



SNS COLLEGE OF TECHNOLOGY

Vazhiampalayam, Coimbatore-35

(An Autonomous institution)

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Approved by **AICTE**, New Delhi & Affiliated to **Anna University**, Chennai

DEPARTMENT OF CHEMISTRY

COURSE NAME : 19CHB101- CHEMISTRY FOR ENGINEERS

I YEAR / I SEMESTER

UNIT : 4. WATER AND INSTRUMENTAL ANALYSIS

TOPIC : 2. HARDNESS





WHAT DO YOU INFER FROM THESE IMAGES?





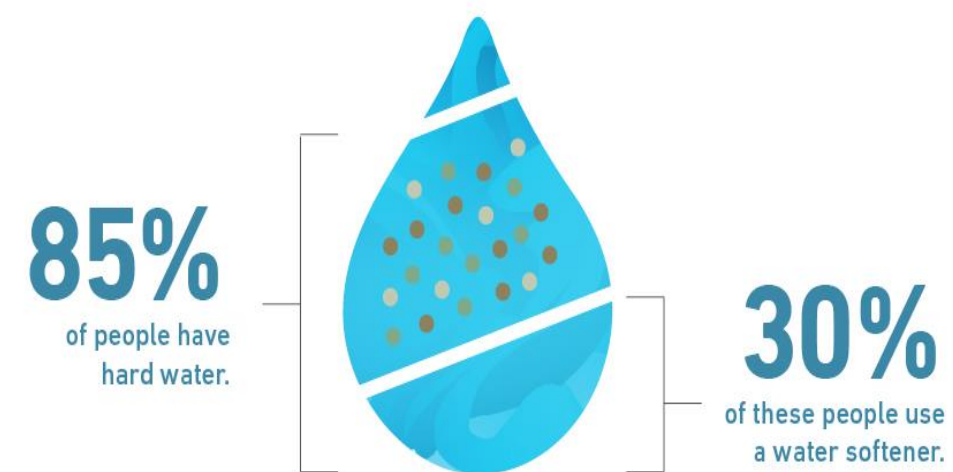
HARD WATER AND SOFT WATER



Does not produce lather with soap solution.

