Effect of Red Gypsum Addition in Clay Based Products

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Abstract

Red gypsum is a waste produced during the Titanium Oxide Production. In Malaysia more than 110,000 tons of red gypsum is produced annually. Almost all of the red gypsum produced is land-filled at specific licensed location as the waste has been classified as scheduled waste. Attempts are being made to convert this waste into an economical and environmental friendly product. One of the obvious options is by making building material. In this work red gypsum was added at 5, 10, 15 and 20 % weight into basic processed clay to produce pressed tiles and extruded bricks. Samples were produced by two common methods used in the industry, extrusion for bricks and pressing for the tiles. For the samples produced, analysis was done for parameters that commonly specified for bricks and tiles such as strength, absorption, shrinkage and color. It was found that some parameters meet or exceed the minimum standard established for bricks and tiles while others may have been compromised. Even though some of these parameters may have been compromised, the tiles and bricks produced from gypsum-clay combination can still be used for specific applications.

Introduction

Malaysia has been developing rapidly for the last two decades and is on the way in becoming a fully developed industrialized nation by the year 2020. High growth in the industrial sector has resulted in higher generation of scheduled waste[1]. Even though central facility is available in treating and disposing majority of the scheduled waste generated in Malaysia[2], recovery activities are still not being successfully implemented at a larger scale due to unfavorable economic viability. In achieving economic viability one must meet following criteria:

i. The waste must contain valuable recoverable material and must be available in large volume
ii. The recovered material (directly or indirectly) must be acceptable by the users and legislators while fulfilling safety and other technical specifications.
iii. The technology for recovery must be available at an affordable cost and overall cost should be lower than the overall disposal and treatment costs.

A waste that is produced in large volume in Malaysia is red gypsum. Annually more than 110,000 tons of red gypsum is being produced. Presently majority of this waste is being land-filled at a specific site. Red gypsum contains up to 70% Phosphogypsum (CaSO₄·2H₂O) on a dry basis. This material is commonly used in cement and gypsum board manufacturing process as raw material. This forms the basic on whether red gypsum can be incorporated into manufacturing clay or cement based building material.

The incorporation of solid waste materials in the construction industry is not a new concept. In Japan large amount of waste goes into road making and many other engineering products such as pavement blocks, roofing

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