Production and Application of Synthetic Detergents and Surfactants

Group nine

Introduction

➢ What are synthetic detergents?

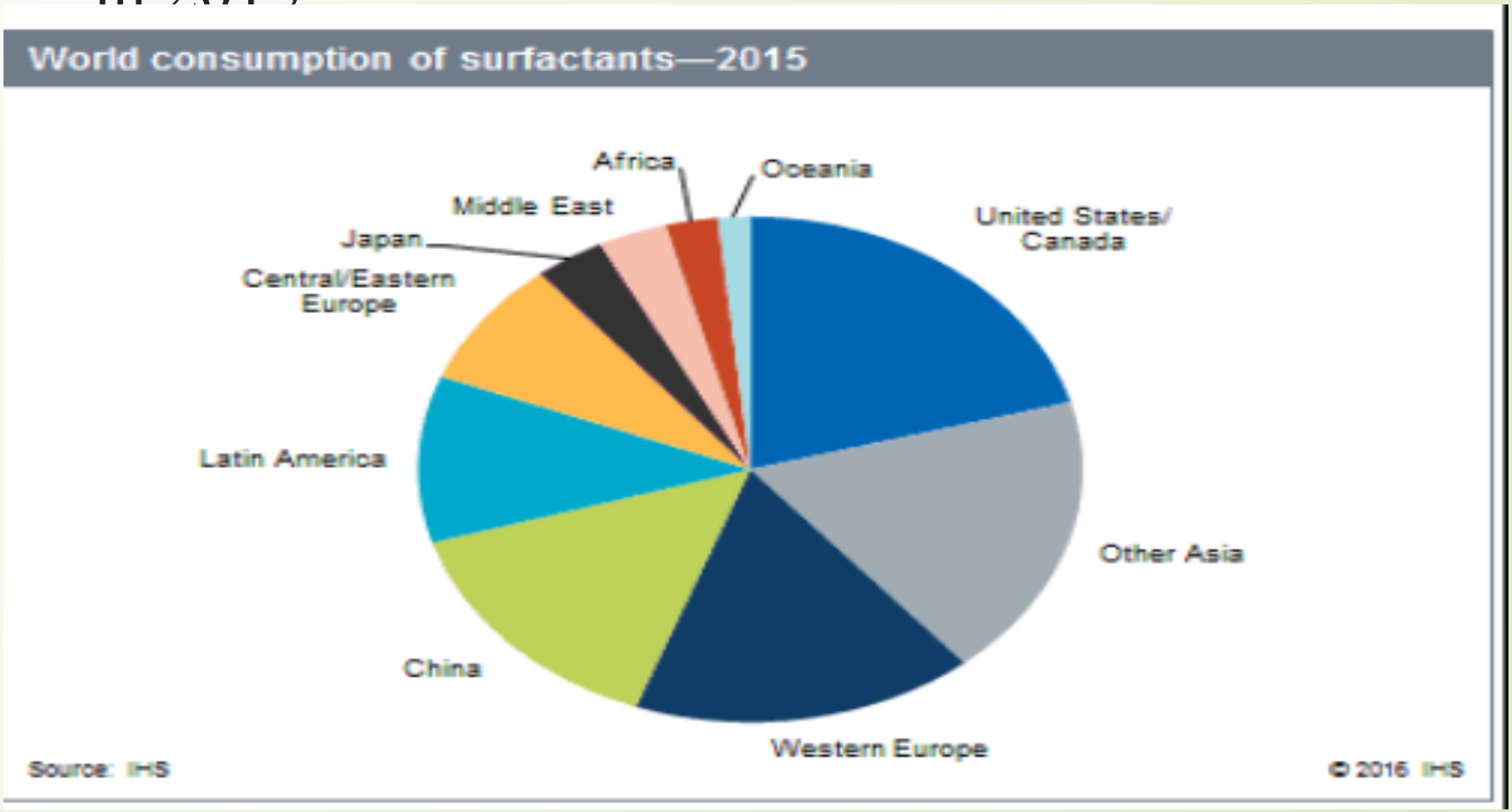
- They are non-soap washing and cleaning products that are "synthesized" or put together chemically from a variety of raw materials. Examples are sodium lauryl sulphate and sodium dodecylsulphate.
- It can be in the form of liquid or solid (powder).
- It was first developed by Germans during the first world war period to allow fats to be utilized for other purposes.
- The basic component is a surface active agent known as surfactants.
- Other components include phosphates, zeolites and filters

Introduction

- What are surfactants?
- A surfactant (Surface active agent) is a molecule that

  reduces the surface tension of water.
- It has a hydrophobic (non-polar, “fat-loving”) tail and a hydrophilic (polar “water-loving”) head, and works as a foaming agent, emulsifier and dispersant.
- It binds to grease and dirt and keeps them suspended in water.
- Examples are free fatty acid salts (soaps),lignin sulfonates.