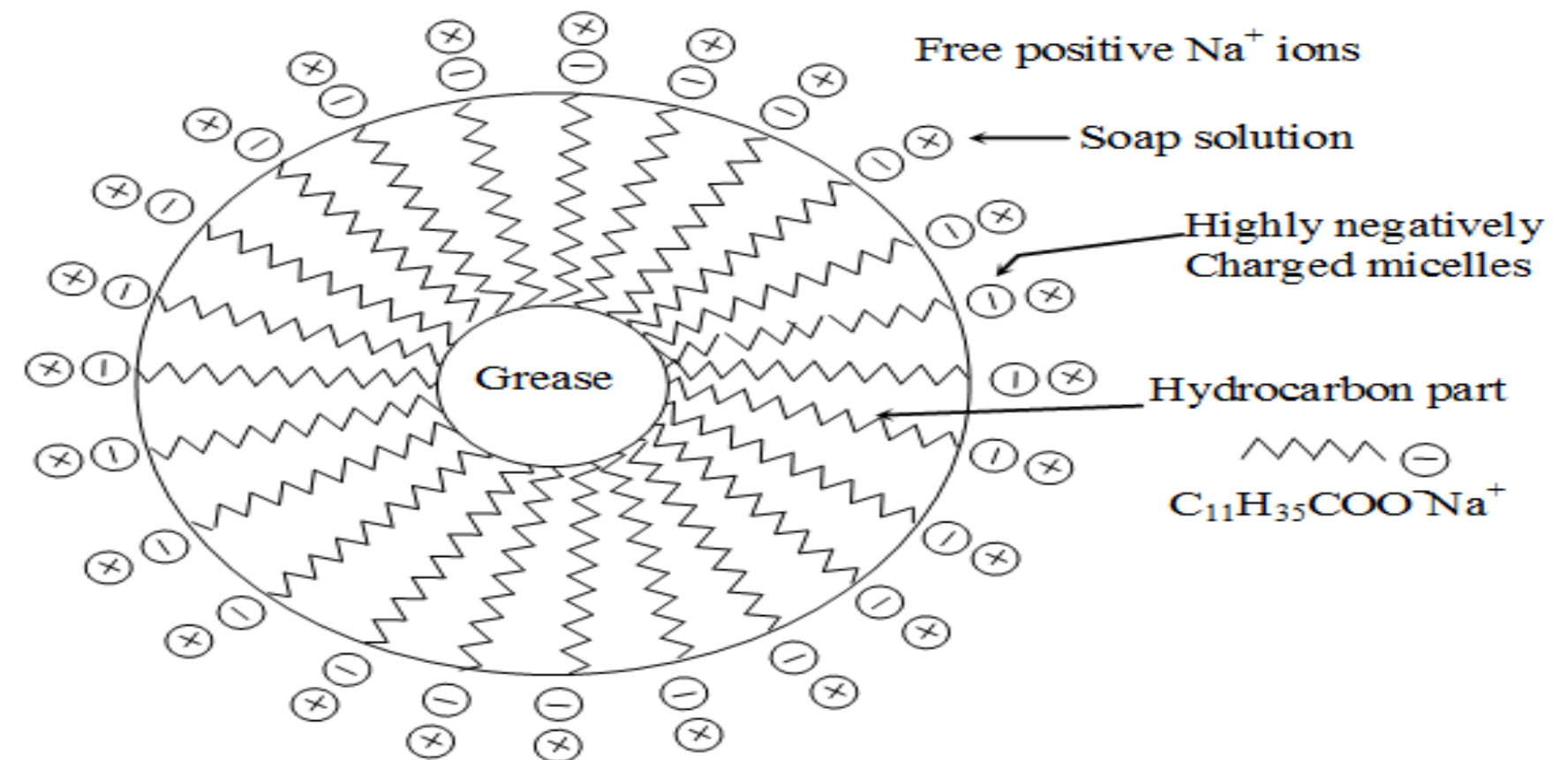
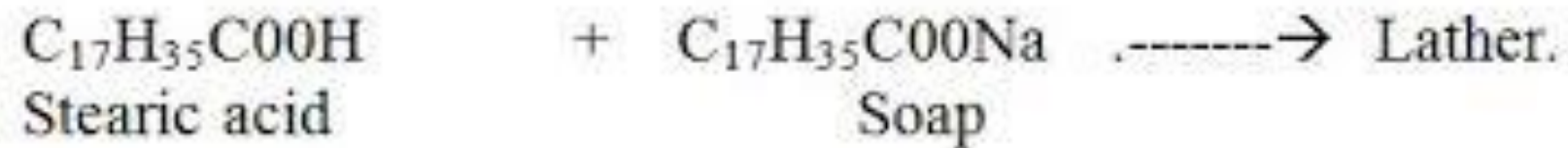
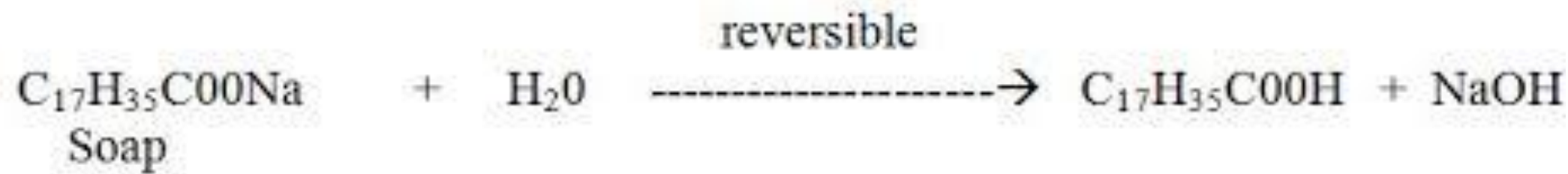


Lathers easily with soap solution.





REACTION WITH SOAP SOLUTION



Cleansing action of soap. Soap micelle entraps the oily dirt particle



HARDNESS

- Characteristic of water
- Prevents the lathering of soap
- Due to the presence of Calcium and Magnesium salts in water





TYPES OF HARDNESS

- Temporary or carbonate hardness
- Presence of $\text{Ca}(\text{HCO}_3)_2$ & $\text{Mg}(\text{HCO}_3)_2$



- Permanent or non carbonate hardness
- Presence of CaSO_4 , MgSO_4 , CaCl_2 & MgCl_2



