

SUMMARY

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The work done in this thesis, synthesis of nonionic and anionic surface-active agents (sulfated and sulfonated) obtained from non-edible *Gawafa fat*, were considered because of the remarkable properties and wide scope of uses of these compounds. This study has been represented in the following sections

Section I: It includes the preparation of the fat samples by cold extraction with n-hexane. The extracted fat was subjected to chemical characterisation and fatty acids composition via *G. L. C.* The mixed fatty esters prepared were subjected to reduction with LiAlH_4 to the corresponding fatty alcohols. Nonionic surfactants from the mentioned compounds were prepared by propylene oxide (3,5 and 7 mole) adduct, in presence of KOH as catalyst. Also, in this section, anionic surfactants, were prepared by reacting the individual fatty alcohols (decanol C_{10} , dodecanol C_{12} , tetradecanol C_{14} , hexadecanol C_{16} , octadecanol C_{18} and 9-octadecenol) and / or fatty alcohols of *Gawafa Fat*, with chlorosulfonic acid followed by neutralization using NaOH to $\text{pH} = 7$; and / or addition of propylene oxide ($n = 1, 2$ and 3) followed by sulfation and neutralization with sodium hydroxide (2 N). The structure of the synthesized surfactants was confirmed by examination of their infrared and proton nuclear magnetic resonance spectra.

Section II: Was concerned with the synthesis of sulfo-fatty esters from acrylic, methacrylic acids and fatty alcohols (decyl, dodecyl, tetradecyl, hexadecyl, octadecyl, octadec9-enyl, and fatty alcohols of *Gawafa Fat*) followed by addition of NaHSO_3 forming bisulfite adducts where, the surface active properties showed that; these compounds gave high surface

properties as detergent with high Ca^{2+} stability. On other hand sulfo-fatty esters, were prepared by the reaction of fatty acids with allyl alcohol, followed by addition of sodium bisulfate forming anionic surface active agents.

Section III: In this section mono- and diesters of itaconic acid or diester were prepared using the standard method of esterification followed by addition of sodium bisulfite where , the sulfo-mono fatty alkyl itaconic acid esters showed more surface properties than diesters. Micro-analytical data; IR and ^1H NMR spectra established the structures of the prepared compounds. The surface active properties were studied and it is clear that, some of these compounds showed high Ca^{++} stability hence they might be utilized in hard water and most of these compounds showed good biodegradability properties which manifested the importance of their application avoiding pollution problems. More improved properties, were obtained by introducing propylene oxide (3 mole) to sulfo-alkyl esters of acrylic and itaconic acids with fatty acids and/or fatty alcohols of *Gawafa Fat* .

The physical and surface active properties of the prepared surfactants were evaluated as illustrated in (34 Tables) and (17 Figures) which revealed that: the surface active properties in this study were quite satisfactory and it is hoped that, they will find uses in some industrial application.