STUDENT STUDY PROJECT

CHEMISTRY

- EFFECTS OF SODIUM CARBONATE ON FOAMING CAPACITYOF A SOAP

INTRODUCTION

Soap is an anionic surfactant used in conjunction with water for washing and cleaning, which historically comes either in solid bars or in the form of a viscous liquid. Soap consists of sodium or potassium salts of fatty acids and is obtained by reacting common oils or fats with a strong alkaline in a process known as saponification. The fats are hydrolyzed by the base, yielding alkali salts of fatty acids (crude soap) and glycerol.

$CH_3-(CH_2)_n-COONa$

Soaps are useful for cleaning because soap molecules have both a hydrophilic end, which dissolves in water, as well as a hydrophobic end, which is able to dissolve non polar grease molecules. Applied to a soiled surface, soapy water effectively holds particles in colloidal suspension so it can be rinsed off with clean water. The hydrophobic portion (made up of a long hydrocarbon chain) dissolves dirt and oils,

while the ionic end dissolves in water. The resultant forms a round structure called micelle.

REVIEW OF LITERATURE

Soaps and detergents remove dirt and grease from skin and clothes. But all soaps are not equally effective in their cleaning action. Soaps are the Na and K salts of higher fatty acids such as Palmitic acid, Stearic acid and Oleic acid. The cleansing action of soaps depends on the solubility of the long alkyl chain in grease and that of the -COONa or the -COOK part in water. Whenever soap is applied on a dirty wet cloth, the non polar alkyl group dissolves in grease while the polar -COONa part dissolves in water. In this manner, an emulsion is formed between grease and water which appears as foam. The washing ability of soap depends on foaming capacity, as well as the water used in cleaning. The salts of Ca and Mg disrupt the formation of micelle formation. The presence of such salts

makes the water hard and the water is called hard water. These salts thus make the soap inefficient in its cleaning action. Sodium Carbonate when added to hard water reacts with Ca and Mg and precipitates them out. Therefore sodium carbonate is used in the treatment of hard water. This project aims at finding the foaming capacity of various soaps and the action of Ca and Mg salts on their foaming capacity.

METHODS :

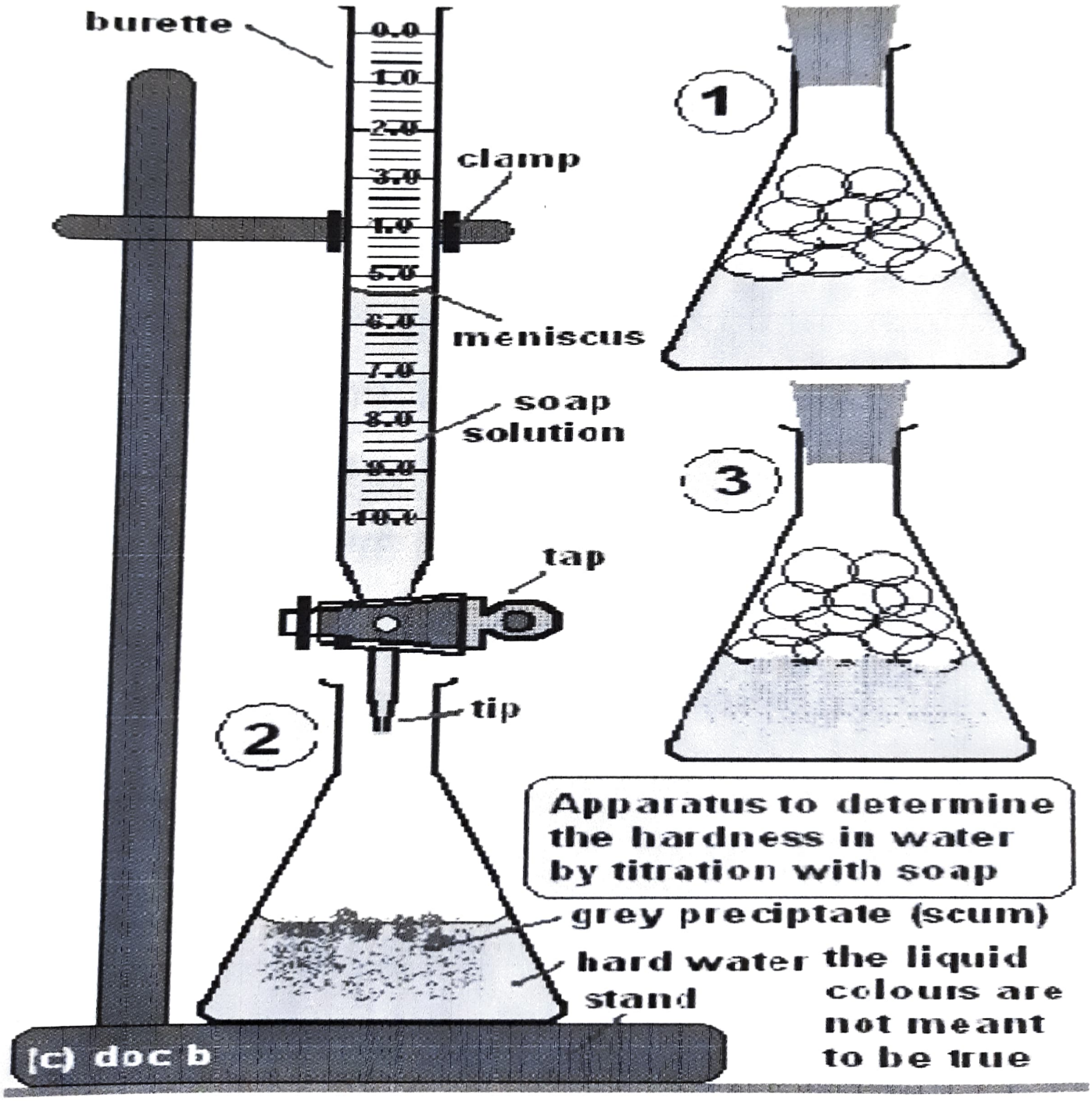
In cold-process and hot-process soap making, heat may be required for saponification. Cold-process soap making takes place at a sufficient temperature to ensure the liquification of the fat being used. Unlike cold-processed soap, hot-processed soap can be used right

