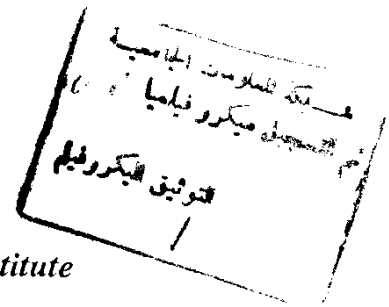
EFFECT OF RADIATION ON SOME PREPARED POLYMERIC MOULDS FOR USE IN ENVIRONMENTAL APPLICATIONS



Thesis
Submitted to
Environmental Studies and Researches Institute
Ain Shams University

For

M. Sc. Degree of Environmental Sciences
Department of Biological and Physical Sciences

By

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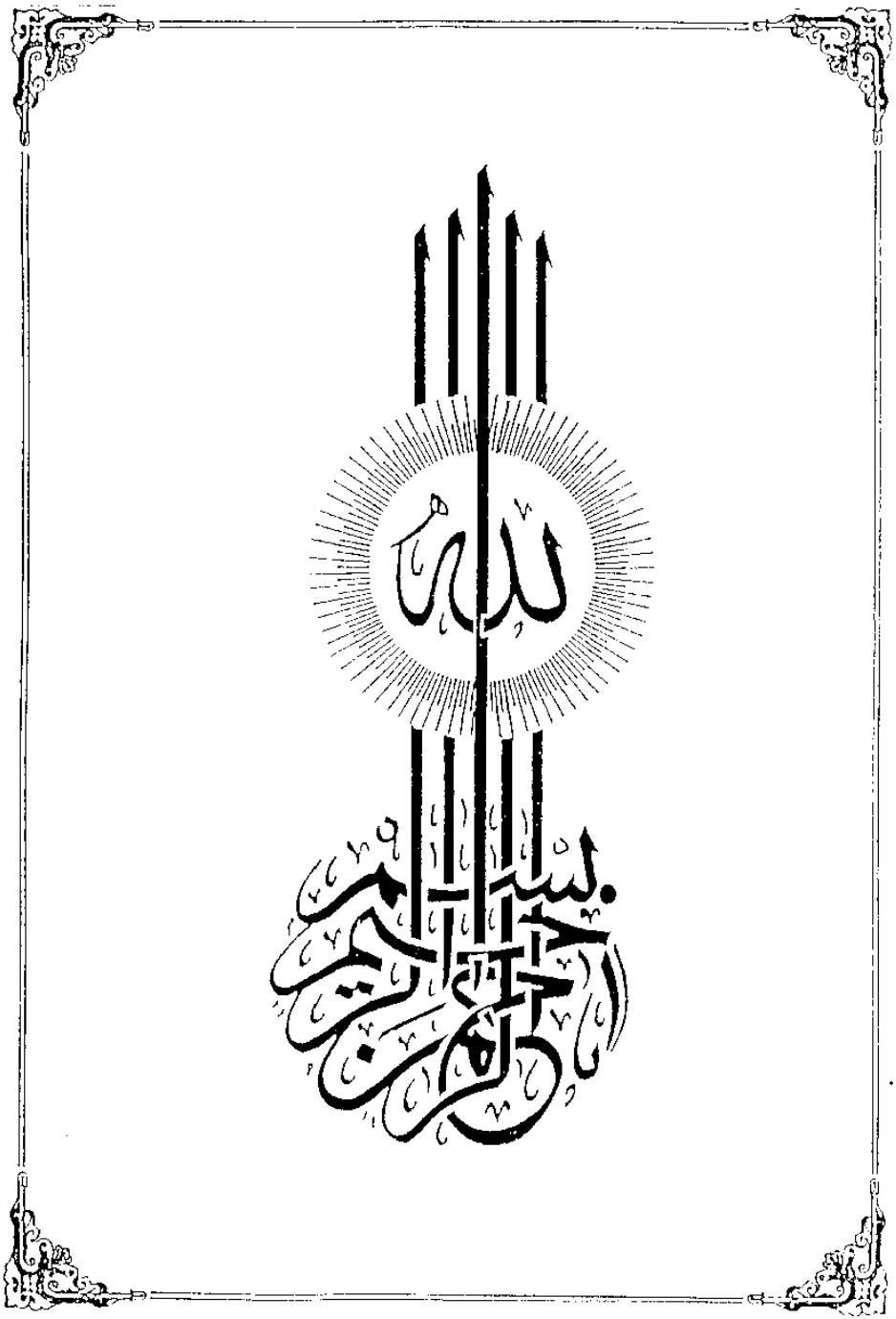
1995

