÷ Unit – 5 ÷ (Material of Pharmaceutical Plant construction)

→ In pharmaceutical industry diff types of material, equipment are used which is made by diff. 2 materials

→ (i) During the manufacturing process the equipments bears high pressure and high temprature so the selection of material to plant construction should be choose in very effective ways

÷ Factors affecting the selection of material ÷

The selection of material for plant construction is depends upon basicaly three factors.

(i) Chemical Factor
(ii) Physical Factor
(iii) Economics

(1) Chemical Factor :-

The construction material should be inert because when drug material comes in contact with instrument then it should not be reacts.

- Chemicaly it depends upon two factors.

(A) Contamination Process :- If the material of construction such as iron, glass, and plastic are mixed with the drug then drug will be contaminated and their odour taste, and action their can be change

(B) Corrosion of Material :- Some drug material such as strong acidic, strong basic. Tannin and Alkaloid are corrosive in nature so they react with the construction material and destroy the container so material should be non corrosive in nature.

(2) Physical Factors :-

(i) Strength :- In the some manufacturing process of pharmaceutical products high pressure and high stress condition are involved so the strength of material should be very high so such material are used

Ex - Cast iron are used for making die and punchase in tablet punching machine.

(B) Mass :- Mass of material is consider for packing material for making transportation easy due to light weight.

(C) Wear Properties :- When their is possibility of friction b/w two particles b/w two surfaces then the soft surface material can be contaminated the product.

(D) Thermal conductivity :- In some operations such as drying and evaporation high temp is required so we should choose the material of high conductivity and thermal stability.

(E) Thermal Expansion :- Some materials like plastic and rubber expanied in high temp so their shape and size is change so for such operations those materials are used which are thermostable.

(F) Ease of Fabrication :- Material should be soft so during manufacturing it can be easily converted into diff shape.

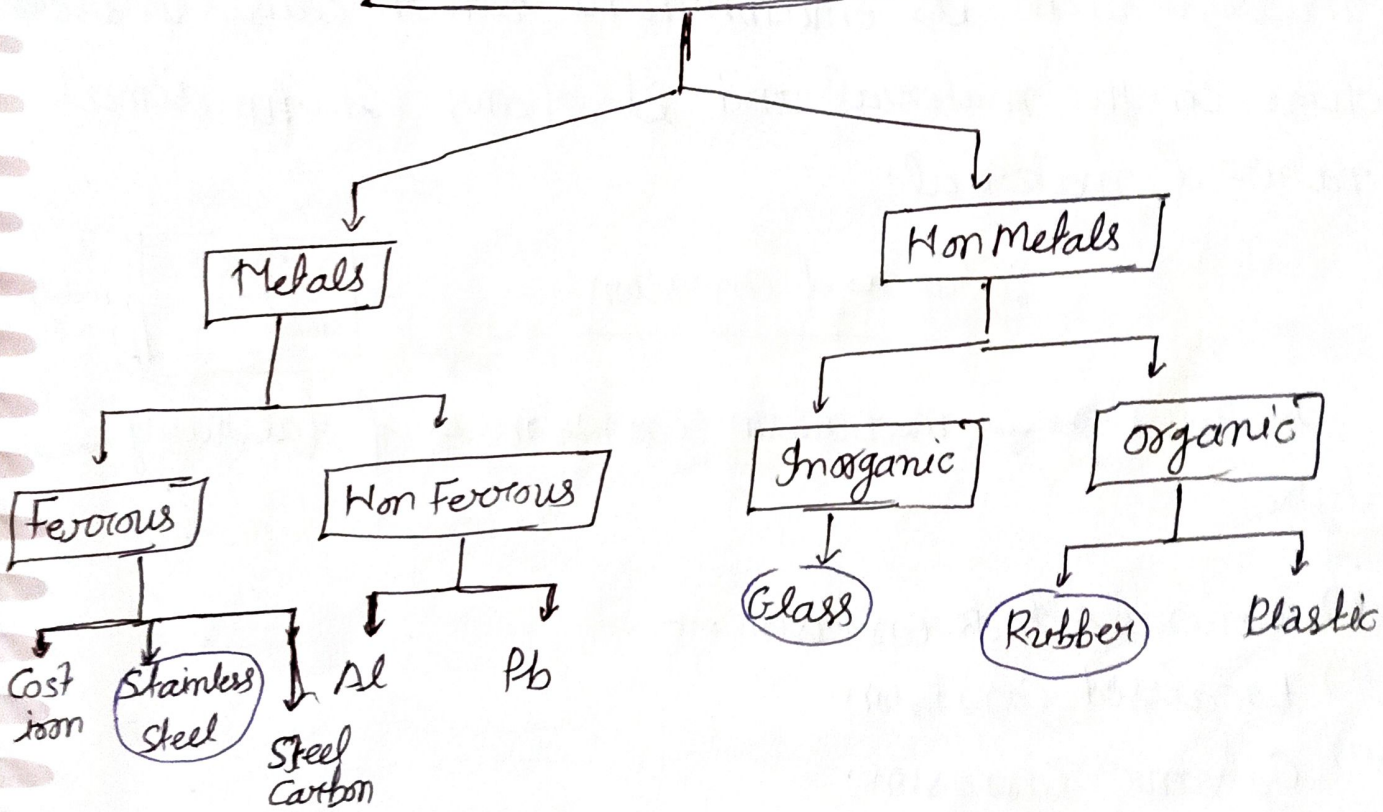
(G) Cleaning :- Smooth and polished surface can be easily clean

(4) Sterilization :- Sterilization in value pressure and temp and material should be stable with it.

(3) Economic factors :-

Before the manufacturing of product the budget and size should be considered.

