

# Soaps And Detergents

Soaps :- A soap is the sodium salt (or potassium salt) of a long chain carboxylic acids.

Example of soap: Sodium stearate  $C_{17}H_{35}COO^-Na^+$

Preparation of soap: Saponification reaction.

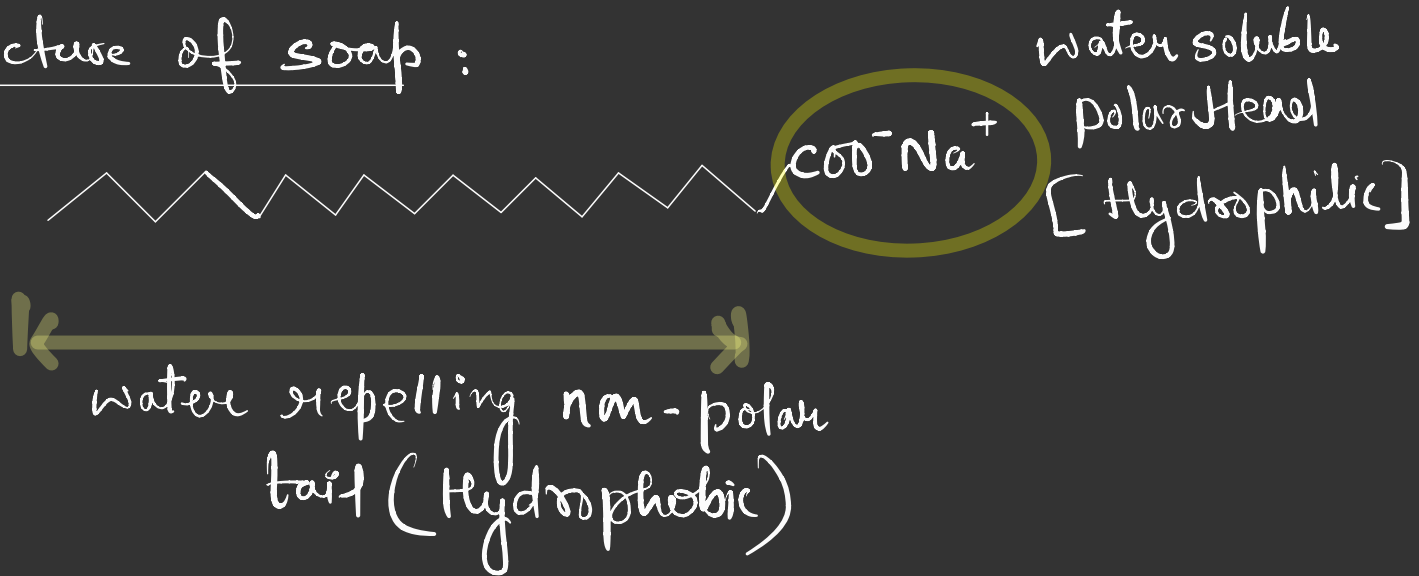


vegetable oil like castor oil, soyabean oil etc

\* Common salt is added in soap making.

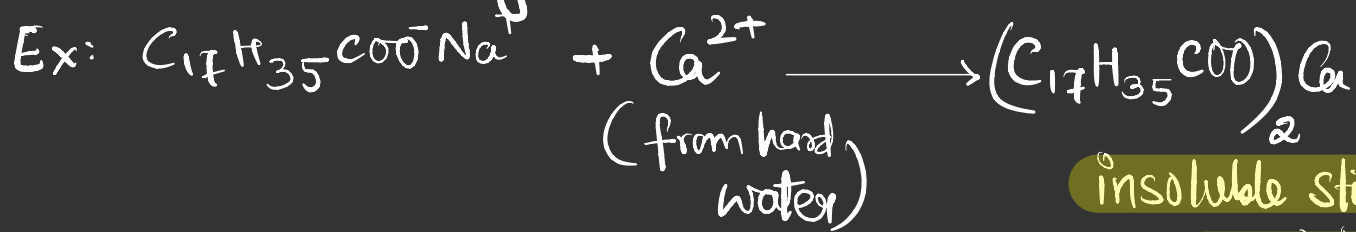
Reason: Common salt (NaCl) is added to precipitate out all the soap from aqueous solution

Structure of soap :



\* Soaps clean well in soft water but do not clean well in hard water.

Reason: Soap forms insoluble precipitate of calcium or magnesium in hard water.