away because the alkali and fat saponify more quickly at the higher temperatures used in hot-process soap making. Hot-process soap making was used when the purity of alkali was unreliable. Cold-process soap making requires exact measurements of alkali and fat amounts and computing their ratio, using saponification charts to ensure that the finished product is mild and skin-friendly.

- ***Hot process***

In the hot-process method, alkali and fat are boiled together at 80–100 °C until saponification occurs, which the soap maker can determine by taste or by eye. After saponification has occurred, the soap is sometimes precipitated from the solution

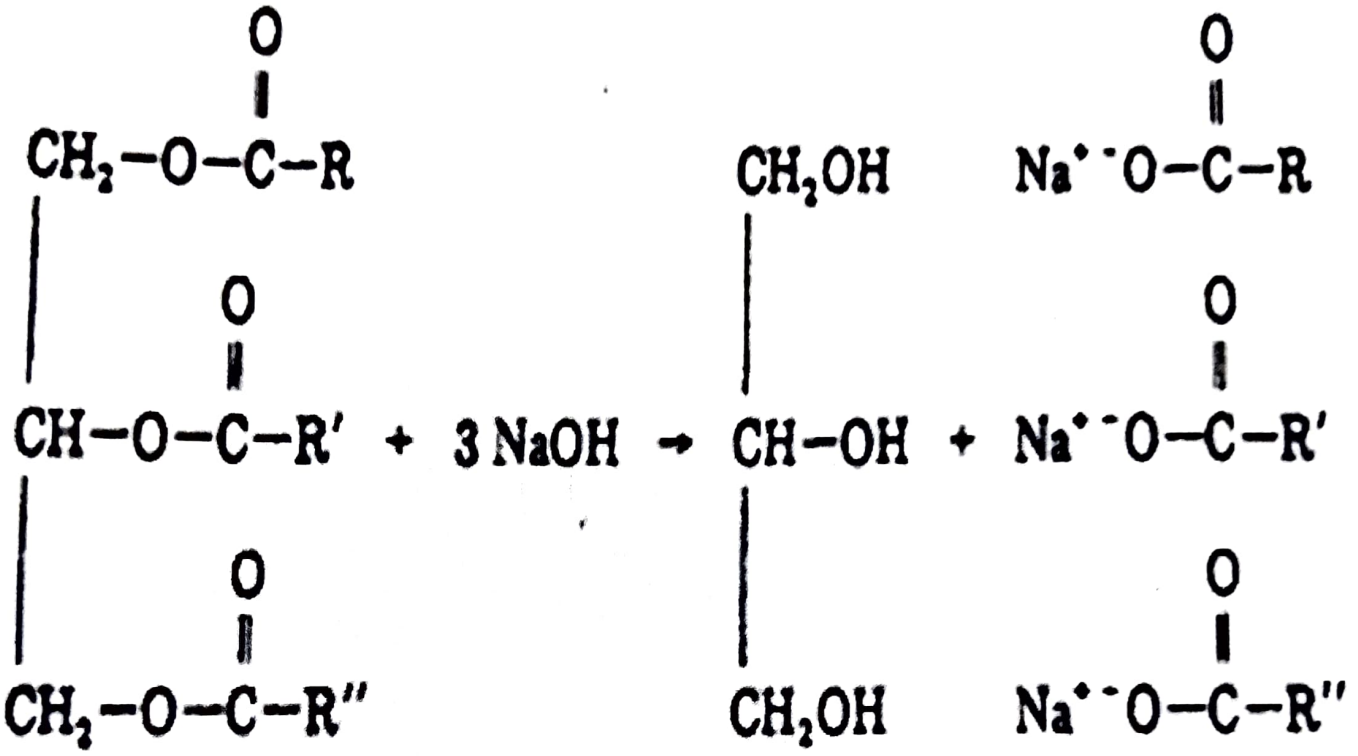
by adding salt, and the excess liquid drained off. The hot, soft soap is then spooned into a mold.

