SYNTHESIS AND EVALUATION OF SOME ORGANIC EMULSION BREAKERS FOR TREATMENT OF WASTEWATER FROM OIL FIELD PRODUCTION COMPANIES

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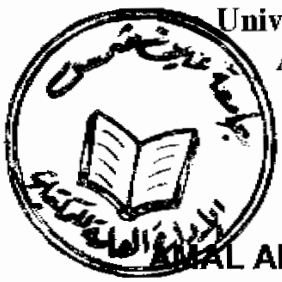

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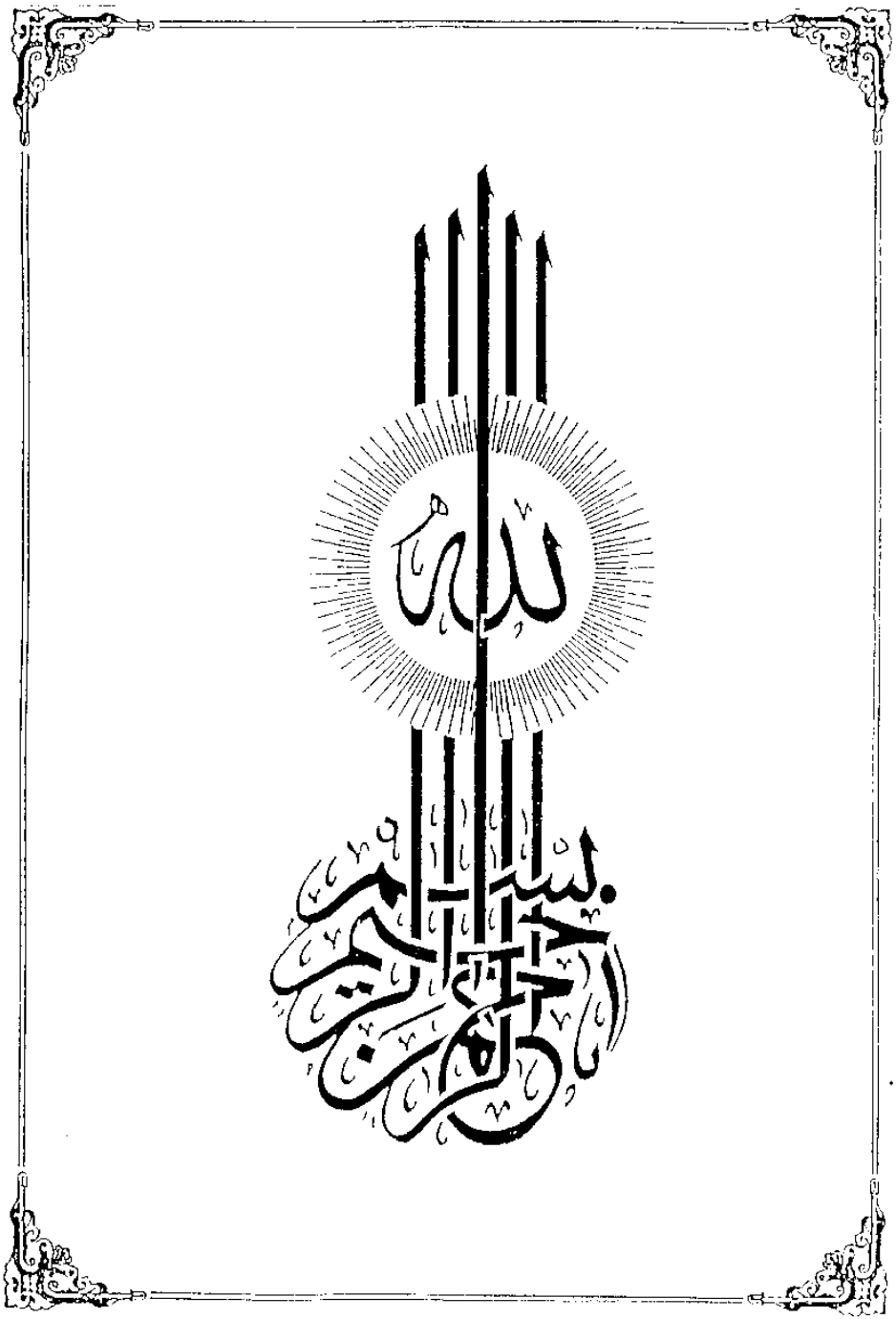

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AIM OF THE WORK

The wastewater resulting from oil-field production companies is an emulsion into which the oil is dispersed in water. This oil-in-water emulsion causes an environmental problem, and is currently treated with low molecular weight polymers termed emulsion breakers.

Most of the research works on breaking of petroleum emulsions are carried out in the industrial companies and are published as patents.

This study pertains to the synthesis of polytriethanolamine and it derivatives to be utilized as emulsion breakers.

SUMMARY OF THE WORK

The target of this thesis was to synthesis polytriethanolamine and some derivatives (I-XIII) of different molecular weights to be evaluated as emulsion breakers for oil-in-water emulsion. Thus, triethanolamine is condensed in the presence of different catalysts such as sodium hydroxide, aluminum sulphate, aluminum sulphate/acetic acid, orthophosphoric acid, orthophosphoric/acetic acid, polyaluminum chloride, polyaluminum chloride/acetic acid and calcium chloride.

The structures of the produced polytriethanolamines have been established by the mass spectroscopy (using the chemical ionization method) for determination of the molecular weights of these polytriethanolamines and ^{1}H nmr and ^{13}C nmr. Elemental micro analysis of nitrogen has been also determined.

Infrared spectroscopy predict to the formation of ether linkage of the polymers.

The produced products were evaluated in laboratory as emulsion breakers for Petrobel wastewater which has a pollution ratio 50-200 ppm. The efficiency of these products for breaking the emulsions proved to be higher than the commercial emulsion breaker Magna Clear 10 (Baker Co.).

The critical flocculation concentration (CFC) of these products were 5-20 ppm.

The surface properties of these products were determined, as surface charge density per one mole of products plotted versus their efficiency at certain concentrations (5,10,20,30 and 40 ppm).

The effect of emulsion pH value on the efficiency of products I,II and III showed that as the alkalinity of the emulsion increases, the breaking of emulsion increases.

The effect of a co-flocculant (as $Al_2(SO_4)_3$ was studied to show that the concentrations of this co-flocculant which enhance the efficiency in breaking emulsion were 5-20 ppm of $Al_2(SO_4)_3$.

The polytriethanolamines quaternized with three different alkyl halides showed less efficiency than the parent polytriethanolamines. Also the urethane derivatives of polytriethanolamine showed less efficiency than the parent compounds.

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INTRODUCTION