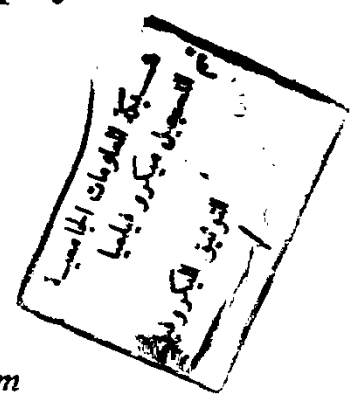
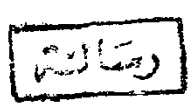
Catalytic and Physical Characteristics of Dispersed Metal-Tetraphenylporphyrin on Different Supports



By

Hany Mohamed Ahamed Abdel Dayem
(B. Sc. Chemistry)



Presented
To

The Faculty of Science
Ain Shams University
Cairo

For

The Degree of M. Sc.

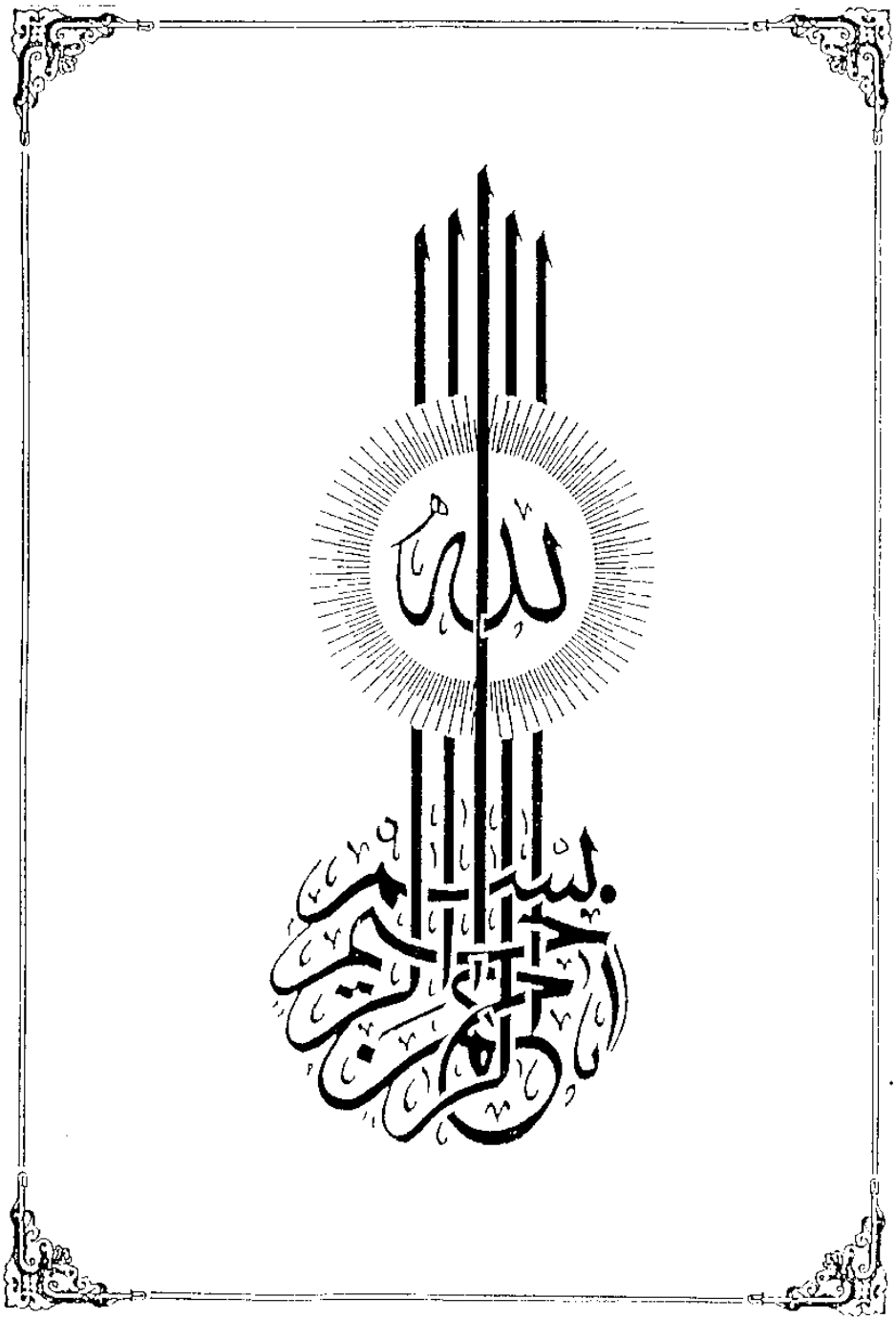
In Chemistry

1994

وما أوتيتم من العلم إلا

قليلا

﴿ صدق الله العظيم ﴾



To My Father Memory
and To My Mother
Sister and Brothers

ACKNOWLEDGEMENT

I wish to express my deepest gratitudate to my principle supervisor professor Dr. ***Salah A. Hassan*** for giving me the opportunity to work within his school of catalysis, designing the point of research, discussing and interpretting the result and for his continous guidance during the course of this work.

I wish olso to express my thanks to Dr. ***Khalid E. Hashem*** for his sincer efforts, devotion, constant support, talented supervision.

Thanks are also to Dr. ***Hamdi A. Hassan*** for the helpful supervision and his constant support through out this wrok.

I am finally indebted to my mother for her continous supports and encouragements

THE THEORETICAL CURRICULA FOR THE DEGREE

Beside the work carried out in this thesis the student has accomplished successfully the post graduate studies for the partial fulfillment of the M.Sc. degree in the following topics:

1- Advanced Electrochemistry.
2- Statistical Thermodynamics.
3- Physical polymer Chemistry.
4- Advanced Chemical Kinetics.
5- Quantum Mechanics.
6- surface Chemistry.
7- Computer science.
8- Cement Chemistry.
9- Catalysis.

Prof.Dr. A.F.Fahmy

Head of Chemistry Department

CONTENTS

I. INTRODUCTION

1- INTRODUCTION

1.1. Introductory Remarks

Homogeneous, heterogeneous and "heterogenized homogeneous" catalysts

The development of catalysis over last two decades has been characterized by the wide application of metal complexes and organometallic compounds as catalysts. Using novel catalytic systems, industrial processes have been developed for both the production of products on a large scale ,e.g., polypropylene ,high density polyethylene, acetaldehyde, acetic acid, alcohols and propylene oxide (1-3) and for the synthesis of expensive compounds in relatively small quantities ,e.g., asymmetric amino acids (3). As a rule, these processes are performed under fairly mild conditions and are characterized by high selectivity. Initially for some new catalytic technologies coordination compounds were used as solid heterogeneous catalysts ,e.g., the process of polypropylene production based on the application of titanium trichloride as a catalyst. But many processes ,e.g., ethylene oxidation to acetaldehyde and synthesis of aldehydes and alcohols by hydroformylation of olefins, have been developed with the application, as catalysts, of coordination or organometallic compounds in solution (homogeneous catalysts). However for large scale processes, the application of such catalysts leads to significant problems (1):

1) Difficulties in the separation of catalyst from the reaction medium and catalysts recovery. This is a great