A chart showing world surfactant consumption in 2015



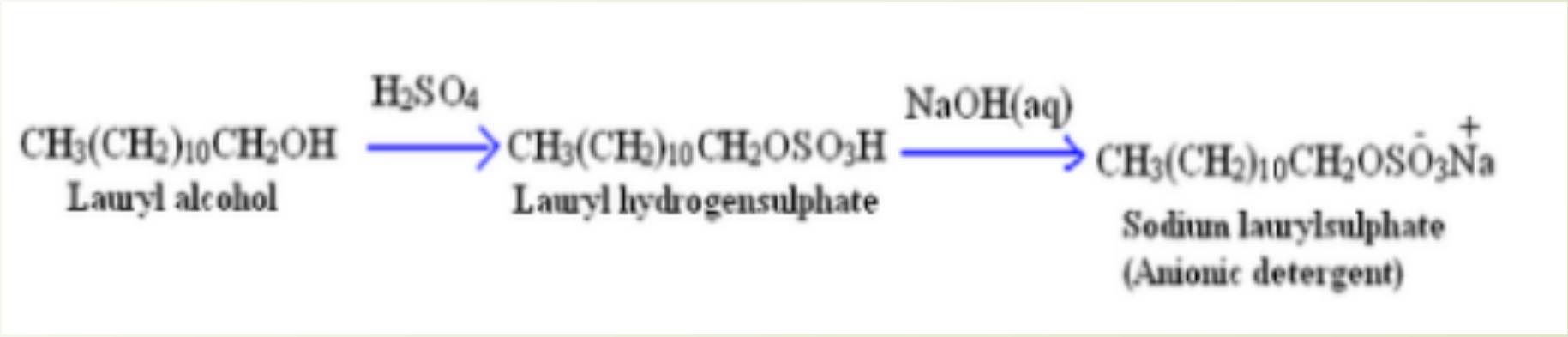
Types of Synthetic Detergents

Types of synthetic detergents include

- Anionic
- Cationic
- Non-ionic

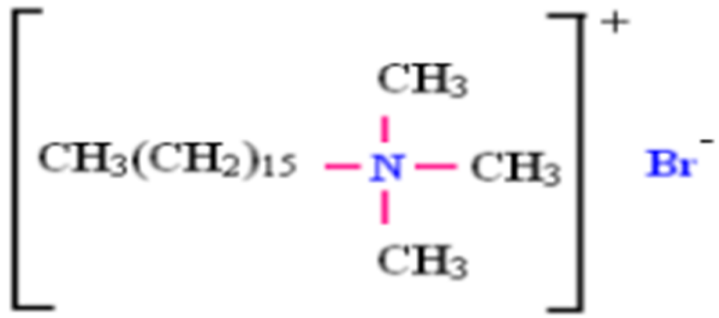
Anionic Synthetic Detergents

- The anionic detergents are sodium salt of sulfonated lengthy chain alcohols or hydrocarbons.
- Alkyl hydrogen of sulphate created by plenty lengthy chain alcohols with determined sulphuric acid are neutralized with alkali to shape anionic detergents.



Cationic Synthetic Detergents

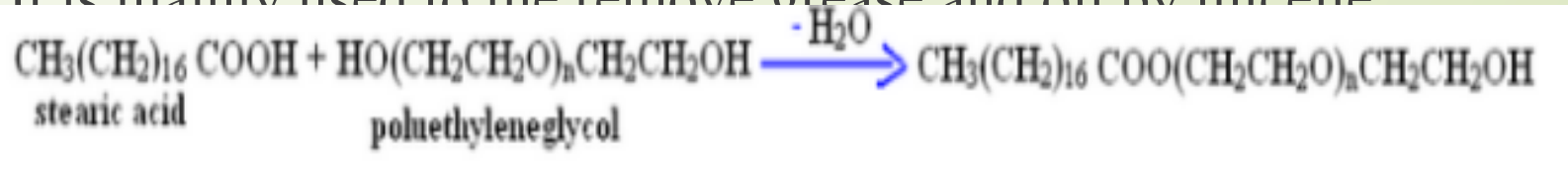
- The cationic detergents are the part of ammonium salts of amines through acetates, chlorides otherwise bromides as anions. These parts are known as the cationic detergents.
- The famous cationic detergent is cetyltrimethylammonium. That is used in the hair conditioners. The cationic detergents contain the ge



Non-ionic Synthetic Detergents

- The non-ionic detergent specified do not include some ions in their constitution. Single detergent is created when stearic acid reacts with polyethyleneglycol.

- The non-ionic type detergent is the liquid dishwashing detergents. The cleaning action method of this type of detergents is the same as that of soaps.
- It is mainly used to the remove grease and oil by micelle



Production of synthetic detergents and surfactants.

