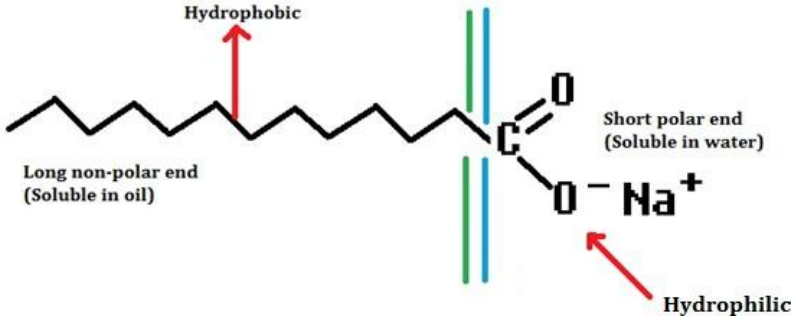
Chemistry Study Materials for Class 10

(NCERT based : Carbon and its compounds)

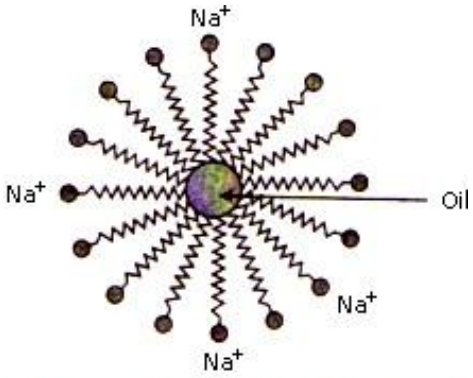
Ganesh Kumar Date:- 14/07/2020

Soaps & Detergents

- Soaps are cleansing agents capable of reacting with water and dislodging the unwanted particles from clothes or skin.
- The molecules of soap are sodium or potassium salts of long chain carboxylic acids.
- A soap molecule has a tadpole shaped structure.
- At one end (long non-polar end) of the soap molecule is a hydrocarbon chain which is insoluble in water but soluble in oil.
- At the other end (short polar end) of the soap molecule, there is a carboxylate ion which is hydrophilic i.e. water soluble but insoluble in oil.



- Soap on mixing with water forms a concentrated solution and causes foaming.
- The long non-polar end of soap gravitates towards and surrounds the dirt and absorbs the dust in it.
- The short polar end with the carboxylate ion repels the water away from the dirt.
- A spherical aggregate of soap molecules is formed in the soap solution in water, and is called a micelle.
- Thus, the soap molecule dissolves the dirt and help in cleaning our clothes.

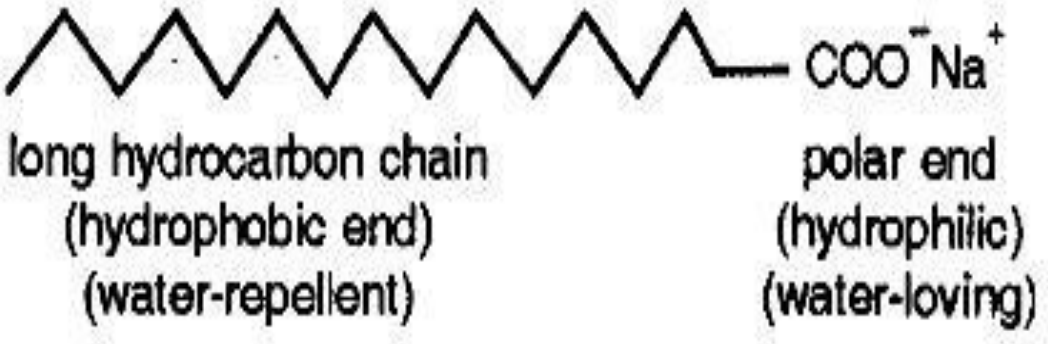


Formation of Micelles

Question:-What is the difference between the chemical composition of soaps and detergents? State in brief the action of soaps in removing an oily spot from a shirt. Why soaps are not considered suitable for washing where water is hard?

Answer. Soaps are sodium or potassium salts of fatty acids having — COONa group. Detergents are sodium or potassium salts of sulphonic acids having —SO_3Na and — SO_4Na group.

Cleansing action of soap: Soap molecules consist of a large hydrocarbon tail which is hydrophobic (water-hating or water repelling) with a negatively charged head which is hydrophilic (water-loving) as shown in figure.

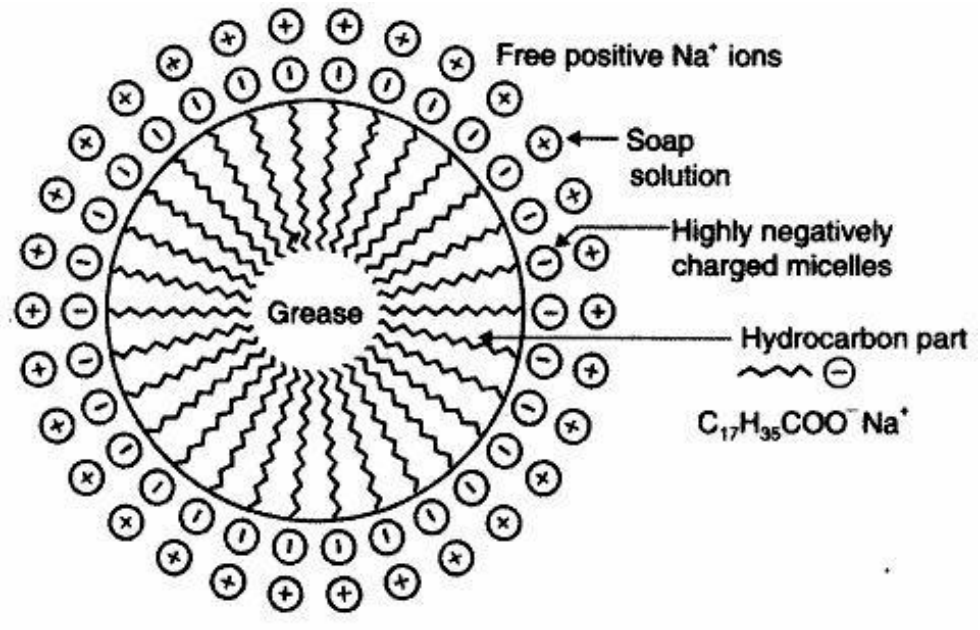


When a soap is dissolved in water, the molecules associate together as clusters called micelles in which water molecules, being polar in nature, surround the ions and the hydrocarbon part of the molecule attracts grease, oil and dirt.

The tails stick inwards and the heads outwards. In cleaning, the hydrocarbon tail attaches itself to oily dirt. When water is agiated (shaken vigorously), the oily dirt tends to lift off from the dirty surface and dissociate into fragments.

This gives opportunity to other tails to stick to oil. The solution now contains small globules of oil surrounded by soap molecules.

The negatively charged and form aggregates. Thus, the oily dirst is removed. Hard water has Ca^{2+} and Mg^{2+} ions. When it reacts with soap, it forms insoluble compound and the soap goes waste.



****