



Cairo University

# **THE USE OF SOME AGRICULTURAL WASTE IN THE PREPARATION OF INSULATING FIRE BRICKS**

By

**Ali Mohamed Ali Hassan**

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
In Partial Fulfillment of the  
Requirements for the Degree of

**Doctor of Philosophy**

In

**Chemical Engineering**

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Under the Supervision of

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**Title of Thesis:**

**THE USE OF SOME AGRICULTURAL WASTE IN THE PREPARATION OF INSULATING FIRE BRICKS**

**Key Words:**

Agricultural waste, Bagasse, Wheat straw, Polystyrene, Refractories

**Summary:**

Insulating fire bricks were prepared by the addition of one of two types of agricultural wastes, namely bagasse, the fibrous residue from sugar cane processing and wheat straw residue. These wastes were first sun dried, shredded then mixed with polystyrene (PS) beads as pore forming agent to be finally added to local Egyptian clay (kaolin). Shaped cubic samples of bricks ( $60 \times 60 \times 60 \text{ mm}^3$ ) were thus prepared, dried overnight then fired. Brick samples were heated to temperatures which varied between 900 and 1250°C for 6 h, with a heating rate of 2.5°C/min until 650°C, and then at 5°C/min until 900°C, 1000°C and 1250°C. The effect of varying PS and bagasse or PS and wheat straw content on the fired bricks was investigated.

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## **Dedication**

**TO MY PARENTS AND MY LOVED WIFE  
AND SONS**

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