DEVELOPMENT OF FIRE RETARDANT BIOCOMPOSITE ROOFING SHINGLES FROM RECOVERED POLYMER WASTE

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ABSTRACT

The present work is on the development of flame retardant roofing shingles using recycled Low-Density Polyethylene (rLDPE), Coconut Shell particle-fibre and Rice Husk Ash (RHA). The test samples were prepared by compounding and hot compression molding in a plastic compression molding machine. Ten samples were produced from various filler loadings in order to obtain a mix ratio with the best mechanical properties. The best sample was then selected for further analysis on its thermal and morphological characteristics. Water absorption characterization of all samples was also carried out to determine percentage equilibrium of water absorption. Sample 'E' has the highest tensile strength of 8.54MPa, highest flexural strength of 16.16MPa, highest flexural modulus of 415.44MPa, impact strength of 2.60J/m and hardness value of 48.20HV. Sample 'E' showed an increase in glass transition temperature, T_g by 3.53% when compared to neat recycled Low-Density Polyethylene and also presence of microscopic voids resulting from filler agglomeration. The water absorption content of the sample E is 0.91%. The results obtained and analysis carried out revealed that Sample 'E' with a composition of 5% coconut shell particle-fibre, 20% Rice Husk Ash and 75% recycled Low Density Polyethylene was adopted in this work based on its better performance in regards to mechanical properties. Results obtained are in agreement with findings of Ziyad *et al*, Chira *et al*, Khan *et al*, Atuanya *et al*, Koay *et al* and Porabka *et al.*

Keywords: Biocomposite, Recycled Low-Density Polyethylene (rLDPE), Coconut particle fibre, Rice Husk Ash (RHA), Glass transition temperature (T_g).