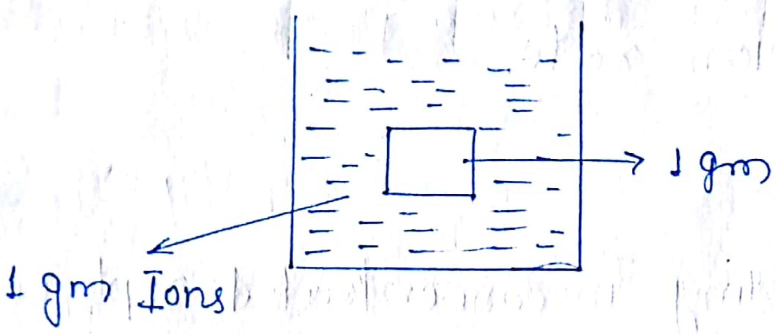
'Corrosion'



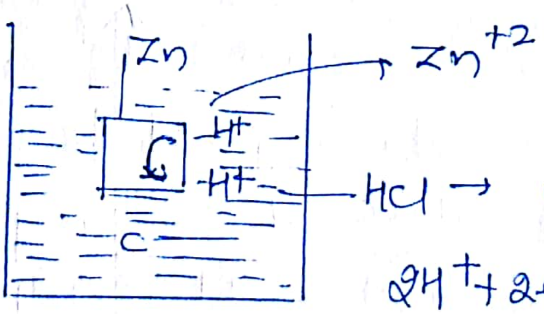
H_2/H^+ emf = 0

when 1 gm. of material is immersed into 1gm. of its ions, there will be some potential diff. b/w ions and material called emf. This emf is called self potential

→ larger the self potential more will be corrosion rate

→ Every material present in world will corrode includeny graphite

→ Self potential of hydrogen is almost insignificant, that's why we take it as a ref. atom



$HCl \rightarrow H^+ + Cl^-$

$2H^+ + 2e^- \rightarrow H_2 \uparrow$

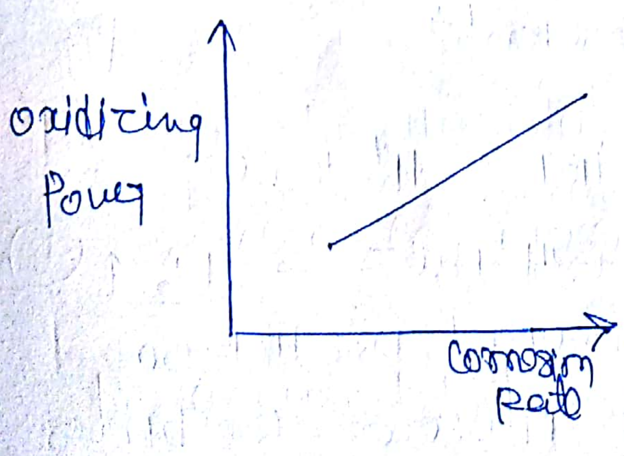
when Zn material is immersed in HCl so there will be flow of e^-. These e^- combines with hydrogen ion present on surface and ~~production~~ produce hydrogen gas. But for the circuit to get completed, ions of material will come out to the solution it is called 'corrosion rate'

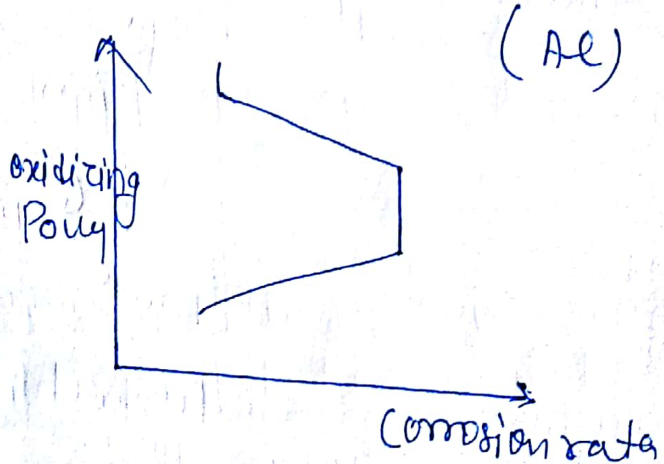
→ More is potential diff. b/w material & surrounding More will be corrosion rate.

Polarization

Suppose the surrounding in concentrated replace the H^+ ion near surface of material will be delayed. This will decrease corrosion rate and also material will be charged This phenomena is called polarization.
The moment there is some turbulence in atmosphere around the material corrosion rate will again increase.

Oxidizing Power





—Passivity

oxidizing power of any material can be increase by flow of Nescent O_2 to the environment for most of materials by increasing oxidizing power, corrosion rate also increase. But there are certain materials like 'Al' where intially there will be a corrosion but it forms a thin layer of Al_2O_3 over it which is a ceramic and ceramic are having high anti corrosion properties. This will derease corrosion rate. This phenomena is called 'passivity'

Forms of Corrosion

① Uniform Corrosion

- Uniform theroughout the surface

② Galvanic corrosion :-

Pt, Gold, Graphite, Ti, Ag., Ni, C, Bronze, Cu, Brass, Sn, Pb
CI, Steel, Cd, Al, Zn, Mg

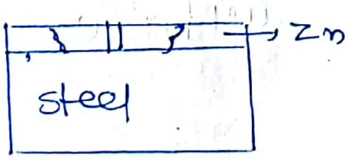
(Cathode) ⟶ (Anode)

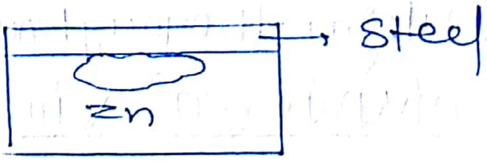
If any alloy has to be prepare element should be selected which are very close in galvanic series, larger is the diff. in galvanic series, More will be the potential diff and hence more will be corrosion of anode.

→ suppose we need to protect any material from corrosion a material is selected from anodic side and attached with cathodic material anode will be consumed and cathode will be protected.

→ The way corrosion is taking place in material is e^- are coming out of it so corrosion of that material can be prevented by supplying current to it or in other words giving e^- back to material and this is accomplished by connecting it to a battery

③ Area effect





when a thin layer of Zn is coated over steel and if there is a small hole on surface concentration of e^- will be very high through this hole, this leads to rapid corrosion of anodic material.

④ Crevice corrosion : whenever there are riveted / Bolted jointed dust will be accumulated in these regions. This produce acidic atmosphere which leads to corrosion The way to avoid this corrosion is to use welded joint.

To see microstructure of any material, after polishing it is dipped into some etchent or chemical. This creates corrosive enviroment to the material. Grain boundries will corrode more (because of larger bond length) and different phase extent of corrosion will be different. That is the we are able to see different regions under invented optical microscope (1600 x)

⑤ Stress Corrosion :-

when material are overstresed dueing tightening, there will be some microcracks in material near the fasteners. These cracks will corrode first under acidic enviroment.

eg. NH_3 enviroment for brass so gradually size of crack keeps on increasing and once the crack reaches a particular value sample will be divided in 2 parts

→ when we have to use two material in any application sometime insulating material are provided b/w them, by this way whole burden of corrosion will not Fall only on anodic material

* one way of surface corrosion can be taken care of ~~or~~ is by providing allowance to corrosion.