



SNS COLLEGE OF TECHNOLOGY

Vazhiampalayam, Coimbatore-35

(An Autonomous institution)

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DEPARTMENT OF CHEMISTRY

COURSE NAME : 19CHB101- CHEMISTRY FOR ENGINEERS

I YEAR / I SEMESTER

UNIT : 4. WATER AND INSTRUMENTAL ANALYSIS

TOPIC : 5.ION EXCHANGE METHOD





GUESS IT



What is the reason behind these images?



WHY WATER SOFTENING?

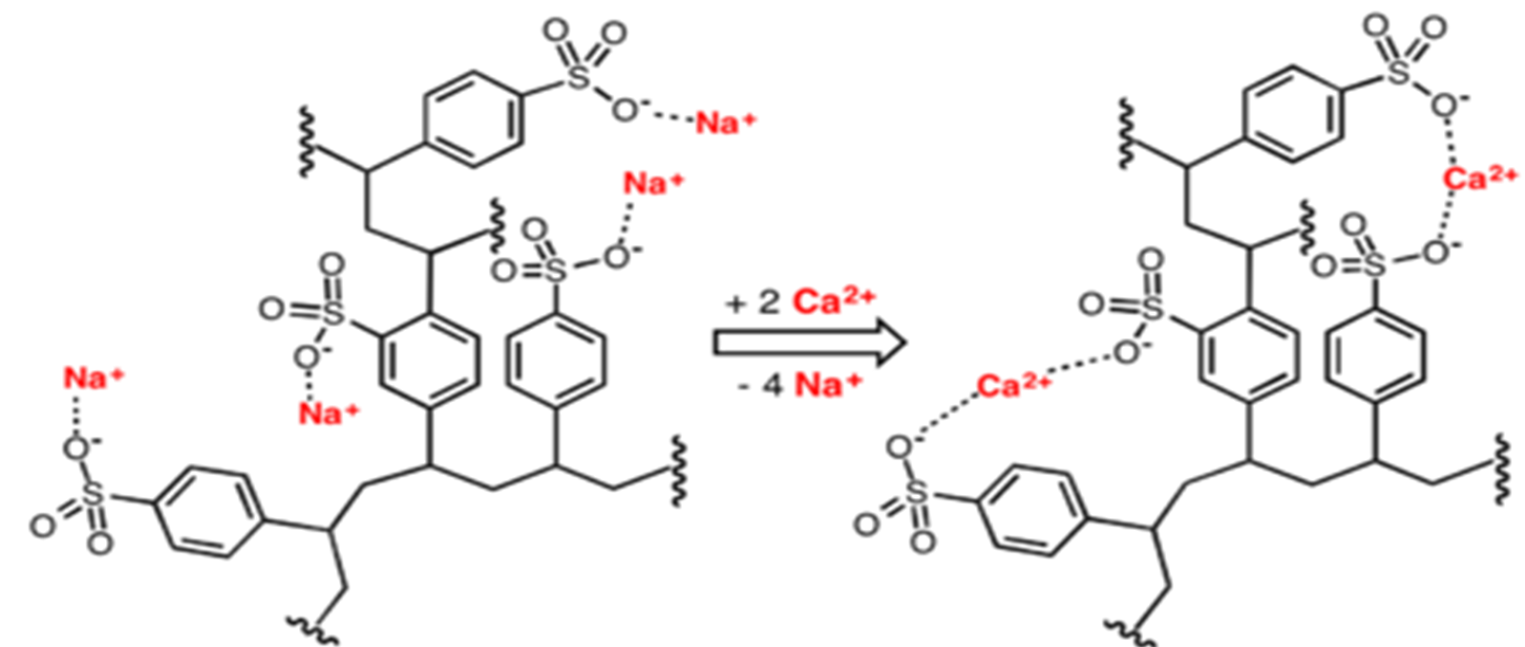
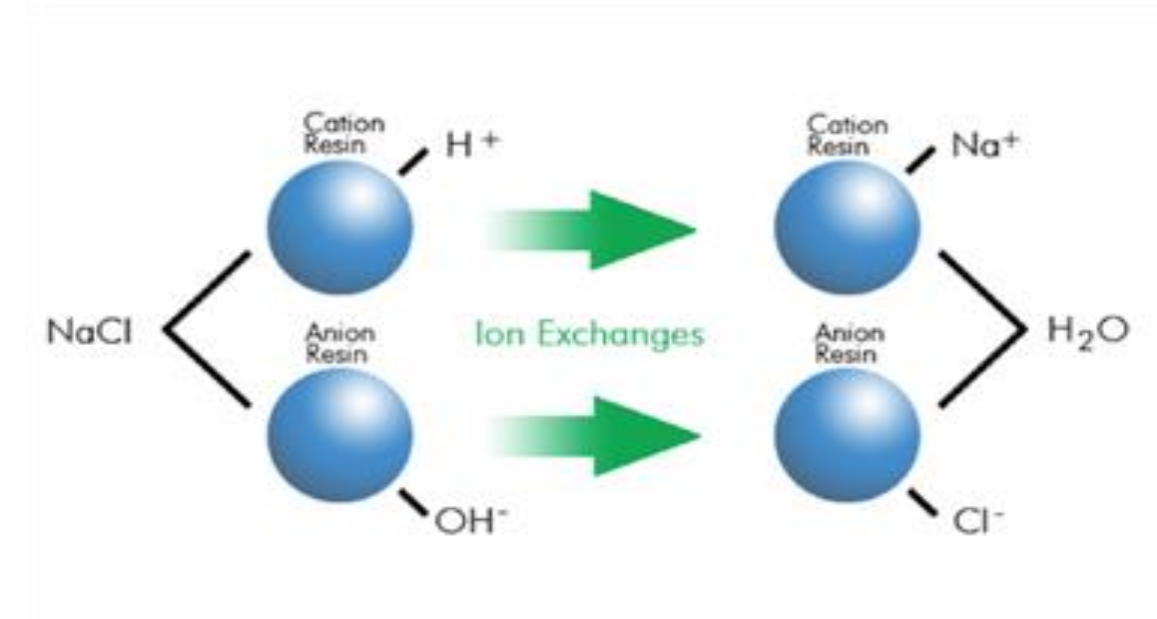
- The presence of hardness producing substances is responsible for corrosion
- Hardness producing substances-Ca & Mg salts





