توصيف و إعادة إستخدام كسر السيراميك المحروق فى المنتجات السيراميكية

رسالة مقدمة من الطالب

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بكالوريوس علوم - كلية العلوم - جامعة عين شمس - ١٩٨٨

ماجستير فى العلوم البيئية – معهد الدراسات و البحوث البيئية - جامعة عين شمس - ٢٠٠٨

لإستكمال متطلبات الحصول على درجة دكتوراة الفلسفة

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ختم الإجازة :

أجيزت الرسالة بتاريخ / /٢٠١٦

موافقة مجلس المعهد / /٢٠١٦ موافقة مجلس الجامعة / /٢٠١٦

٢٠١٦

صفحة الموافقة على الرسالة

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CHARACTERIZATION AND REUSE OF FIRED CERAMIC SCRAPS IN CERAMIC PRODUCTS

Submitted By

Hatem El-Mohamady Ibrahem Ahmed

B.Sc. of Science, Faculty of Science, Ain Shams University, 1988
M.Sc. of Environmental Sciences, Institute of Environmental Studies & Research, Ain Shams University, 2008

A thesis Submitted in Partial Fulfillment
Of
The Requirement for the Doctor of Philosophy Degree
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Department of Environmental Basic Sciences
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APROVAL SHEET

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ACKNOWLEDGEMENT

The author wishes to express his deep thanks and great appreciation and gratitude to his supervisor Prof. Dr. Salah A. Abo-El Enein, Prof of Physical Chemistry & Building Materials, Faculty of Science, Ain Shams Univ., for his guidance, supervision, fruitful discussion and encouragement through the progress of this work.

Deepest thanks and great appreciation and gratitude also due to Prof. Dr. M. F. Abadir with the Chemical Engineering Department, Faculty of Engineering, Cairo University, for his guidance, supervision, great cooperation and valuable advice through this work.

The author would like to offer special thanks to the work team of central Lab., for raw materials and manufacturing investments at Ceramica Cleopatra Group Factory, for helping him in preparation the different mixtures and tile formation.

ABSTRACT

Large amounts of wastes as fired scrape are produced routinely during the manufacturing of wall, floor tiles, decorated pieces and sanitary ware in ceramic factories. In an average plant producing about 30000 sqm/d nearly 2% of this quantity accumulated as a fired scrap in a big piles about 10 Tons per day it will be several hundreds tons per one month. This represents an extremely high ecological hazard occupy a big area around ceramic factories and cause serious environmental pollution.

The main aim of this thesis is to investigate the possibility of substituting part of the main body of floor and porcelain tiles by this grinded fired scrap.

The experimental program includes performing XRF and XRD measurements of raw materials. The grinded waste was used to partially replace a basic mixture, suitable for production of floor and porcelain tiles from Egyptian and some exported raw materials. The replacement ratios varied from zero % to 15 % by weight.

Screen analysis, wet grinding were performed on the other hand, viscosity and plasticity of different mixes were determined.

Rectangular tile specimens of dimension 100 × 50 × 5 mm3 were molded by dry pressing under uniaxial pressure of 30 MPa, 40 MPa then dried overnight at 120 ºC. Tile samples were fired at temperature 1180 ºC., 1215 ºC., as floor tiles and porcelain tiles.

Water absorption, apparent porosity, bulk density, modulus of rupture, deep abrasion, linear thermal expansion, chemical resistance. Linear firing shrinkage all of these properties of the proposed and basic ceramic standard body were studied on a laboratory scale according to both Egyptian and ISO standards.

Fired samples of the proposed mixtures were subjected to XRD and investigated by scanning electron microscope (SEM).

The results indicated that 6% waste-addition to the standard batch has no deterioration effect on the product, on the contrary it may improve some of them e.g., resistance to alkali and acid attack, resistance to abrasion and MOR. The method used of the waste gives good quality products and also gives economical and environmental benefits that revealed by a simple cost estimation that the using of the suggested fired scraps give about 10% saving in the raw materials cost.

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