:- Material used for Plant construction :-



∴ Corrosion ∴

Corrosion is a natural process in which the metal surface after reaction with atmosphere converted into most stable form of metal such as metal oxide; metal hydroxide etc.

By the corrosion there are gradual distruction of material by chemical or electrochemical reaction.

⇒ Corrosion can be defind as the rxn of metalic material with its environment which causes undesirable chages in the material and it change the functional nature of material.

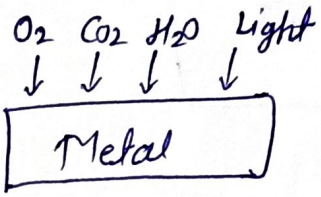
∴ Types of corrosion ∴

On the basis of mechanism corrosion is of following type:

(i) General Attack corrosion.
(ii) Localised Corrosion.
(iii) Galvanic Corrosion.
(iv) Environmental Cracking
(v) FAC (Flow assisted corrosion)
(vi) De-allaying.
(vii) Fretting Corrosion.

(1) General Attack corrosion :- It is the most common type of corrosion which is caused be chemical or electrochemical reaction this corrosion is deteriorate (ख़राब होना) the all surface of metal

- This type of corrosion is predetermined and can be managed.



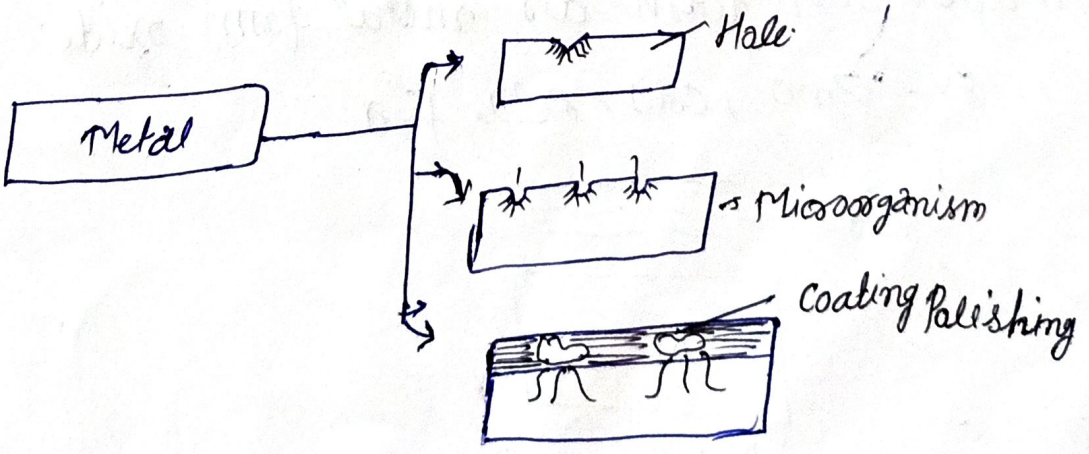
(2) Localised Corrosion :- This type of corrosion is seen on any local and general area.

It is of three types.

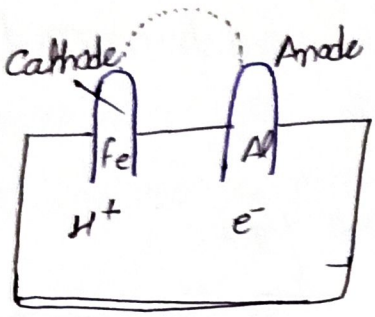
(A) Pitting :- A small hole.

(B) Crevice Corrosion :- By Microorganism.

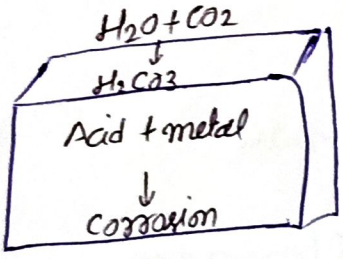
(C) Filiform :- Under Painted surface.



(iii) Galvanic Corrosion:- In this type corrosion is seen where two types of metals are present in which one behave like anode and others behave like cathode and started electrochemical reaction.

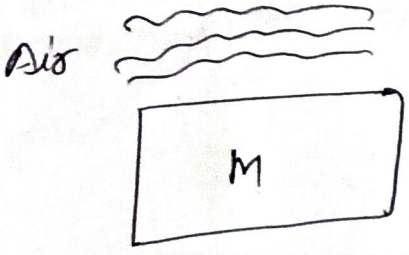


(iv) Emissonmental Cracking:- This is affected by the emissonment when material is exposed in emissonment then by the effect of rain, sunlight, air, and humidity the outer surface of metal it degenerate.



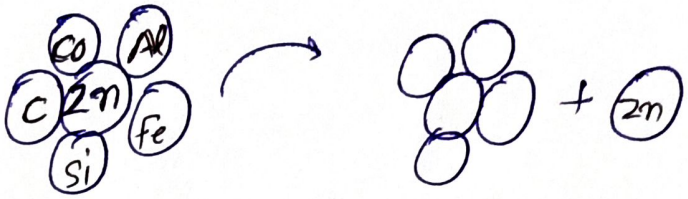
(v) FAC (Flow assisted corrosion):- When metal is put in air then after rxn with air metal form oxide.

Ex- ZnO, CaO, Al_2O_3, FeO



$M + O_2 \rightarrow MO_2$ (metal oxide)

(VI) De-Alloying:- Alloy are the materials which is made up of mixture of many metals and if after corrosion any one metal is remove this is called Alloying.



(VII) Fretting Corrosion:- Fretting corrosion is generally found in rotation and impact mechine which exposed to vibration during transportation.