بسم الله الرحمن الرحيم



TO MY PARENTS

ACKNOWLEDGEMENT

The author is greatly indebted to Professor Dr.M.S. Abdel-Mottaleb, Professor of Inorganic Chemistry, Faculty of Science- Ain Shams University, to Professor Dr. A.M. Dessouki, Head of Radiation Chemistry of Polymers Department, National Centre for Radiation Research and Technology (NCRRT) and to Assist. Professor Dr. N. Hafez, Radiation Chemistry of Polymers Department (NCRRT), for suggesting the point of research, supervision, continuous guidance and valuable discussions throughout this work. My best thanks to prof. Dr. A. El - Behay, president of NCRRT for facilities offored, care and interest.

Many sincere thanks to Professor Dr. Adel Yassin, Dean of Institute of Environmental Studies and Researches- Ain Shams University and Professor Dr. Abdalla Ibrahim, Head of Department of Biological and Physical Sciences for their help and interest. Also, my best thanks to all my colleagues in the department and the centre.

EFFECT OF RADIATION ON SOME PREPARED POLYMERIC MOULDS FOR USE IN ENVIRONMENTAL APPLICATIONS.

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CHAPTER IV

TABLES AND FIGURES LIST

NOMENCLATURE

NRL	=	Natural Rubber Latex.
KGy	=	Kilo-gray.
Mrad.	=	Mega rad. = 10 KGy
phr	=	Part per hundred parts rubber
T_b	=	Tensile strength at break.
E_b	=	Percentage elongation at break
Vegomet	=	Anhydrous Sodium meta Silicate
Cellosize	=	Hydroxy Ethyl Cellulose (HEC)
O.P.C.	=	Ordinary PortlandCement

Aim of Work

A multitude of industrial applications of polymeric moulds which have been proposed and exploited was reported in many books and articles. For example, in sandy soil stabilization by spraying such a rubberized mould using a delayed- action mechanism, a fine network of plasticised rubber is produced which binds the surface particles together. Erosion by wind and rain is thereby retarded, and vegetation was able to grow, which itself has a further binding and stabilizing effect upon the soil particles. Furthermore, use of the spray on sandy slopes is said to prevent the rain from draining through the sand; it can therefore be diverted in such a way as to render the valleys fertile.

An important application of rubberized moulds is the ability of these compositions to take up small relative movements which can be used in constructing materials as in expansion joints, crack's filling materials and soil injection...etc. A further application in waste disposal, where the important advantage offered by rubber-cement composition moulds which can be resistant to cracks, corrosion, humidity and land trembling.

The aim of this work is to prepare some polymeric moulds using Natural Rubber Latex (NRL)-Cement composites based on a delayed - action mechanism. Factors affecting the preparation process such as concentration, mixing percentage, additives and their effects on what is regarded as a delayed-action coacervant combination will be studied.

The effect of γ- radiation on some properties of the prepared materials such as the mechanical properties will be studied. A study of the effect of natural aging of the prepared moulds before and after irradiation at different environmental conditions as well as the possibility of their application in the construction field as expansion joints and cracks filling materials will be also investigated.

CHAPTER I

INTRODUCTION

Introduction

Interaction of high energy radiation with matter

The primary effect of the interaction of gamma - rays with matter includes the production of high energy, and hence high speed electrons by the photoelectric, compton, or pair-production processes. These electrons are the main agent through which all the effects of gamma - rays arise. The high speed electrons will continuously be subjected to repulsion which deflects it from its original path and also slows it down. Its path is, therefore tortuous and quickly loses all its energy. Thereafter it is captured by one of the many atoms, which have been ionized by radiation under other circumstances, there will be interaction between the high speed electron and one of the individual electrons of the atom. This may involve the transfer of enough energy to an orbital electron to "raise it" from its normal orbit to one of slightly higher energy. Excited atoms are produced which are very reactive. These excited atoms usually have sufficient extra energy to break spontaneously into radicals. Another alternative is that the high speed electron may repel an individual electron to eject it completely from its parent atom.

Ionization is therefore a consequence of the passage of electrons through the matter. Therefore a chemical change may be expected, since the electron ejected may have been responsible for a chemical bond in a compound. Estimates for the time of this electron capture process vary but appear to be too short in most situations for ionic chemcial reactions to take place as judged by the experimental evidence(1). It can be seen from the above that typical active