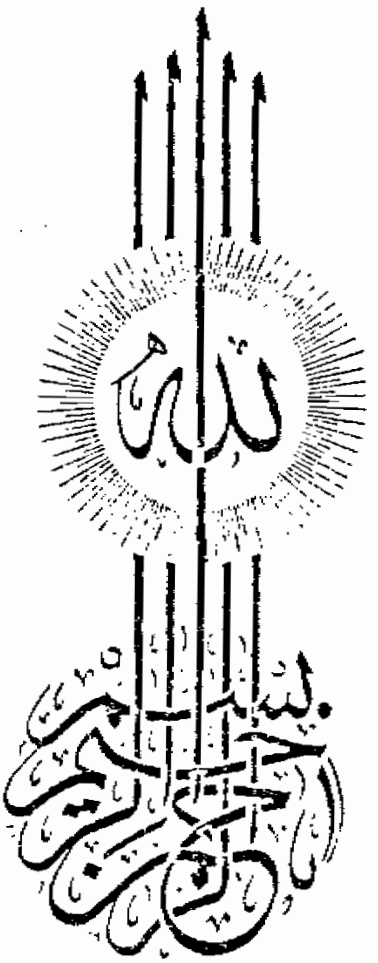


« علم الانسان ما لم يعلم »

صدق الله العظيم

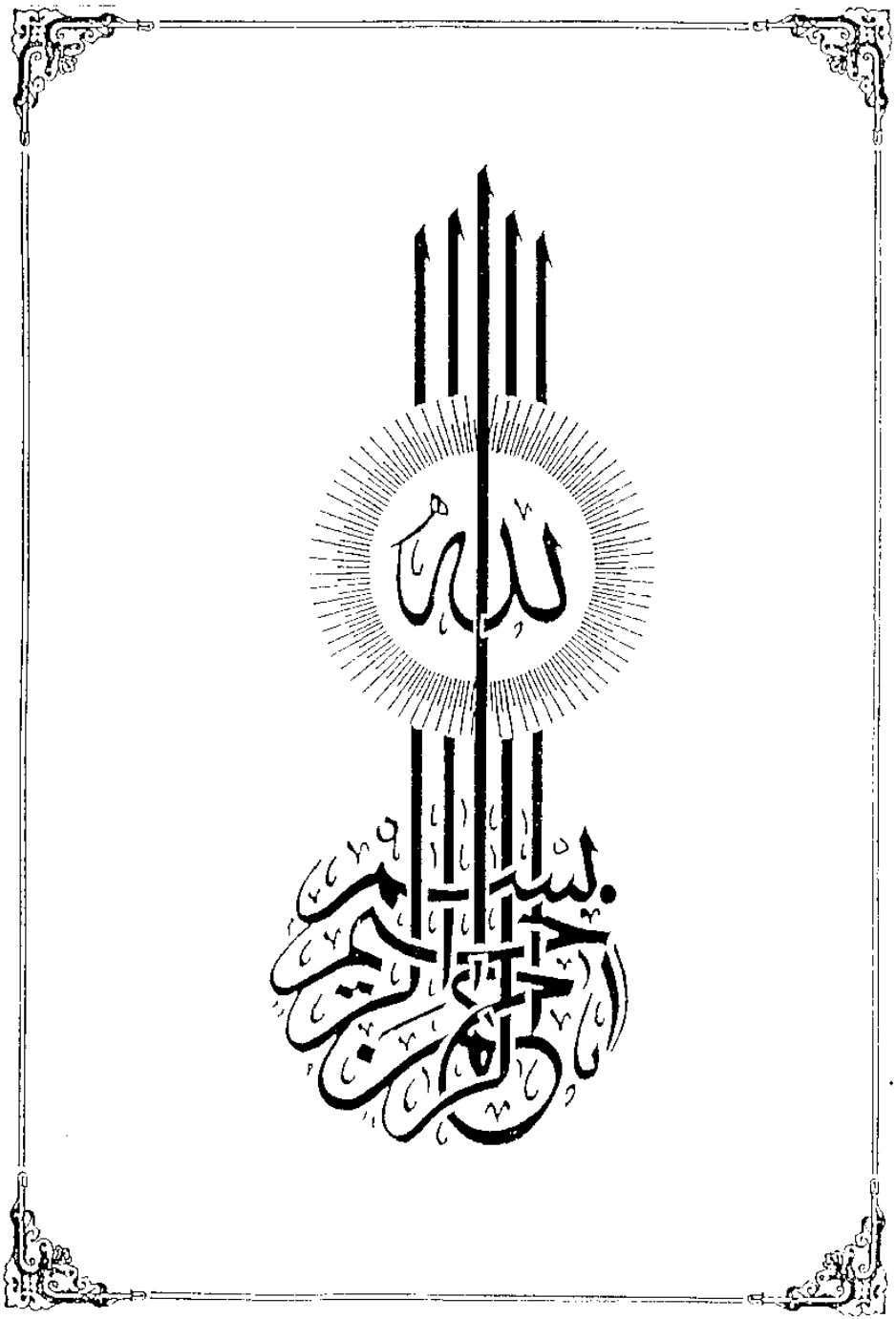
سورة العلق آية ٥

PRESENTMENT TO

MY MOTHER

AND

MY FATHER



STUDIES ON SOME POLY FUNCTIONAL FLUIDS AND THEIR USES

THESIS

SUBMITTED IN PARTIAL FULFILMENT

OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN CHEMISTRY

BY

TAISIR TAHA ALI KHEDRE

PRESENTED TO

CHEMISTRY DEPARTMENT

GIRLS COLLEGE FOR ARTS, SCIENCE AND EDUCATION

AIN SHAMS UNIVERSITY

EGYPTIAN PETROLEUM RESEARCH INSTITUTE

CAIRO-EGYPT

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STUDIES ON SOME

POLY FUNCTIONAL FLUIDS AND THEIR USES

THESIS ADVISORS — APPROVED

PROF. Dr. ABOEL-KHAIR B.MOSTAFA.
Chemistry department. Girls College
for Arts, Science and Education
Ain Shams University.

PROF. Dr. ISMAIL ALI EL-MAGLY
Application Division, Egyptian
Petroleum Research Institute (E.P.R.I.)

PROF. Dr. FERIAL MOHAMED GHUIBA
Application Division, Egyptian
Petroleum Research Institute (E.P.R.I.)

Head of Chemistry Department

Marguerite A. Wassef

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NOTE

Besides the work carried out in this thesis, the candidate has attended postgraduate courses in the following topics.

1. Photochemistry.
2. Quantum chemistry.
3. Spectroscopy.
4. Instrumental analysis.
5. Chemical Kinetics.
6. Thermodynamic.
7. Heterocyclic.
8. Natural product.
9. Organomettalic chemistry.
10. Advanced reaction mechanism.
11. German language.

She has successfuly passed a written examination in these courses, in partial Fulfillment for the degree of master of science .

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AIM OF THE WORK