Activity



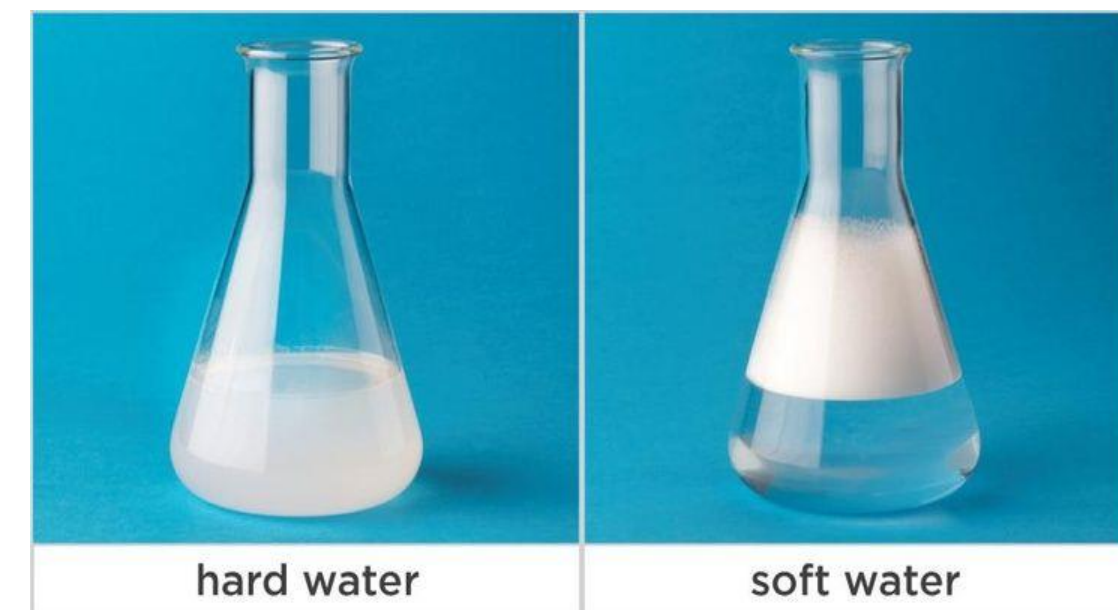


TEST FOR SOFT WATER AND HARD WATER



Using EBT indicator

Treating with soap solution





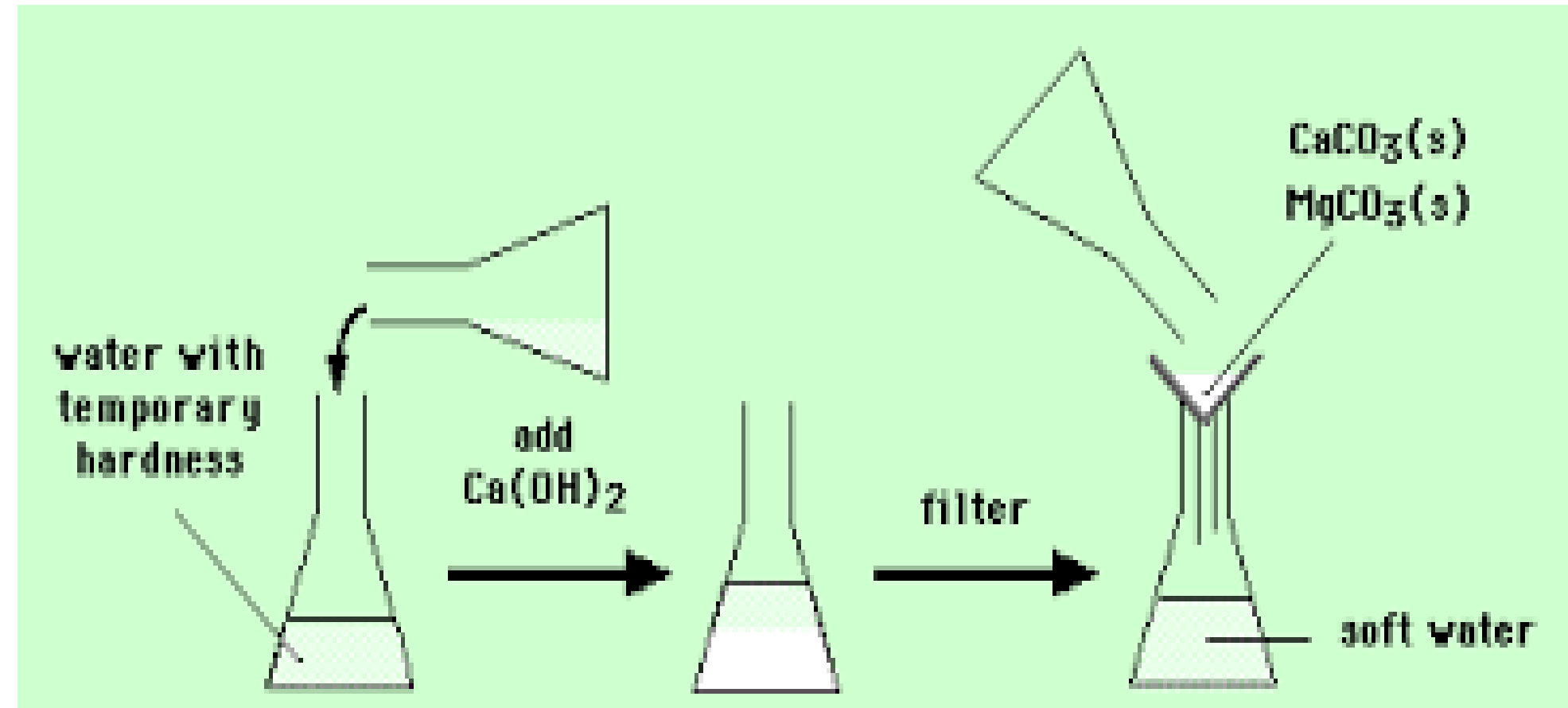
EFFECTS OF HARD WATER





REMOVAL OF TEMPORARY HARDNESS

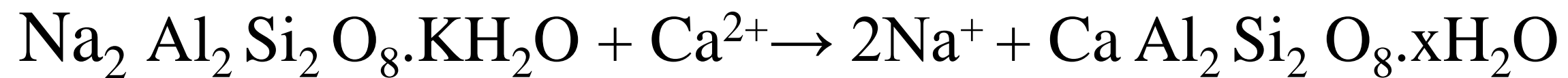
- Boiling
- Addition of lime
- Addition of sodium carbonates
- Base exchange process





