

Effects of processing method, moisture content, and resin system on physical and mechanical properties of woven kenaf plant fiber composites

ABSTRACT

Effects of the processing method, moisture content, and polymer type were evaluated relative to the physical and mechanical properties of composites based on natural plants. When kenaf was heated above the glass transition temperature of lignin, there was a reduction in moisture content by more than 8% of the total weight of the raw material. To investigate polymer behavior, the raw material was reinforced with three types of polymers: epoxy, unsaturated polyester (UP), and vinyl ester fabricated using hand lay-up with cold press (HCP) and vacuum infusion (VI). The results of (HCP) showed a noticeable improvement in tensile and flexural strength and their moduli for all types of polymer used compared with (VI), in ascending order from UP and vinyl ester to epoxy. Using the HCP method, the tensile strength improved considerably, by 60% for epoxy, 59% for UP, and 250% for vinyl ester, while flexural strength was enhanced by 16% for epoxy, 126% for UP, and 117% for vinyl ester compared to VI. Impact results showed a slight or no improvement in absorbed energy.

Keyword: Plant fiber; Kenaf; Polymer; Mechanical properties; Morphological; Moisture content; Vacuum infusion; Cold press