Evaluation of Waste Cooking Oil as Sustainable Binder for Building Blocks

Johnson Olufemi Adebayo[1*], *Madzlan* Napiah[2], *Kamaruddin* Ibrahim[1] and *Mohamad* Raduan. Kabit[3]

[1]Department of Civil Engineering, School of Energy, Geoscience, Infrastructure and Society, Heriot-Watt University Malaysia, 62200 Putrajaya, Malaysia
[2]Department of Civil and Environmental Engineering, Universiti Teknologi PETRONAS, 31750 Seri Iskandar, Tronoh, Malaysia
[3]Department of Civil Engineering Faculty of Engineering Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia

Abstract. Increasing depletion of material resources and concern for the environment has led to the great quest for degradable and environmentally sustainable material in various industries in recent years. Application of Waste Vegetable oils as a renewable and biodegradable binder material was explored in this work. Block samples were prepared with 10% liquid binder of vegetable oil, compacted with 75 impact blows and thermally cured in a conventional oven at temperature ranges of 160-200°C. This study explores the effectiveness of waste cooking oil as a novel binder in the production of building block, called WasteVege block. Important parameters such as optimum binder content, optimum curing temperature, and optimum curing age were established. The mechanical and physical properties of the product were examined, the result shows that compressive strength in ranges of 5 – 34 MPa was achieved, initial rate of absorption (IRA), water absorption, efflorescence, and wet/dry durability of the product exhibit acceptable values within the threshold of required standards.

1 Introduction

Concern for the environment, increasing waste generation, and reduction in non-renewable resources has given birth to increasing demand in the application of renewable resources. Cooking oils are a renewable resource that can be used as reliable starting material to access new products to a wide array of structural and functional variations. Its availability and lower cost make it an industrially attractive raw material for various industries. Its annual global production has increased from 84.6 million tons (Mt) in 1999/ 2000 to 137.3 Mt in 2009/2010 with an increase of 62% [1].
Increased demand for the application of natural products in solving environment, waste disposal, and reduction in non-renewable resources problem has risen in the recent time.

* Corresponding author: O.Johnson@hw.ac.uk

© The Authors, published by EDP Sciences. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (http://creativecommons.org/licenses/by/4.0/).