- Raw materials

➢ Lauryl alcohol

➢ Sulfuric acid

➢ Sodium Hydroxide

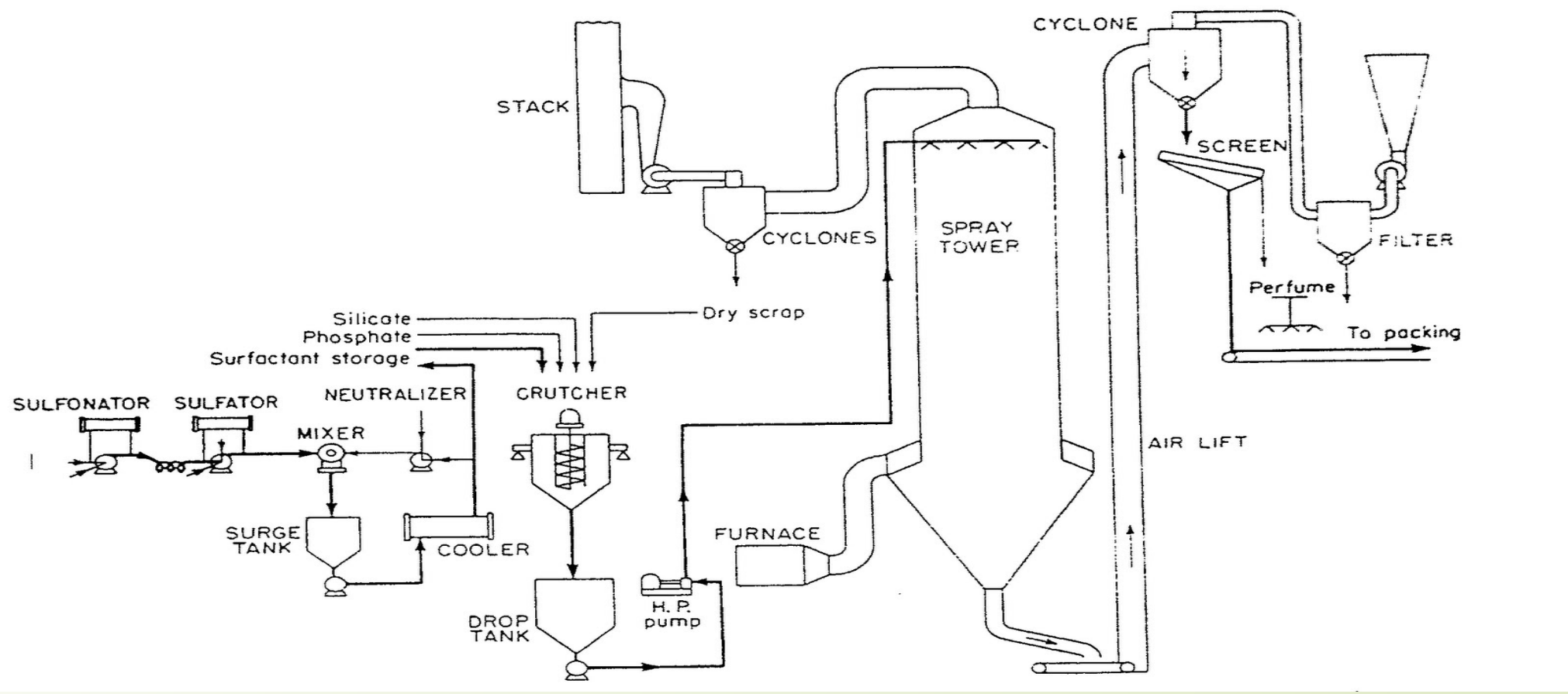
➢ Stearic acid

➢ Polyethyleneglycol

Processes involved in production of Synthetic Detergents

- Sulfonation-sulfation:
  - The alkyl benzene is introduced continuously into a sulfonator with the requisite amount of oleum.
  - The temperature should be maintained about 55oC. Fatty tallow alcohol and more oleum are fed into sulfonated mixture.
  - The mixture is then pumped to the sulfater (should also operate around 50-55oC)
- Neutralization: The sulfonated –sulfated product is neutralized with NaOH solution under controlled temperature to maintain fluidity of the surfactant slurry. The surfactant slurry is conducted to storage.

Flow diagram showing production of synthetic detergent and surfactant



Application of Surfactants

- For making detergents
- For making soaps
- Used as emulsifiers
- Used in ink production
- Used in production of cosmetics like shampoos, hair conditioners and toothpaste.

Application of Detergents

- For household cleaning
- Used as fuel additives
- Used in cosmetic production

By-products of Synthetic Detergents

- Phosphates, which may lead to eutrophication.
- Alkyl Benzene Sulfonate, which may cause foaming in water bodies.

References

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