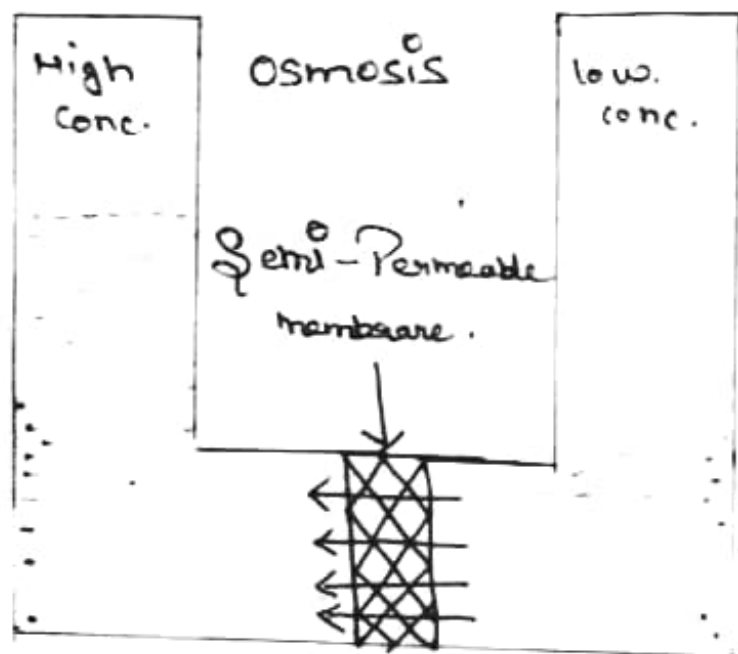


Basic ~~chemistry~~ chemistry Engineering

Topic - Water Treatment

Q. \Rightarrow With the help of suitable sample/display discuss reverse osmosis process for the treatment of hard water.

Ans. \Rightarrow * Reverse osmosis is the opposite process of osmosis.

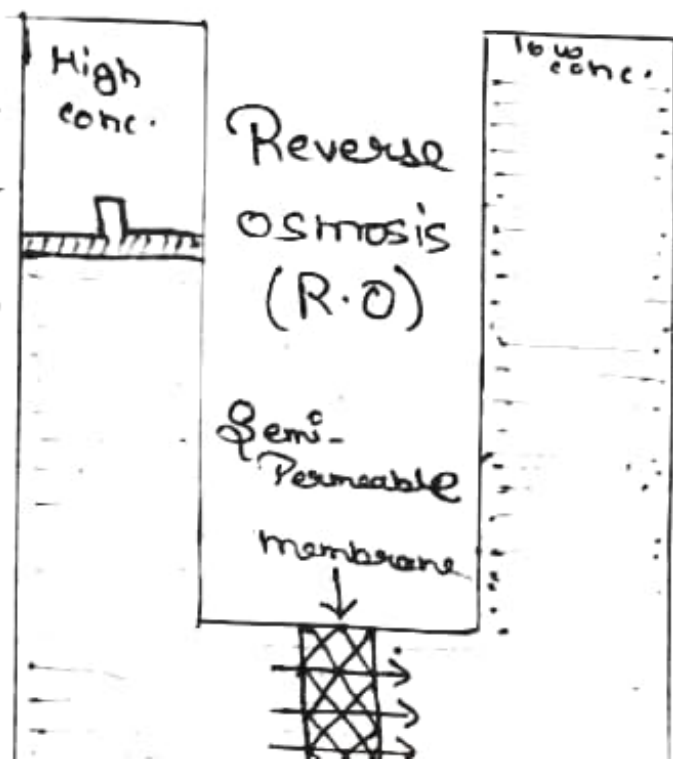


* This ~~Process~~ Figure is shown as the Process of Osmosis.

* This process is that the solvent move to low conc. region to High conc. region through the semi-permeable membrane (SPM). The Process takes continue till the both the region is equal that Pressure is known as osmotic Pressure.

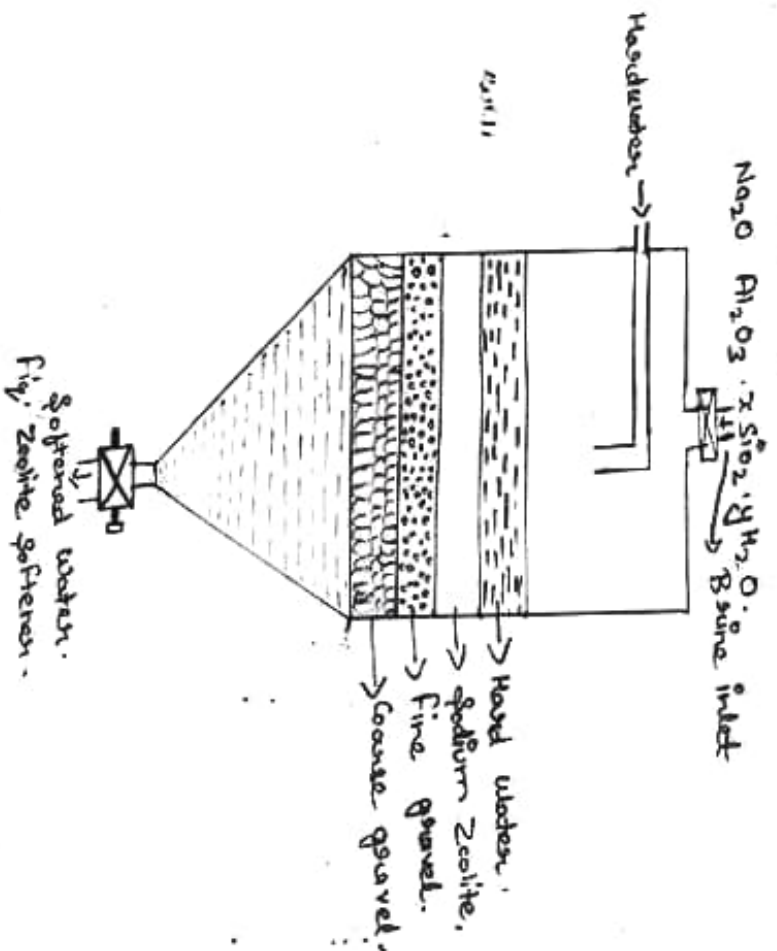
* This Fig. shown as the Process of Reverse osmosis.

