

Thermo-physical, thermal degradation, and flexural properties of betel nut husk fiber-reinforced vinyl ester composites

ABSTRACT

This study aims to investigate the thermo-physical, mechanical, and thermal degradation properties of betel nut husk (BNH) fiber reinforced vinyl ester (VE) composites. These properties were evaluated as a function of fiber maturity, fiber content, and fiber orientation. Thermo-physical properties were analyzed experimentally using a hot disk TPS method. The introduction of BNH was found to reduce the thermal conductivity of neat VE. The thermal conductivity and thermal diffusivity of BNH reinforced VE composites decreased with the increase in fiber content. Short fiber BNH reinforced VE composites showed the lowest thermal conductivity as compared to the unidirectional and random nonwoven composites. The TGA analysis shows lower resin transition peak for the BNH reinforced VE composites than the peak of neat VE. Fiber maturity had a notable effect on the flexural modulus of the BNH fiber reinforced VE composites. Incorporation of 10 wt% BNH fibers into the composite has increased the composites' flexural modulus by 46.37%. However, further increases in the fiber content reduced both flexural strength and modulus of the composites.

Keyword: Thermo-physical; Thermal degradation; Flexural properties; BNH reinforced VE composites