WATER SOFTENING

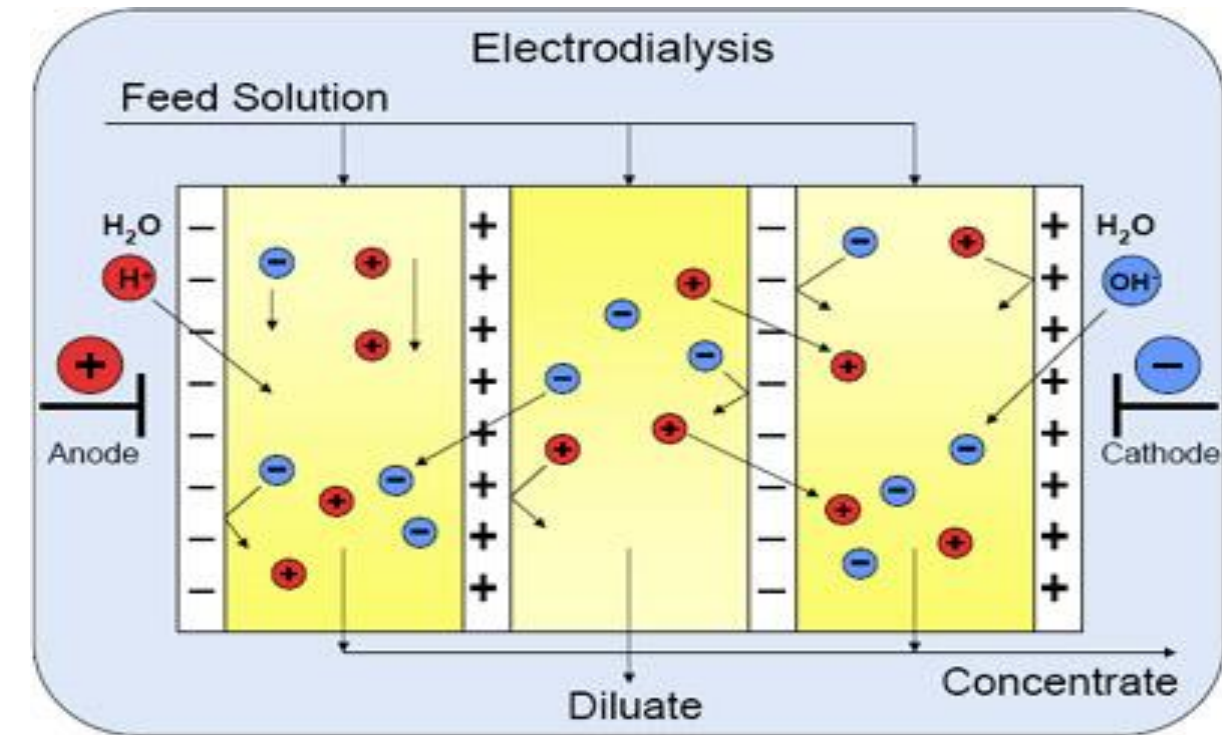
Removal of hardness producing salts from water is called water softening