* This Process which is that the hydrostatic Pressure more than the osmotic Pressure then the solvent move to High conc. Region to low conc. Region through the semi-permeable membrane (SPM). then, this Process is known as Reverse osmosis (R.O).



Q2. Briefly explain the construction and working of Zeolite process for the treatment of hard water?

Ans. Zeolite Process:-



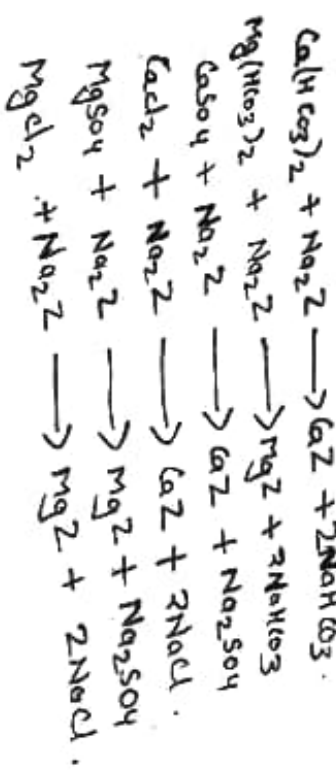
* Construction:- When the well-shaped container is divided into blocks. First block fill

the hard water through the pipe. Second block filled by sodium zeolite and third block filled by fine gravel and fourth block filled by coarse gravel. And, the last block filled by soft water. Produces by treated the blocks. Upper bottom side. Pressure the Brine inlet and lower bottom side. Pressure the outlet. Then, the whole treatment plant is known as Zeolite softener.

* Working:-

In this process, hard water passes at a gradual rate through a bed of active granular sodium zeolite softener, when Ca^{+2} and Mg^{+2} ion are taken up by the zeolite as CaZ and MgZ respectively, while the outgoing water contains equivalent amount of sodium salts.

* The chemical reactions taking place in Zeolite softener are:-



* Small quantities of iron and manganese, present as the divalent bicarbonates, may also get removed simultaneously.



* Zeolite process removes both temporary as well as permanent hardness of water.

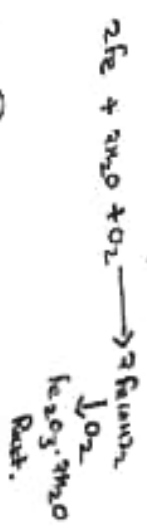
* Regeneration:- After some time, the zeolite is completely changed into calcium and magnesium zeolites, then it gets exhausted (saturated with Ca^{+2} and Mg^{+2} ions) and it ceases to soften water. It can be regenerated and reused by treating it with a 10% brine (sodium chloride) solution.

conditioning.

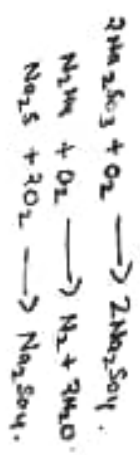
Major scale formation is prevented by calcium conditioning.

Boiler corrosion:-

(i) Dissolved Oxygen:- In water at very high temp, attacks boiling water.



Removal:- By sodium sulphide, hydrazine or sodium sulphide.

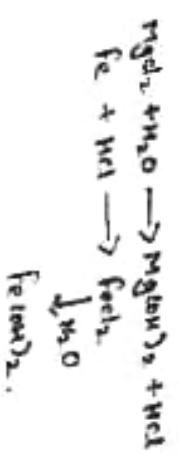


(ii) Dissolved CO_2 :-
 $CO_2 + H_2O \longrightarrow H_2CO_3$ (Slow reaction).

Removed by NaOH.

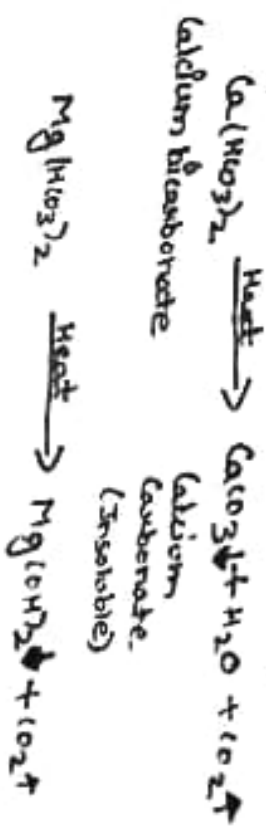


iii, Acids from dissolved salts.



excess calcium and magnesium. When hard water is heated, such as in a home water heater, solid deposits of calcium carbonate can form.

* The temporary hardness of water is removed by boiling of water, where bicarbonates are decomposed producing insoluble carbonates or hydroxides.



(Q5:-) Write a note on priming and foaming.

Ans:- When a boiler is producing steam very rapidly.

Some water particles are carried along with the steam. The process of wet steam formation is called priming. It is due to:-

- * The presence of large quantities of alkali sulphate and chloride in water.
- * Sudden boiling.
- * Sudden increasing in steam production rate.
- * Improper boiler design.

* Foaming is persistent formation of foam on liquid in the boiler, which do not break easily. It is due to the presence of oil. (Reduces the surface tension of water).