REMOVAL OF PERMANENT HARDNESS

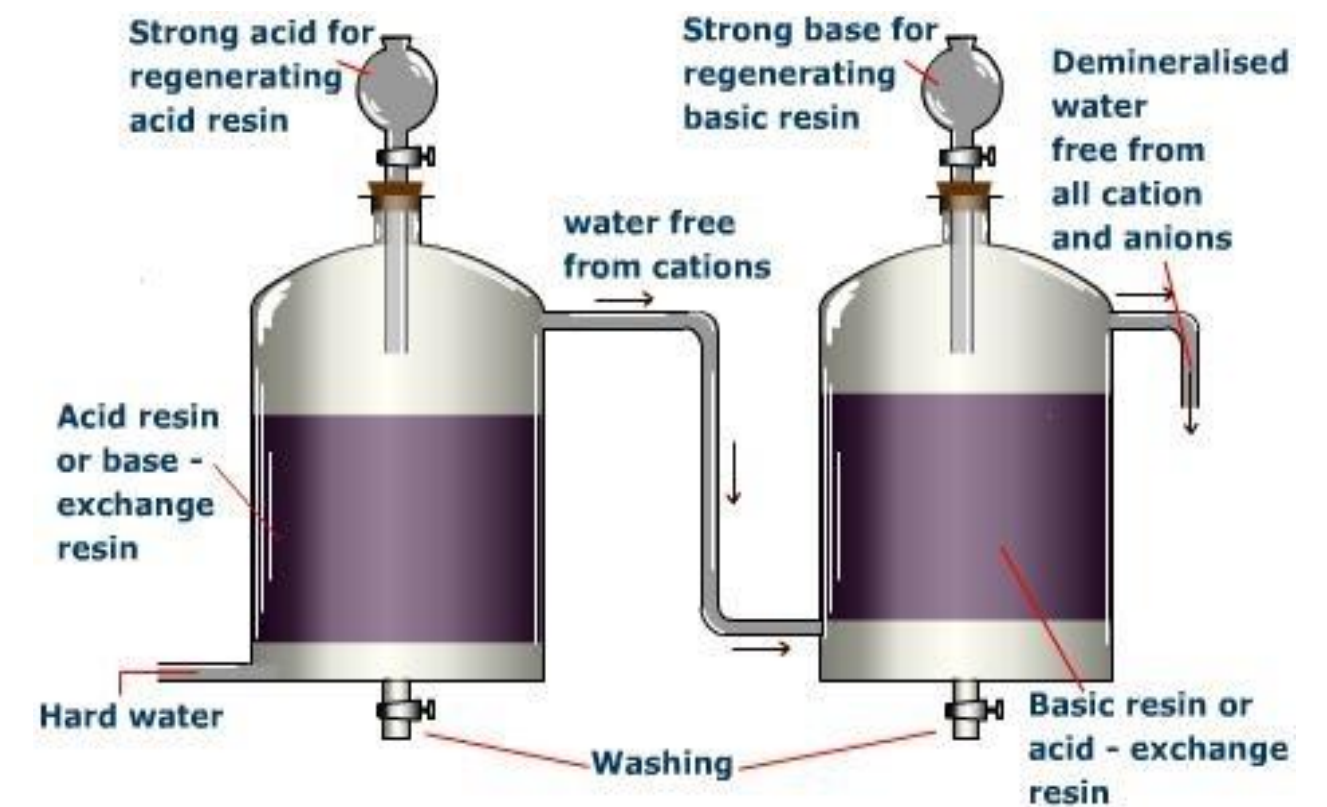
Gan's Permutit Method :



Calgon's Process:

sodium-hexa-meta-phosphate $(\text{NaPO}_3)_6$ - Calgon

Ion Exchange Resin Method





ASSESSMENT



- List out the differences between hard water and soft water
- How hardness of water can be removed?.



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