



## Production of Pavement Blocks Using Low Density Polyethylene Product Waste

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### Abstract:

*Waste sachet water packs cause considerable land pollution in Nigeria. In this research, pavement block was produced using low density polyethylene products waste (sachet water packs) as an alternative binder. The production was achieved by first converting the sachet water packs into pellets and blending it with sandstone in a mass ratio of 8:2 (A), 7:3 (B) and 6:4 (C) sandstone to pellets respectively. The compressive strength, %water absorption and curing time tests were carried out on the pavement block to determine its suitability and safety for low-traffic use. The compressive strength for polymer concrete samples A, B and C were 13.65N/mm<sup>2</sup>, 16.99N/mm<sup>2</sup> and 20.34N/mm<sup>2</sup> respectively. After carrying out the %water absorption test on the polymer concrete A, B and C the following result was obtained: 8.33%, 5.47% and 4.03% respectively. It should be noted that the polymer concrete samples and the control samples which (are cement concrete based) are for light-traffic use (pedestrian, plazas, shopping complexes ramps, car parks, office drive ways, rural roads with low traffic, and residential road).*

**Keywords:** Polyethylene, sachet water packs, Sandstone, Pellets, Pavement block

### Introduction

Financial development and altering intake patterns have led to a rapid increase in the usage and consumption of plastics on the planet. It is on record that the consumption of plastic materials increased from about 5 million tons in the 1950s to well over 100 million tons in the 2000s (Wusu-Sekyere et al., 2013). Specialists have also warned that this growth will not decrease unless people revise how they use and recycle natural resources. There has actually been a tremendous improvement in efforts to turn waste to wealth worldwide. Nigeria produces an estimated 32 million tons of solid waste each year - among the highest quantities in Africa, and of this figure, plastic makes up about 2.5 million tons of heaps (Isioma, 2012). Through its waste management authority (LAWMA), Lagos State has carried the concern of filth that turned its environment into an eyesore by transforming the waste into different helpful materials (Owolabi & Amosa, 2010). Most plastics do not biodegrade. Instead, they gradually break down into smaller-sized fragments referred to as micro plastics which have more adverse effects on human health. Studies show that plastic bags and containers made of polystyrene foam could decay up to thousands of years, polluting soil and water (Mishra, 2016). Polymers have been utilized in building and construction as earlier as the 4th millennium B.C., when the clay brick walls of Babylonia were developed utilizing the natural polymer, asphalt in the mortar. The temple of Ur-Nina in the city of Kish had masonry foundations constructed with mortar made from 25 to 35% bitumen, a natural polymer (Hirde & Dudhal, 2016). Making use of polymers in building works is ending up being typical worldwide. Its physical characteristic as well as its relatively low expense makes it a commonly used construction material. The strength, toughness and aesthetically pleasing surface areas have made paving obstructs attractive for many industrial and community applications such as parking lot, pedestrian strolls and roads (Gencel, 2012). Water-retentive cinder block pavements are also utilized in locations often visited by lots of people consisting of sideways, parks, and plazas (Karasawa et al., 2006). Standard Portland cement concrete has several limitations, such as low flexural strength, low failure strain, vulnerability to frost damage and low resistance to chemicals. These restrictions are well recognized by the engineer and can generally be enabled in most applications. Polymer customized binders however show improved adhesion and cohesion (Sulyman et al., 2016). Furthermore, cement is a main factor in high-energy use, CO<sub>2</sub> and dust emissions, and continuous ecological wear and tear (Koo et al., 2014). In addition, the importation of building materials has become difficult and expensive in the era of the COVID-19 pandemic which necessitates the use of alternative home-developed local