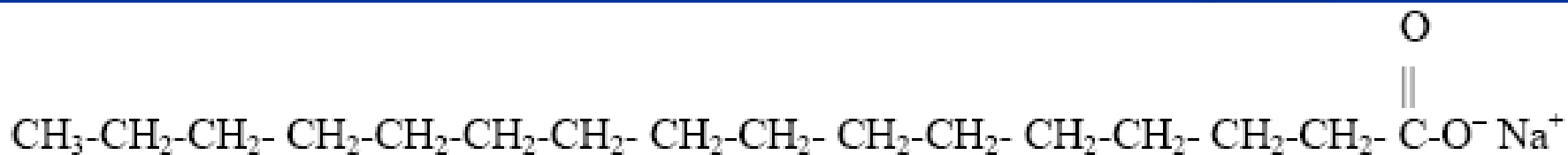


SOAPS

- Soaps are water-soluble sodium or potassium salts of fatty acids.
- A soap molecule consists of a long hydrocarbon chain with a carboxylic acid group on one end which is ionic bonded to a metal ion, usually a sodium or potassium.

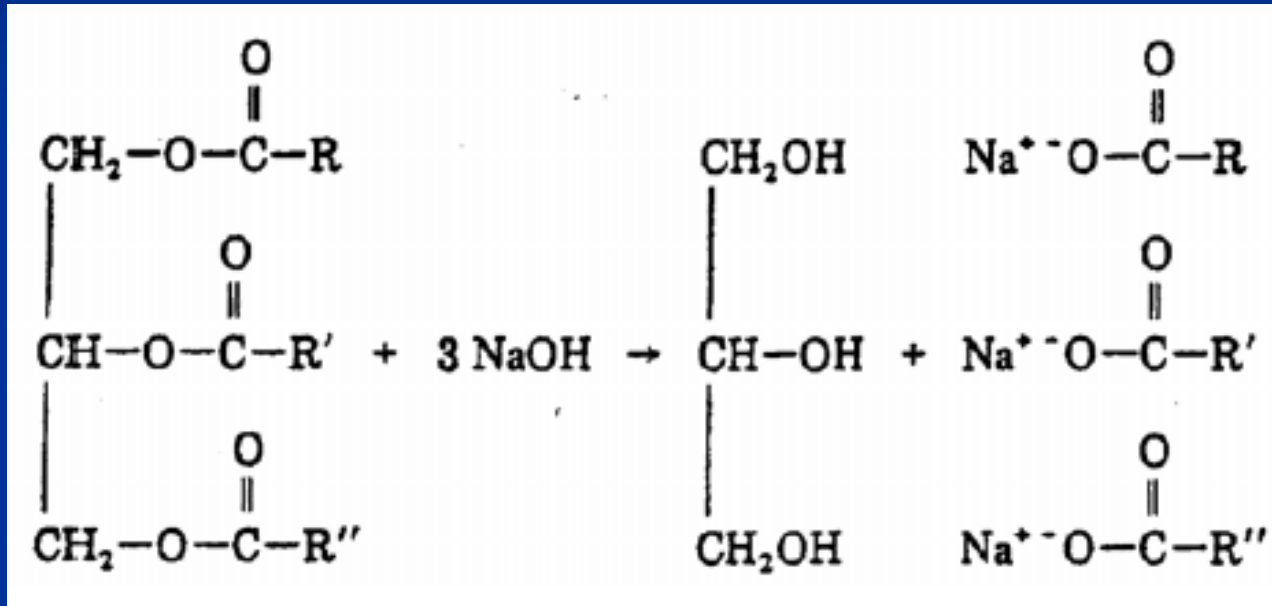


The hydrocarbon end is nonpolar & is soluble in nonpolar substances (such as fats and oils)

The ionic end (the salt of a carboxylic acid) is polar & soluble in water

Preparation of a Soap

- Soaps are prepared by the alkaline hydrolysis of fats or oils.
- .



