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

Effect Of Nano Metakaolin On The Physico-Chemical And Mechanical Properties Of Various Blended Cement Pastes

A Thesis

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Presented by
Aya allah Mahmoud Ebrahim
(B.Sc., 2011)

Supervised by

Prof. Dr. Wafaa S. Hegazi
Prof. of Physical Chemistry
Women's Faculty,
Ain Shams University, Cairo- Egypt.

Dr. Doaa A. Ahmed
Assistant Prof. of Inorganic Chemistry,
Women's Faculty,
Ain Shams University, Cairo- Egypt

Dr. Maha R. Mohamed
Assistant Prof. of Inorganic Chemistry,
Women's Faculty,
Ain Shams University, Cairo-Egypt

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THESIS ADVISORS APPROVED

Prof. Dr. Wafaa S. Hegazi
Prof. of Physical Chemistry

Dr. Doaa A. Ahmed
Assistant Prof. of Inorganic Chemistry

Dr. Maha R. Mohamed
Assistant Prof. of Inorganic Chemistry

Head of Chemistry Department

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

Student Name : **Aya allah Mahmoud Ebrahim**

Scientific Degree : **B. Sc. (Chemistry)**

Department : **Chemistry**

Name of Faculty : **Faculty of Women**

University : **Ain Shams University**

B. Sc. Graduation Date: 2011

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TO MY FAMILY

I AM Very Grateful
To All Of You
For Your Support,
Kindness
and Love.

Aya allah

NOTE

Beside the work done in this thesis, the candidate has attended post- graduate courses for one year in inorganic and analytical chemistry including the following topics:

- Instrumental Analysis.
- Thermodynamic Chemistry.
- Kinetics and Catalysis.
- Nuclear Chemistry.
- Structural Inorganic Chemistry.
- Electrochemical Analysis.
- Special Topics.
- Spectroscopy.
- Coordination Chemistry.
- Photo Chemistry.
- Advanced Chemical Reactions.
- English Language.

She has successfully passed written examinations in the above mentioned topics.

Head of Chemistry Department

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Abstract:

The physico-chemical and mechanical characteristics of various cement pastes are studied in presence of nanometakaolin (2, 4, 6 and 8%) and in absence and presence of different percentages of some industrial wastes such as ground clay bricks, ground granulated blast furnace slag, cement kiln dust and silica fume. The characteristics of these blended pastes are investigated at different hydration times (1-180 days) via determination of the compressive strength, total porosity and chemically combined water content. In addition, the phase composition of the formed hydrates is investigated through X-ray diffraction analysis. The microstructural changes are studied using scanning electron microscopy. The IR spectra and DTA of some cement pastes are also recorded. The results show that the highest compressive strength is obtained for the cement mix blended with 8% NMK in absence of any other additives. In presence of the above mentioned additives, the optimum compressive strength is attained for mixes B, which contain 70% OPC, 20% GCB or slag, 6% CKD or SF, beside 4% NMK. The data obtained for other parameter agree well with the above findings.