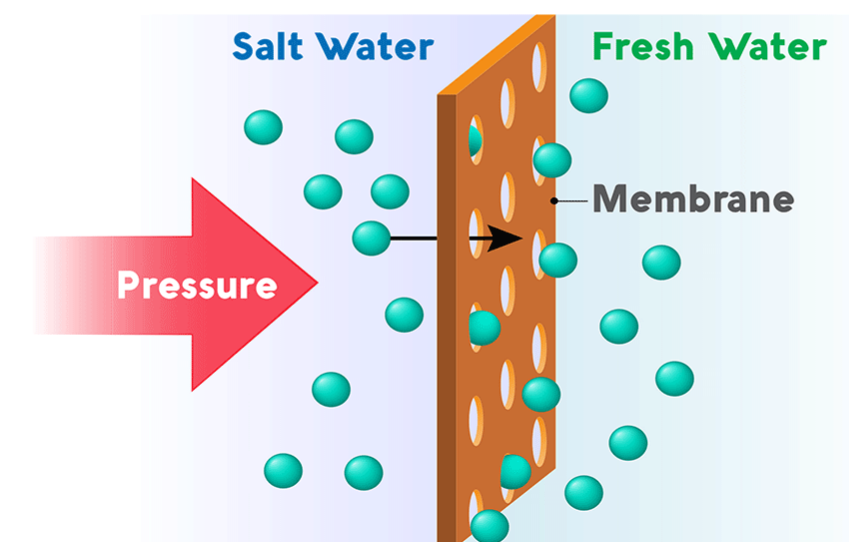


WATER SOFTENING METHODS

- Ion-exchange resin
- Reverse osmosis
- Zeolite process
- Precipitation methods
- The addition of chelating agents



