Impact of Concrete Containing Shredded Latex Gloves and Silicone Catheter on the Fresh and Mechanical Properties at Room and Elevated Temperatures

Mohammad I. Al Biajawi [1,2 a) *], Izwan Johari [1, b)], Rahimah Embong [2, c)], Khairunisa Muthusamy [2, d)], Ufuoma Joseph Udi [1, e)]

[1]*School of Civil Engineering, Universiti Sains Malaysia, Nibong Tebal, Penang 14300, Malaysia*
[2]*Faculty of Civil Engineering Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak, Pahang 26300, Malaysia*

[a)]*Corresponding author: PAH20001@stdmail.ump.edu.my*
[b)]ceizwan@usm.my
[c)]rahimahe@ump.edu.my
[d)]khairunisa@ump.edu.my
[e)]udiufuomajoseph@student.usm.my

Abstract. In recent years, the number of wastes created by factories, hospitals, building sites, and similar facilities has steadily increased from year to year. The disposal of latex glove and silicone catheter wastes usually is one of the issues of global concern. Furthermore, production of concrete using wastes or abandoned materials as a partial substitution for coarse aggregates is an efficient waste management technique. This strategy can significantly minimize the number of wastes to be disposed of in the landfills and positively influence the properties of concrete. The purpose of this research was to determine the effect of utilizing latex gloves and silicone catheter wastes to substitute a portion of the coarse aggregate in the concrete mixture. Moreover, different percentages (2.5, 5, 7.5, and 10%) of latex gloves and waste were used to replace aggregate in the concrete composite. The evaluation of the properties of fabricated specimens in different temperatures such as (Room Temperature, 400°C) has been conducted, including mechanical and fresh properties. The results showed that the incorporation of different percentages of latex gloves significantly reduced the compressive strength of concrete 86% and 59% at a replacement level of 10% for latex gloves and silicone catheter, respectively. Besides, the addition of latex gloves and silicone catheter waste under elevated temperatures has also decreased the density of concrete to up to 34% and 29% for latex gloves and silicone catheter concrete, respectively. This paper aims to improve environmental awareness by raising the level of knowledge on the generated waste and the importance of recycling such wastes.

Keywords: Aggregate, Mechanical properties, Different temperatures, Sustainable concrete, Compressive strength, Fresh properties, Recycled rubber, Concrete.

INTRODUCTION

Urbanisation and economic growth have contributed to increasing construction in the building industry sector [1]. In combination with the expansion in the construction industry, the concrete industry has witnessed a steady increase in demand for main natural resources [2]. It is generally known that concrete is the most extensively utilized construction building material, and coarse aggregates make up a significant portion of concrete [3], [4]. Therefore, as the use of concrete for several construction applications increases, the utilization of coarse aggregates also increases proportionately. Additionally, it has been shown that expanding the use of concrete places a significant burden on the sources of these aggregates and deforms the environment as a consequence of excessive utilization of natural resources [5]. Furthermore, there is a need to utilize alternative materials in many emerging nations, since they are grappling with how to manage the limited natural resources [6]. Nowadays, however, one of