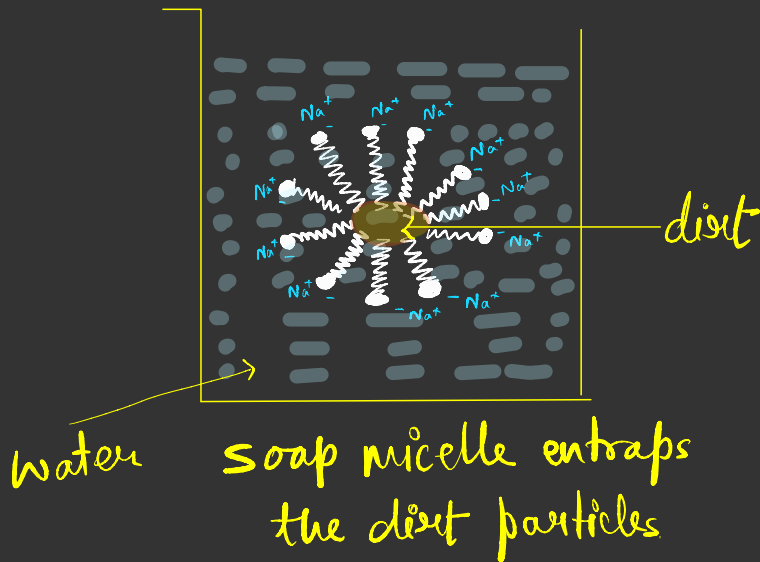
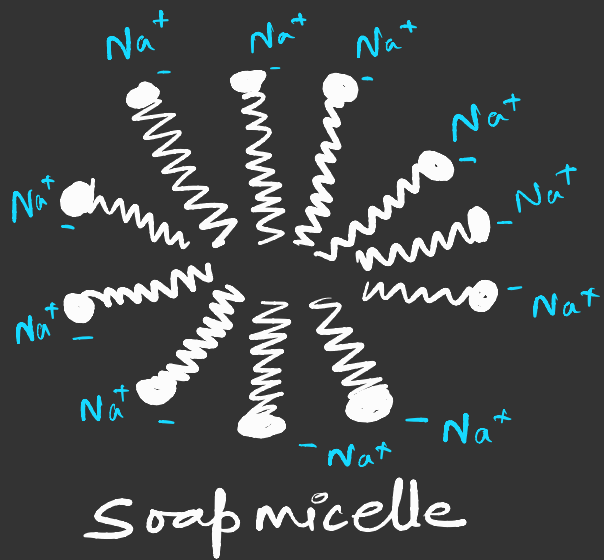
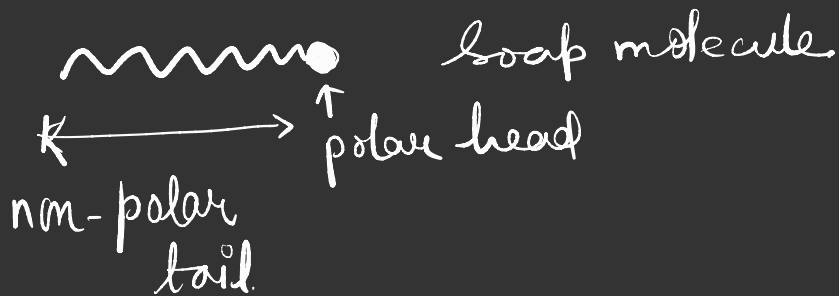
insoluble sticky  
precipitate in  
water, called scum

## Cleansing action of soap:

When soap is dissolved in water it forms spherical structure in which hydrophobic part is towards the centre and the ionic part (hydrophilic head) is towards the outside. This cluster of soap molecules is called micelle.

The hydrophobic part of the micelle dissolves the dirt, oil and grease and forms an emulsion at the centre of the micelles which can be washed away by water.





## Detergents :

A detergent is the sodium salt of long chain benzene sulphonic acid (or sodium salt of long chain alkyl hydrogensulphate)

Ex: Sodium n-dodecyl benzene sulphonate

- \* Detergents clean well in soft and hard water.
- \* Structure of detergent is similar to that of soaps.

# Differences between soaps and detergents

## Soaps

- (i) Soaps are sodium or potassium salt of fatty acids
- ii) Not effective in hard water
- iii) Soaps are biodegradable and do not cause pollution

## detergents

- Detergents are sodium salts of sulphonic acids
- Effective in hard water
- Some detergents are non-biodegradable & cause pollution

## Hard water and Soft water

- Hard water :
- Presence of Mg and Ca in the form of bicarbonate, chloride and sulphate in water makes hard water
  - Does not form foam or lather with soap.
  - Large amount of soap is wasted during washing

- Soft water :
- Mg and Ca bicarbonates, chlorides & sulphate absent
  - Foam or lather is formed
  - Soap is not wasted at all.

## Some Q/A Related to soaps and detergents

1. Compare soaps and detergents on the basis of their composition and cleansing action in hard water.
2. Soaps and detergents are two types of salts. State the difference between the two. Write the mechanism of the cleansing action of soaps. Why do soaps not form lather (or foam) with hard water? Mention any two problems that arise due to the use of detergents instead of soaps.
3. What are micelles? Why does it form when soap is added to water? Will micelle be formed in other solvents such as ethanol also? State briefly how the formation of micelle help to clean the clothes having oily spots?

4. (a) You have three unlabelled test tubes containing ethanol, ethanoic acid and soap solution. Explain the method you would use to identify the compounds in different test tubes by chemical test using litmus paper and sodium metal.

(b) Give the reason of formation of scum when soaps are used with hard water.

5. With the help of a diagram, explain cleansing action of soap.