

Ain Shams University Women's College for Arts, Science and Education, Cairo, Egypt.

Study of Some Characteristics of Blended Cement Containing Industrial Wastes

A thesis

Submitted to chemistry Department, Women's College, Ain shams University In Partial Fulfillment of the Requirements For the Degree of Master of Science in Chemistry

Presented by Ebtisam Moftah Abdalla Bzaga (B. Sc. 2007)

Supervisors

Prof. Dr. Essam A. Kishar Prof of Inorganic Chemistry Women's College Ain Shams University Cairo, Egypt Prof. Dr. Eisa El Sayed Hekal
Prof. of Physical Chemistry and
Building
Materials Faculty of Science
Ain Shams University
Cairo, Egypt

Dr. Doaa A. Ahmed

Assistant Prof. of Inorganic Chemistry
Womens College
Ain Shams University
Cairo, Egypt

 $(7\cdot17)$



Ain Shams University Women's College for Arts, Science and Education, Cairo, Egypt.

Study of Some Characteristics of Blended Cement Containing Industrial Wastes

A thesis

Submitted to chemistry Department, Women's College, Ain shams University In Partial Fulfillment of the Requirements For the Degree of Master of Science in Chemistry

Presented by Ebtisam Moftah Abdalla Bzaga (B. Sc. 2007)

Supervisors

Prof. Dr. Essam A. Kishar Prof of Inorganic Chemistry Women's College Ain Shams University Cairo, Egypt Prof. Dr. Eisa El Sayed Hekal
Prof. of Physical Chemistry and
Building
Materials Faculty of Science
Ain Shams University
Cairo, Egypt

Dr. Doaa A. Ahmed

Assistant Prof. of Inorganic Chemistry
Womens College
Ain Shams University
Cairo, Egypt

(2016)



Ain Shams University Women's College for Arts, Science and Education, Cairo, Egypt.

Student name: Ebtisam Moftah Abdalla Bzaga

Scientific Degree: B. Sc. Chemistry

Department: Chemistry

Name of Faculty: Faculty of Sicence

University: Zawia, University, Libya

B. Sc. Graduation = Date: (2007)



Study of some characteristics of blended cement containing industrial wastes

THESIS ADVISORS APPROVED

Prof. Dr. Essam A. Kishar

Prof. of Inorganic Chemistry

Prof . Dr. Eisa El Sayed Hekal

Prof. of Physical Chemistry and Building Materials

Dr. Doaa A. Ahmed

Assistant Prof. of Inorganic Chemistry

APPROVED

Head of Chemistry Department

Prof. Dr. Mansoura Ismail

Acknowledgment

Praise and thanks be to Allah, the most merciful for assisting and directing me the right way.

I would like to submit my gratitude, sincere thanks and appreciation to Prof. Dr. **Essam A. Kishar,** Professor of Inorganic Chemistry, Women's college, Ain Shams University, for suggesting the subject of this work, useful guidance, kind help, continuous interest, and fruitful discussion, which have facilitated the interpretation of the data throughout the chapters of this study as well as preparation of the thesis in its final form.

I would like to express my deepest thanks to Prof. **Dr. Eisa El Sayed Hekal** Prof. of physical Chemistry, faculty of Science Ain Shams University. For his kind help, talented supervision and criticism, useful directions, valuable and fruitful discussion during all the steps of the study.

My deepest gratitude and appreciation to Dr. **Doaa A. Ahmed,** Ass. Prof of Inorganic Chemistry, Women's College, Ain Shams University, for her deep concern in this work, brilliance and effort in guiding and continuous help through out the whole work.

Thanks are also to all members of the chemistry department, women's college ,Ain Shams university, for their help.

TO MY FAMILY

I AM Very Greatful

To All Of Them

For Their Support,

Kindness

And Love.



List of Contents

Subject	Page
List of Contents	Ι
List of Tables	V
List of Figures	VII
List of Abbreviations	XII
Abstracts	XIII
CHAPTER (I) Introduction	
1.1. Introductory Remarks	1
1.2. Portland Cement	1
1.3. Pozzolanic Cement	4
1.4. Artificial Pozzolana	7
1.4.1. Portland Cement-granulated blast-furnace slag (GBFS) blends	7
1.4.2. Portland Cement-fly ash blends	15
1.4.3. Portland Cement - Silica fume blends	17
1.5. Fire resistance	24
Aim of the work	29