

The effect of gelation and curing temperatures on mechanical properties of pultruded kenaf fibre reinforced vinyl ester composites

ABSTRACT

Process parameters such as gelation and curing temperatures are parameters that influence the pultruded kenaf reinforced vinyl ester composites profile quality and performance. The effect of gelation and curing temperatures on mechanical (tensile, flexural and compression properties) and morphological properties of pultruded kenaf reinforced vinyl ester composites were analyzed. Obtained results indicated that increase of gelation and curing temperatures during the pultrusion process of kenaf reinforced vinyl ester composites influenced the mechanical properties of the composites. When the gelation and curing temperatures were increased, tensile strength, tensile modulus, flexural strength, flexural modulus and compressive strength were affected and they were either increased or decreased. The factors that influenced these results include improper curing, excessive curing, water diffusion, and the problems associated with interfacial bonding between fibre and matrices. The optimum values of the tensile strength for gelation and curing temperatures of kenaf pultruded composites were at 100 C and 140 C, tensile modulus at 80 C and 180 C, flexural strength at 100 and 140, flexural modulus at 120 and 180, and compressive strength at 120 C and 180 C, respectively. The scanning electron micrographs of tensile fractured samples clearly show that with the increase in gelation temperature, it creates the lumens between matrix and kenaf fibre thus reducing tensile properties whereas increasing the curing temperature caused less fibre pull out and enhanced fibre/matrix interfacial bonding.

Keyword: Pultrusion process; Kenaf fibre; Gelation temperature; Curing temperature; Vinyl ester