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Many different types of materials are utilized as functional fluids and Functional fluids are used in many different types of applications. Thus, such fluids have been used as electronic coolants, diffusion pump fluids, lubricants, damping fluids, bases for greases, power transmission and hydraulic fluids, heat transfer fluids, heat pump fluids , refrigiration equipment fluids and filter medium for air-conditioning systems.

A particular important application of such functional fluids are their utilization as hydraulic fluids and engine lubricants in aircraft,requiring successful operation of such fluid over a wide temperature range. An especially valuable and highly desirable property of such fluids being fire resistance.

Phosphate esters have long been used as functional fluids[1]. They have been used alone in wholly synthetic compositions as additives to mineral oil compositions to impart extreme pressure properties thereto. The volume of production of triarylphosphate as flame retardant plasticizers and fire resistant hydraulic fluids, is approximately 100 million pounds per years [MRI 1977][1] and now it seems to be more than the double.

The needs of the local market from the hydraulic brake fluids exceeds 300 imported tons per year. The Egyptian petroleum Research Institute [EPRI] has encouraged this work, which deals with hydraulic brake fluids. Therefore this research program covers a study of some functional fluids needed for the local market.

The aim of this study covers the following :

- Synthesis of some triphosphate esters .
- Study of some parameters which affect the esterification reactions for the aim of optimization.
- Characterization of the prepared compounds using the recent methods and different tools of analysis.
- Laboratory testing for the prepared esters to outline their suitability as base for hydraulic brake fluids in connection with some of the international standard specifications.