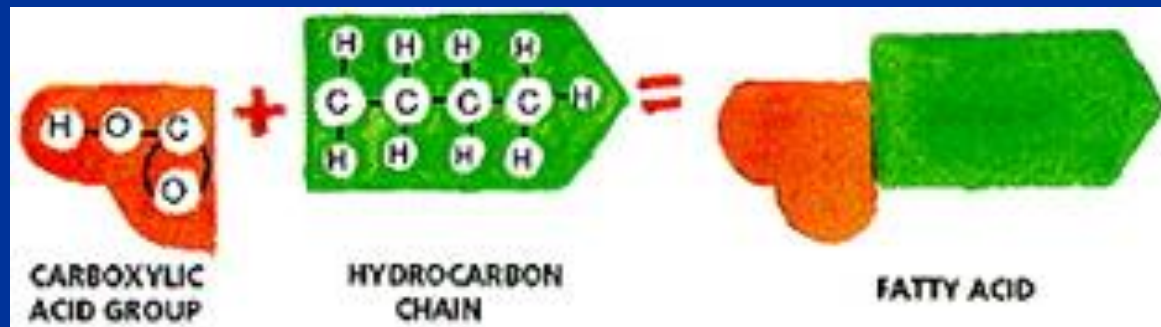
Fat or Oil

Glycerol

Soaps

- A by-product of this reaction is glycerol which is useful as an antifreeze, as a tobacco-moistening agent, and in the manufacture of nitroglycerine and dynamite.

- The fats and oils used in soap making come from animal or plant sources.
- Each fat or oil is made up of a distinctive mixture of several different triglycerides.
- In a triglyceride molecule, three fatty acid molecules are attached to one molecule of glycerine.
- Fatty acids are weak acids composed of two parts:



- Saturated Fatty Acids:

1. Stearic Acid ($C_{17}H_{35}COOH$)
2. Palmitic Acid ($C_{15}H_{31}COOH$)

- Unsaturated Fatty Acids:

1. Oleic Acid ($C_{17}H_{33}COOH$)
2. Linolic Acid

Detergents

- Detergents are structurally similar to soaps, but differ in the water-soluble portion.
- A detergent is regarded as the chemical formation which essentially consists of surface active or surfactant and subsidiary constituents such as fillers, builders etc.
- Detergent = Surfactants + Fillers



Surfactant is a chemical which when dissolved in water or dispersed in a liquid, clean the Surface by removing oil in which dust particles are dispersed.

- Detergents have two groups:
 1. Hydrophilic-Water soluble
 2. Hydrophobic-Water insoluble

Classification of Detergents

Detergents

Ionic detergents

Non-ionic detergents

Anionic

Cationic

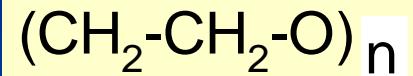
Amphoteric

Used to clean glass or Porcelain utensils

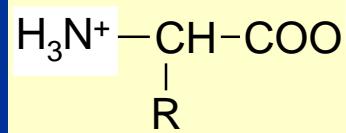
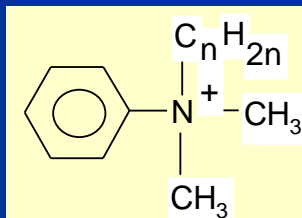
Specially useful for household purpose

Being germicides useful in hospitals & in cosmetics

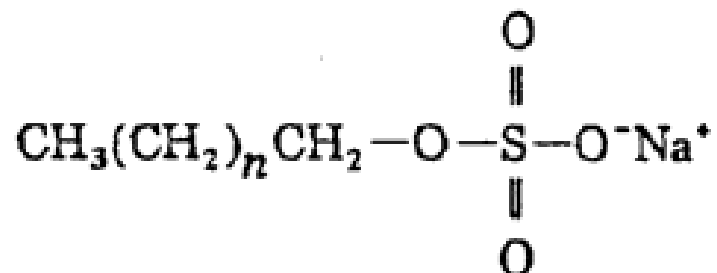
Used in cosmetics & Shampoo



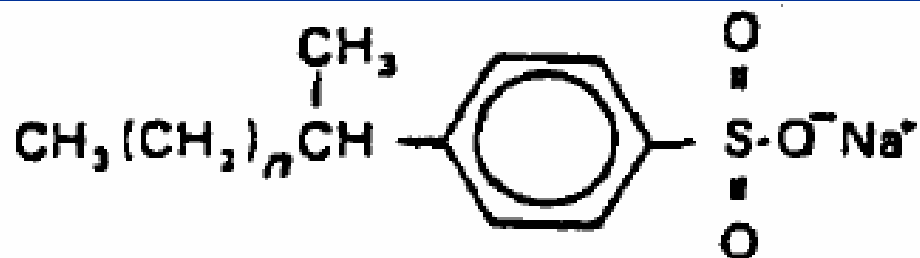
ABS



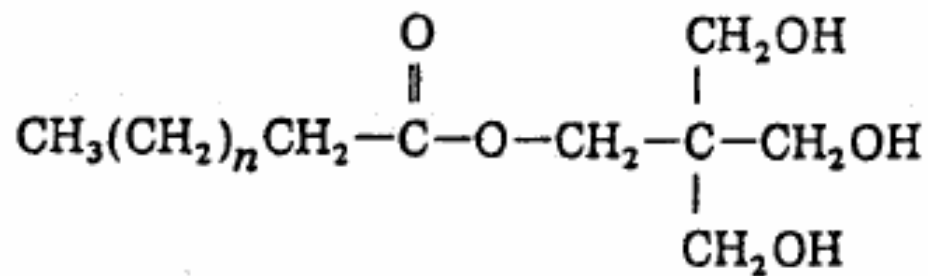
Examples of Detergents:



a sodium alkyl sulfate



a sodium alkylbenzene sulfonate
(ABS)

