UNIVERSITI TEKNOLOGI MARA

DEVELOPMENT OF UNFIRED CLAY BRICK USING OIL BASED TREATMENT SLUDGE (OBTs)

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ABSTRACT

Wastes or secondary products produce by manufacturing industries has a direct impact to the environment. The high increasing of these materials is not only give a burden to the industry, but also has adverse effects on the environment. The storage of such wastes remain at the disposal would pollute the air, water resource and agricultural fields. There is a huge opportunity for recycling and it uses large quantities of wastes to minimise the environmental impact. It can be solved by recycling an industrial waste into the construction components. The use of the industrial waste as a target material for the construction components (brick) is a practical solution to the management of wastewater sludge and to the environment. This research work reports on Oil Based Treatment sludge (OBTs) to develop unfired clay building materials for sustainable building construction. The research aim is to develop unfired clay bricks for sustainable construction components using Hydrated Lime, Portland cement (PC) and activated industrial by-product Ground Granulated Blast-furnace Slag (GGBS) to stabilise Laterite Clay (LC) and OBTs as a target material. The research has investigated the effectiveness of using OBTs as sustainable construction components (unfired clay bricks). This also include the evaluation on the physical and mechanical properties, and environmental properties and the scheduling of environmental profile the OBTs bricks. The brick specimens with dimension 215mm×102.5mm×65mm were manufactured in industrial scale by using conventional mixer and mechanical press at Majpadu Bricks Sdn Bhd, Klang, Selangor. These target materials were stabilised using Lime, Portland cement (PC) on its own and the combination of Ground Granulated Blast-furnace Slag (GGBS) to the lime and PC respectively at the ratio of 50:50 and 30:70, at 10%, 20% and 30% stabiliser dosage to the lime and PC respectively. The brick specimens were tested on 7 and 28 days of curing period. Compressive strength, flexural strength, water absorption, thermal conductivity and Toxicity Characteristic Leaching Procedure (TCLP) test were conducted and compared with the relevant standards. It was found that it is feasible to utilise OBTs as unfired bricks from the sustainable environmental point of view as it will conserve natural resource, protect the environment from waste disposal, and low carbon construction components.

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TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION

This Chapter explains the background to the research, its aim and objectives, methodologies used, research significant and contribution to knowledge. The Chapter ends with a brief description of structure of the entire thesis.

1.1 RESEARCH BACKGROUND

The construction industry in Malaysia is moving forward and rapidly developing. Former Prime Minister, Tun Mahathir Mohamed, with his concept of vision 2020 making Malaysia as fully industrialised and developed country. Tun Mahathir Mohamed states that formulation of industrial policy in Malaysia is geared towards enhancing the contribution and performance of the industrial sector. This policy leads to the growth of various industries such as construction, food, mines and quarries, agriculture and nuclear industry. This will also increase the demand from the infrastructure to meet the national targeted economic (Nalathambi, 2010).

Rapid industrialisation growth in Malaysia is striking the national economic development towards a developing country. However, this could result to serious damage of surrounding environment due to the wastes and contaminants generated from various industries.

Department of Environmental (2008) stated that, there were increasing volumes of wastewater every year due to the fast industrial development in this country. The increasing of wastewater has lead to the increased volume of sludge that produced from the Wastewater Treatment Plants (WTP). The sludge is one of the suspended substances that give a huge impact to the environment. The presence of toxic characteristics such as aluminium, arsenic, lead, mercury, chlorine gas and etc. in the sludge could pose serious threat to the environment if not treated properly (O'Connor, 2010).

Besides that, industrial sludge is often classified as hazardous substances that harm nature and the environment. This sludge has been classified by Malaysia Environmental Quality Act 1974 as 'schedule waste' due to the presence of heavy