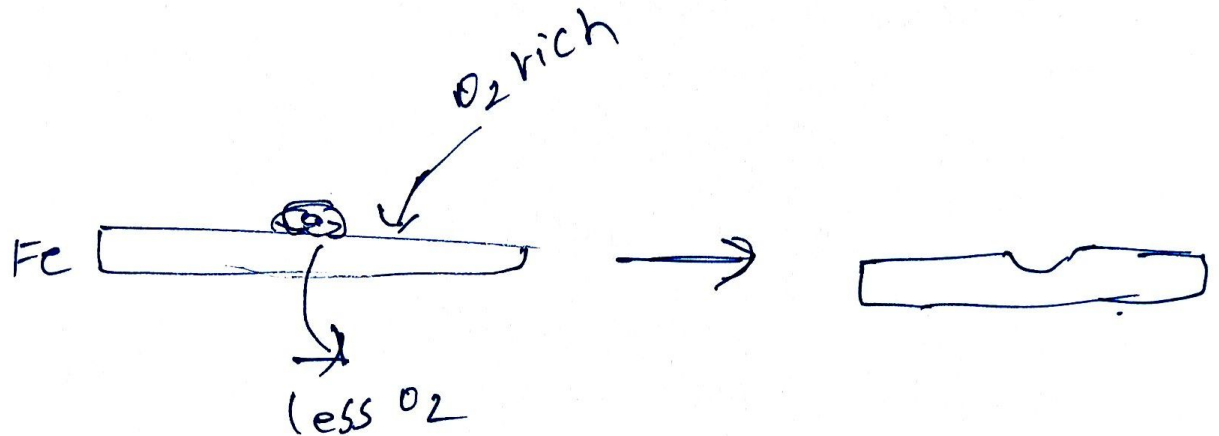


In Case Acidic

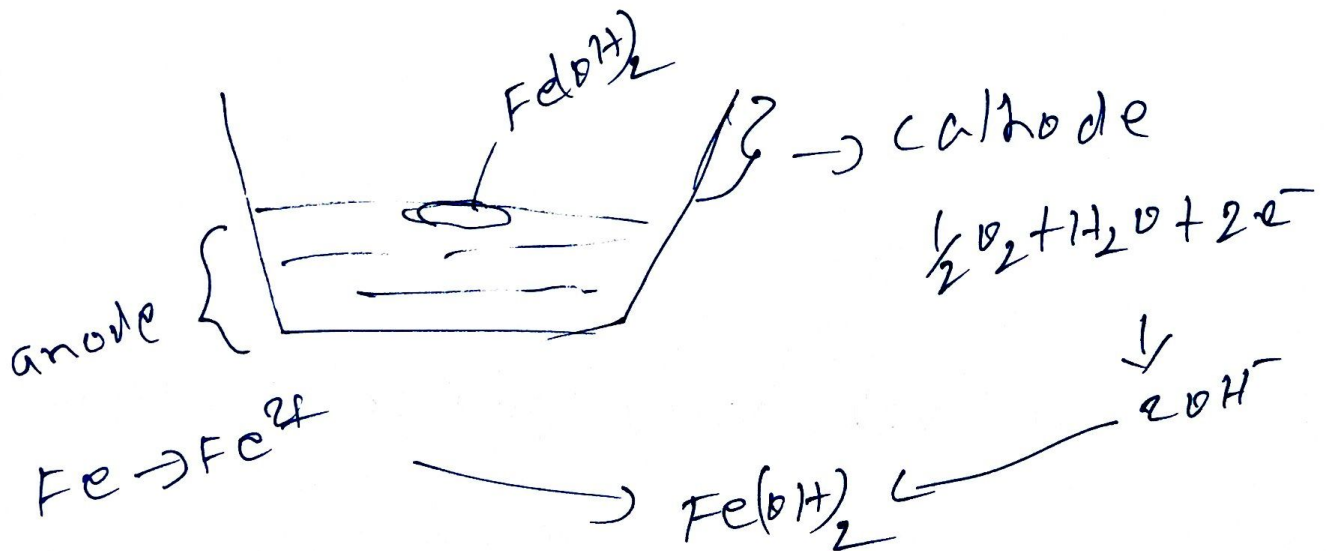
every atom - anode
every adjacent atom - cathode



Pitting Corr.




Waterline Corrosion




Galvanic series

Metals & Alloys \rightarrow Corrosion
tendency

w.r. to 

Corroding
medium

H₂O, sea water, pH, Temperat.

a series 

Position will vary w.r. to medium, concret

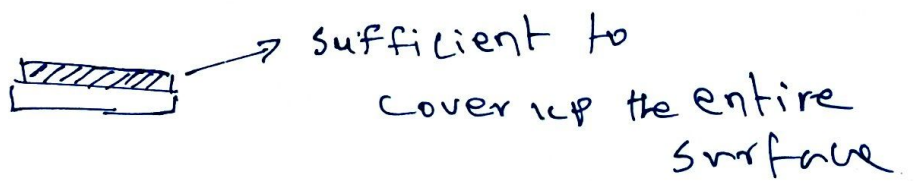
Difference Galvanic | EMF

Pilling - Bedworth Ratio

Oxide layer porous (or) nonporous?

$$PBR = \frac{\text{volume of meta oxide}}{\text{volume of metal}}$$

$PBR > 1$ Non porous protective



$PBR < 1$ Porous non-protective

