Study of Hybridized Kenaf/Palf- Reinforced Hdpe Composites by Dynamic Mechanical Analysis.

Abstract

This article presents an experimental study on the dynamic mechanical property of hybridized Kenaf/PALF-reinforced HDPE composites. Variation in storage modulus (E′), loss modulus (E″) and damping parameter (tan δ) with fiber loading and variation in fiber length were investigated. The concept of hybridization was also discussed as it affects the dynamic properties. Initial storage modulus (E′) of all hybrids at different fibre ratios have been enormously improved compared to pure HDPE, and dependence of modulus on cellulose content of natural fibres was very clear. A lower percentage of PALF is required for hybridization with kenaf bast fibre to achieve a positive hybridization effect. Adequate hybridization could impart higher impact strength to the composite. The dynamic modulus curve showed an increase in the E′ value with increase in operating temperature up to about 130°C and is at a maximum at higher fibre loading. At lower temperatures, 60% of fibre loading had reduced the loss modulus peak of the pure HDPE. At temperature range of 30 to 65°C, incorporation of the fibres helped reduce the E″ peak of the matrix. Increasing the fibre content of the hybrids raised the damping peak with temperature. In addition, there is an increase in storage modulus with increased fibre length at room temperature up to about 65°C. Above this temperature, variation in fibre length became irrelevant up to the less viscous point of the matrix. A marginal difference in loss modulus with variation in fibre length was observed, no difference could be seen in the case of loss tangent (tan delta) in regard to variation in fibre length.

Keyword: Damping peak; Fibre loading; HDPE; Hybridization; Modulus