SYNTHESIS AND COMPARISON OF CLEANING POWER OF EDIBLE OIL SOAPS WITH COMMERCIAL DETERGENTS

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Abstract : 5/6- Edible oil soaps were synthesized by following saponification process. They were separated and purified, allowed to demoisturize to get in pure dry form. The surface tension of all synthesized soaps are recorded by standard procedure. The surface tensions of few commercial detergents was also determined. The comparison of the cleaning power of synthesized soaps was made with commercial samples. Few of the synthesized soaps showed higher cleaning power than commercial detergents. The findings are presented in this paper.

Keywords: Edible oils, NaOH, Edible oil soaps, Detergents, Stalagmometer.

Introduction: The discovery of soap predates recorded history back perhaps as far as 6000 years. Excavation of ancient Babylon uncovered cylinders with inscriptions for making soap around 2800 BC. Later records from ancient Egypt (1500BC) describe how animal and vegetable oils were combined with alkaline salts to make soaps. Soaps are cleaning agents that are usually made by reacting alkali (e.g. Sodium Hydroxide) with naturally occuring fats and fatty acids. The reaction produces sodium salts of these fatty acids, which improve the cleaning process by making water better able to lift away greasy stains from skin, hair, clothes and just about anything else. As a substance that has help clean bodies as well as possessions, soap has been remarkably useful.[1] In industry, soaps are used as thickeners, components of some lubricants and precursors to catalysts apart from washing agent.[2][3]

Results and Discussion: The basic structure of all soaps is essentially consisting of a long hydrophobic (water fearing) hydrocarbon tail and a hydrophilic (water loving) anionic head.

$CH_3(CH_2)_nCOO^-Na^+$

sodium stearate

The anionic charge on the carboxylate head is balanced by positively charged potassium(K^+) or sodium (Na+) cation. In making soaps, triglycerides in fats or oils are heated in presence of strong alkali like NaOH or KOH to produce 3 moles of soap and 1 mole of glycerol. This process is called as **saponification.**

Soaps are surface active agents like synthetic detergents and make water better at cleaning surfaces. Surfactants work by reducing surface tension of water allowing water molecules to better wet. the surface thus increase ability of water to dissolve dirty and oily stains. The soaps work by forming micelle. In a micelle, the tails of soap molecules are oriented toward and into the grease, while the heads face outward into the water resulting in an emulsion of soapy grease particles suspended in the water.

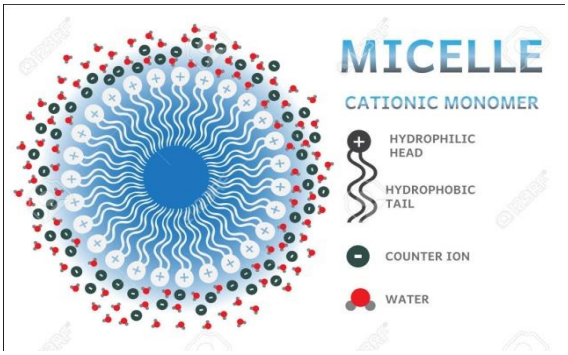


Fig: Structure of micelle

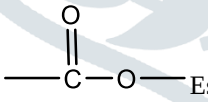
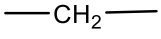
Three different soaps from three different edible oils were synthesized by saponification method. The synthesized soaps were characterized well by using chemical and spectral method. The surface tension of all the synthesized soaps and commercial detergents were recorded. The values were compared and on these basis the cleaning power of ground nut oil soap was highest amongst synthesized soaps. and it was comparable with commercial detergents.

On the basis of literature survey it was proposed to synthesize few soaps from edible oil to compare their cleaning power with commercial detergents.

Experimental: Following three different types of soaps were synthesized using three different edible oils by heating these oils with warm alkali at 60°C for about 30 minutes and allowing to cool the reaction mixture, wet soaps were precipitated out.

Sr.No.	Edible Oil	Surface Tension dyne/cm	Remark (Cleaning power)
Soap A	Soybean	30.20	Moderate
Soap B	Ground nut	28.99	Highest
Soap C	Coconut	43.76	Satisfactory
Detergent D	Tide	30.11	Good
Detergent E	Wheel	27.52	Very Good

The synthesized soaps were characterized by some chemical tests and IR spectroscopy[4],.[5],[6]. The IR spectrum of ground nut oil soap showed following absorption bands. The assignment was recorded as below:

Frequency (cm^{-1})	Assignment	Literature Value (cm^{-1})
1747	 Ester group	1740-1710
1465	 Aliphatic Stretch	1475-1300
1003	 Stretch	1000-1300

The surface tensions of all these synthesized soaps were recorded by using standard stalagmometer method. The same method was used for the measurement of surface tensions of commercial detergents. The values of surface tensions were compared.

Conclusion: We have successfully synthesized three different soaps from edible oils. All the synthesized soaps were characterized by chemical method and one of them was characterized by IR spectral studies. The surface tensions of all the synthesized soaps were determined by physical measurement of surface tension using stalagmometer. It was observed that the cleaning power of ground nut oil soap was highest amongst synthesized soaps when compared with surface tension values of synthesized soap with standard commercial samples like Tide and Wheel.

The cleaning power of other two synthesized soaps was however lesser than Tide and Wheel detergents.

Though, the cleaning power of ground nut oil is highest but we cannot propose it for commercial use due to high cost. Economically it is not feasible to use it.

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