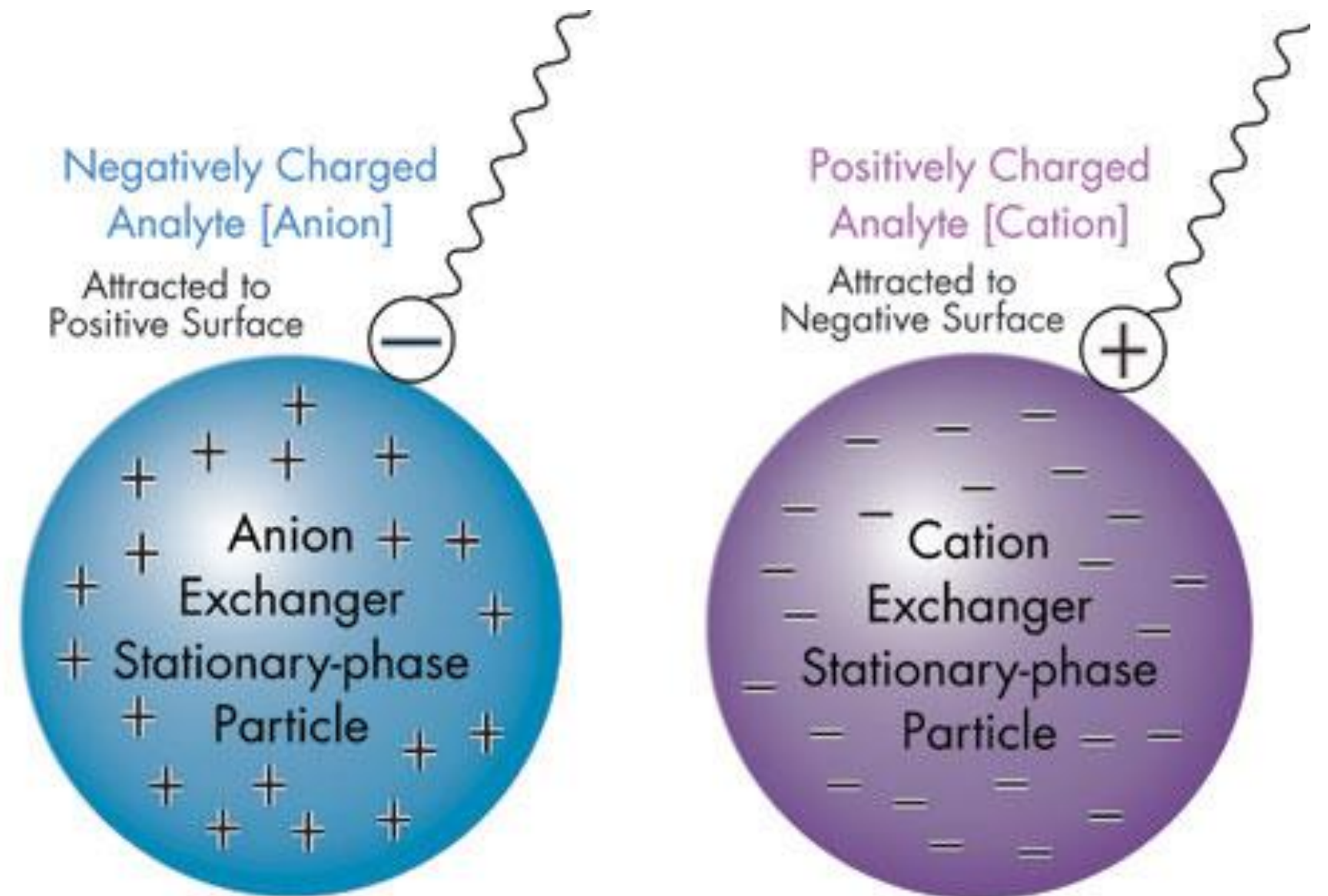
Reverse Osmosis





ION EXCHANGE METHOD

- Removes all the ions (Both cations and anions) present in water
- Consists of ion exchange resin
- Long chain, cross linked, insoluble organic polymers with microporous structure





