SUMMARY

This thesis comprises the evaluation of surfactants prepared from by-product in line with the production of linear alkyl benzene "soft foam", and aromatic residues extracted during the production of lube oil at Amerya Petroleum Refining Company and Alexandaria Mineral Oil Company (AMOC), which are not ideally used. These by-product and residues are disposed by adding to furnace oil, whereas, it is possible by different chemical treatments to obtain valuable and useful products such as industrial detergents, grease removers, emulsifiers,oil dispersants, wetting agents, …. etc.

In this investigation the following topics are studied:

1. Chemical evaluation of local by-product and residues as compared to linear alkyl benzene in order to study the physical and chemical properties with a view to synthesize chemicals of practical use.

2. Determination of the chemical structures for the by-product and residues, by different analytical and spectroscopic methods such as GC/MS was carried out.

3. Many trials are carried out on sulphonation process by applying different conditions to obtain maximum yields, using concentrated sulphuric acids.

4. Preparation of surfactants and their chemical evaluation compared with surfactants prepared from linear alkyl benzene and HAB.

5. Performance evaluation of surfactant's efficiency compared with traditional products available in the local market was carried out.

The different experiments carried out on these surfactants involved the following items:

- Detergency power.

- Wetting power.

- Emulsification power.

-foam power.

* **Evaluation of oil spill dispersant in open sea**:

- Effectiveness test of oil dispersant.

- Toxicity and biodegradability test of oil dispersant.

A. Natural phytoplankton population.

B. Shrimp.

C . Fishes

The results showed that:

- The by-product, heavy alkylated benzene, consists of sisteen components with α-substituted side chains (C_{12}-C_{16}). The highest component percentage is 1-methyl-2-propyl-nonyl benzene, which represents about 27.69%.

- The light aromatic extract consists of seventeen components, with highly substitution in the benzene ring (19.6% mono-, 26.3% di-substitution) and branched side chains with alcoholic groups. The highest components percentage is 4 (3-hydroxy-octadecyl) phthalic acid which represents about 14%.

- The medium aromatic extract consists of twenty components, which contain C_{28}-C_{31} side chains with alcoholic groups. The highest component percentage is 5, 7, 12- trihydroxy nonacosyl-benzene which represents about 9%.

- In case of the heavy alkylated by-product, the acid/ sample ratio range is from (1.5-1.7): 1, at temperature range (45-60^{o}C) with digestion time 4-5 hours.

- In case of light and medium aromatic extracts, the acid/sample ratio range is from (1.5-1.8): 1 at temperature range (35-60^{o}C)and (35-45 ^{o}C) with digestion time 4-6 hours. N-Butyl acetate was used as a capturing agent during sulphonation processes to protect the alcoholic groups from sulphation process.

- In case blend of light and medium aromatic extracts with heavy alkylated by-product, the acid/sample ratio range is from (1.5-1.7): 1 at temperature range (35-45^{o}C) with digestion time 4-6 hours. N-Butyl acetate was used as a capturing agent during sulphonation processes to protect the alcoholic groups from sulphation process.

The results obtained revealed the following points:

- Dissimilarity of physical properties and chemical structure of linear alkyl benzene "soft foam" and relative by-product heavy alkylated benzene.

- Similarity of physical properties and chemical structure, to some extent, for light and medium aromatic residues.

- The most suitable use of linear alkyl benzene "soft foam" is the production of surfactants of strong wetting, detergency and emulsification power, and can be used in textile factories, hotels,oil spill dispersant in open sea, …. etc.

- The most suitable use of light, medium alkylated benzene is the production of surfactants of high detergency power, good wetting, and emulsification power for domestic use.

- The most suitable use of aromatic residues (HAB+ light) and (HAB+ medium) is the production of industrial detergents of strong detergency power, and grease removers for heavy duity machine.