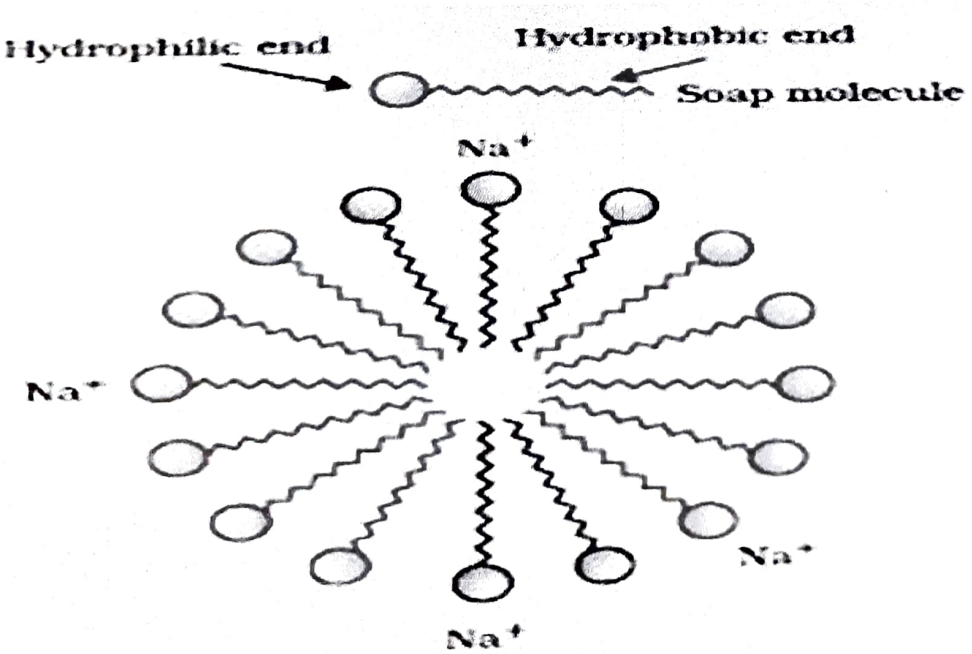


➢ ***Cold process***

A cold-process soap maker first looks up the saponification value of the fats being used on a saponification chart, which is then used to calculate the appropriate amount of alkali. Excess unreacted alkali in the soap will result in a very high pH and can burn or irritate skin. Not enough alkali and the soap are greasy. The alkali is dissolved in water. Then oils are heated, or melted if they are solid at room temperature. Once both substances have cooled to approximately 100-110°F (37-43°C), and are no more than 10°F (~5.5°C) apart, they may be combined. This alkali-fat mixture is stirred until "trace". There are varying levels of trace. After much stirring, the mixture turns to the consistency of a thin pudding. "Trace"

corresponds roughly to viscosity. Essential and fragrance oils are added at light trace.





CONCLUSION

Foaming capacity of soap is maximum in distilled water.

The foaming capacity of soap increases on the addition of sodium carbonate.

REFERENCES {bibliography}

Parts of this project have been referred from foreign sources and have been included in this investigatory project after editing.

The references of the sources are as follows:

Books:

Together with lab manual chemistry and comprehensive chemistry-12.