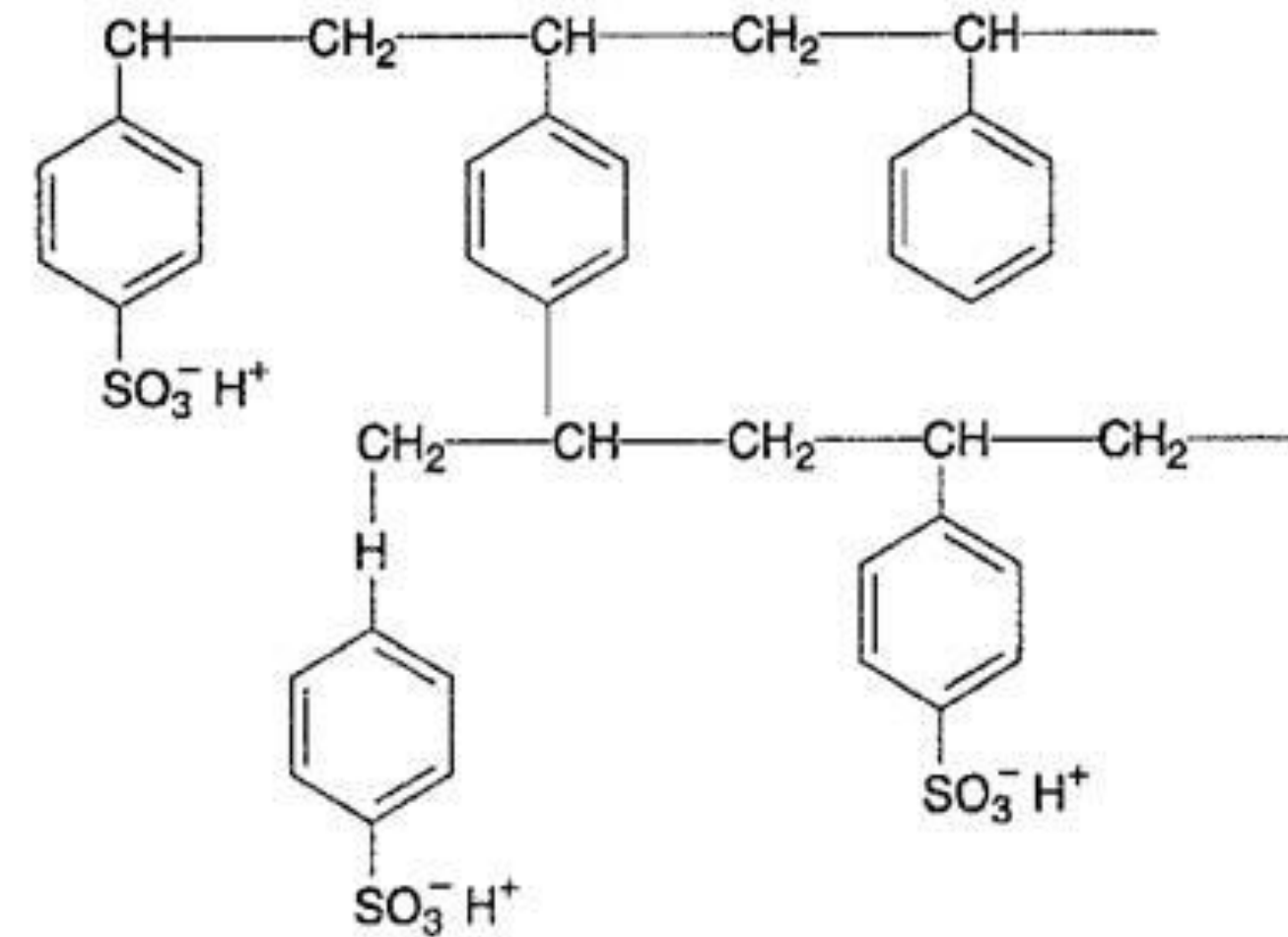
ACTIVITY





CATION EXCHANGER

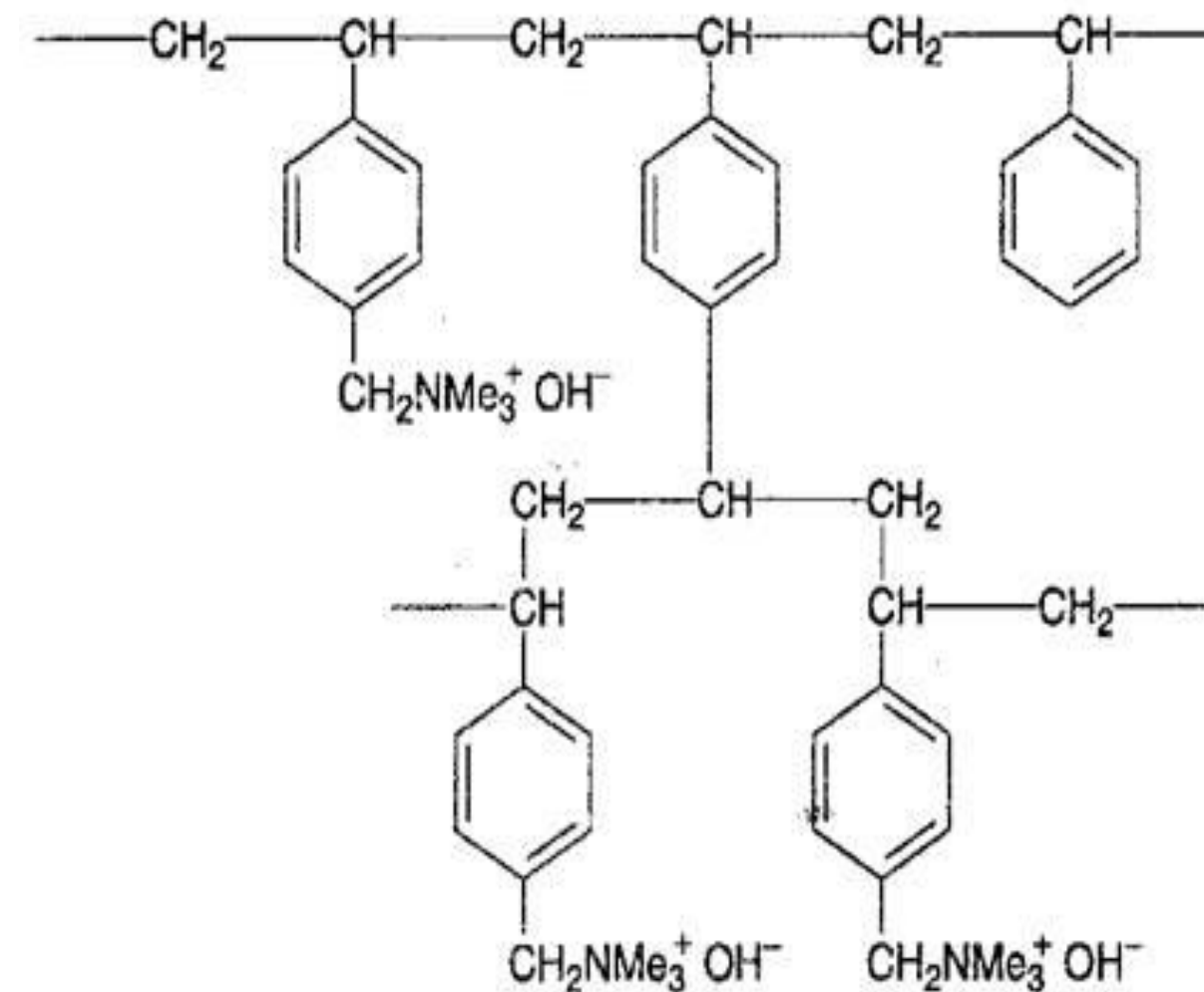
- Resins containing acidic functional groups like $-\text{COOH}$, $-\text{SO}_3\text{H}$
- Capable of exchanging cations with other cations of water
- Ex. Sulphonated coals, Sulphonated polystyrene etc
- $\text{RH}_2 + \text{CaCl}_2 \rightarrow \text{R Ca} + 2 \text{HCl}$