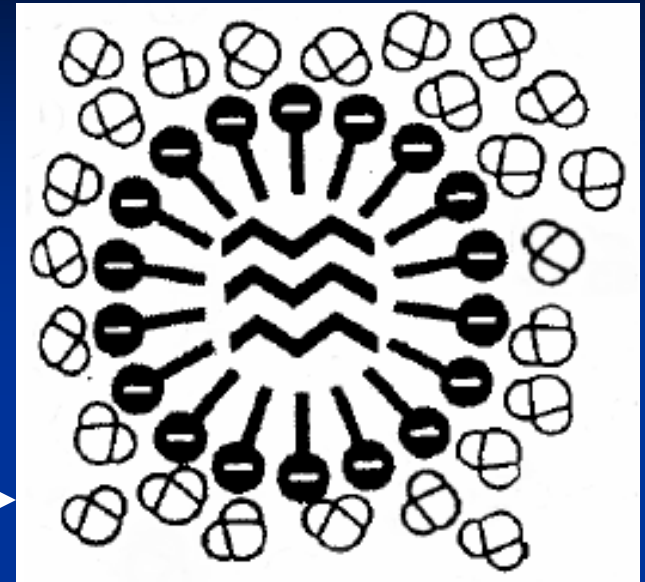


glycerol (a non-ionic detergent)

Cleaning Action of Soaps & Detergents

- When a soap or detergent is added to water, a polar solvent, the molecules form clusters, known as *micelles*, in which the polar ends of the molecules are on the outside of the cluster and the non-polar ends are in the middle.

A diagram of a soap micelle surrounded by water molecules. The lines in the center represent grease and oil.



- The cleaning action of both soaps and detergents results from their ability to emulsify or disperse water-insoluble materials (dirt, oil, grease, etc.) and hold them in suspension in water.
- This ability comes from the molecular structure of soaps and detergents.

- When a soap or detergent is added to water that contains oil or other water-insoluble materials, the soap or detergent molecules surround the oil droplets.
- The oil or grease is “dissolved” in the alkyl groups of the soap molecules while the ionic end allows the micelle to dissolve in water.
- As a result, the oil droplets are dispersed throughout the water (this is referred to as *emulsification*) and can be rinsed away.

■ Bio-soft & Bio-Hard Detergents:

- Detergents used in domestic life are discharged into drainage and hence get collected in sewage treatment plant.
- If molecules of detergent contain only alkyl chains, the detergents are called Bio-Soft. For example, Lauryl alkyl sulphonate.
- if the detergent molecule contain aromatic nucleus, they can't be degraded by fermentation and increase the pollution. These are called Bio-Hard detergents. For example, ABS

Ingredients used for manufacturing detergents

- **Sodium carbonate:** It provides high alkalinity & softens hard water.
- **Sodium tripolyphosphate:** It is a foaming agent. Make hard water to soft & decrease the surface tension of water.
- **Sodium bicarbonate:** It provides high alkalinity to water.
- **Sodium sulphate:** It improves the surface activity of the detergent.
- **Sodium metasilicate:** It is used to soften hard water by forming precipitates which do not deposit on the fibre but are readily washed away. It has wetting & emulsifying properties and is generally added to the dish-washing detergent powders.

- **Sodium perborate:** It is used as a bleaching & whitening agent. It is generally used in small quantities (about 2%).
- **Sodium Carboxyl Methyl Cellulose(CMC):** It is used as anti-redeposition agent because it has ability to suspend and prevent redeposition of the soil on the washed garments.
- **Sodium lauryl sulphate:** It has excellent foaming characteristics and its effect on the skin is very mild
- **Optical brightners:** These are not bleachers but are dyestuffs which are absorbed by textile fibres from solution and are not removed on rinsing. Their function is to absorb light on the washed garment and to reflect a visible blue colour.

- **Acid slurry:** It is acidic and main part of detergent. It removes the surface tension of water.
- **Ranipal:** As a whitening agent
- **Perfume:** For giving good smell.
- **Colour:** For giving colour
- **Borex:** To remove stickiness
- **Salt:** Many inorganic substances like NaCl are used to decrease the cost of detergent.

Thank You

THE SCIENCE OF SOAPS & DETERGENTS

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