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Mechanical Properties of Recycled Polyethylene / Polypropylene Material with Embedded Pharmaceutical Waste

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Extended Abstract

The introduction of pharmaceuticals and personal care products (PPCPs) into the environment has recently gained significant interest [1,2]. Pharmaceutical waste represents one source of waste that contributes to the accumulation of PPCPs in the environment [3,4]. In a previous study, the use of mixed plastics composed primarily of polyethylene/polypropylene (PE/PP) reclaimed from municipal solid waste (MSW) streams was assessed for the immobilization of expired pharmaceuticals [5]. In this study, the mechanical properties of matrix materials composed of reclaimed low density PE (LDPE), high density PE (HDPE), and PP and other plastics are determined. The potential use of the resulting materials depends on the pharmaceuticals leaching behavior and the mechanical properties of the end product. It was recently shown that the leaching profile reveals the recycled plastic material provide an efficient barrier the leaching of embedded. PE/PP boards were tested for tension, compression, bending, and water absorption according to relevant ASTM standards D638, D695, D790, and D570, respectively. Two mixed formulations were tested: a light board composed of 65% (LDPE), 10% (HDPE), and 25% of PP and other plastics, and a heavy board composed of 75% LDPE, 20% HDPE, and 5% of PP and other plastics. The tensile strength testing results reveal an average of 2.9 ± 0.23 MPa for the lighter board, and 4.92 ± 2.2 MPa for the heavier board. In the case of compressive strength, the lighter board revealed an average of 4.55 ± 1.24 MPa , and 7.78 ± 0.81 MPa for the heavier board and in the case of flexural strength results revealed an average of 6.64 ± 0.64 MPa for the lighter board, and 22.8 ± 2.31 MPa for the heavier board. These findings show the matrix materials have promising potential to be used in construction applications, and provide a sustainable option for reducing plastics in MSW streams, as well as providing a potential solution for the treatment of expired pharmaceutical waste.

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