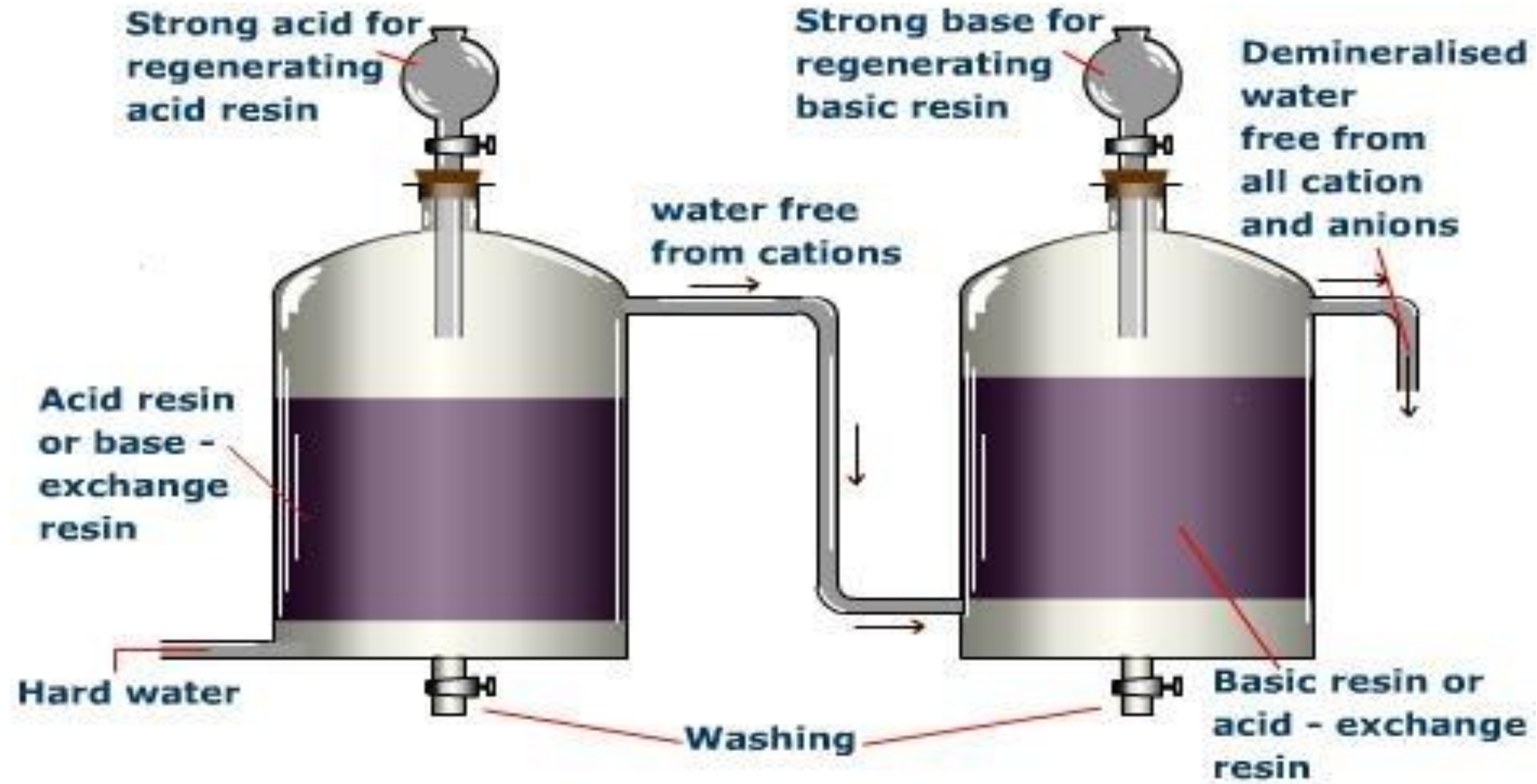
ANION EXCHANGER

- Resins containing basic functional groups like -OH, NH_2
- Capable of exchanging anions with other anions of water
- Ex. Urea formaldehyde resins, cross linked quaternary ammonium salts
- $\text{R}'(\text{OH})_2 + 2 \text{HCl} \rightarrow \text{R}'\text{Cl}_2 + 2\text{H}_2\text{O}$





ION EXCHANGE - PROCESS





MERITS OF REVERSE OSMOSIS

Advantages

- Very good for use in high pressure boilers also.
- It can treat highly acidic or alkaline water.
- Hardness as low of 2 ppm.

Disadvantages

- Expensive
- Fe, Mn cannot be removed as they form complexes with resins
- Cannot be used for turbid water as they clog the resins.



ASSESSMENT

- Draw the out sketch of ion exchange process



SUMMARY



REFERENCES



1. O.G. Palanna, “Engineering Chemistry ”Tata McGraw-Hill Pub. Co. Ltd, New Delhi.2017.
2. Wiley, “Engineering Chemistry”, John Wiley & Sons. InC, USA.
3. P.C.Jain & Monicka Jain, “Engineering Chemistry” , Dhanapat Rai Publising Company Pvt. Ltd. 2017.

THANK YOU