

Mechanical and thermal properties of roselle fibre reinforced vinyl ester composites

ABSTRACT

Roselle (*Hibiscus sabdariffa* L.) bast fibre reinforced vinyl ester (VE) was prepared using a hand lay-up method and an internal mixer. The composite samples were prepared under two different parameters: with various fibre contents; and without fibre (neat VE). The mechanical properties (tensile and impact strength) and thermal properties were investigated. The morphological properties of impact fracture samples were studied using a scanning electron microscope (SEM). Roselle fibre reinforced VE (RFVE) composites showed increased tensile strength and tensile modulus. The highest tensile strength and modulus were at 20wt% fibre loading. However, impact strength decreased as the fibre loading increased. SEM showed that there was good fibre/matrix adhesion and fibre dispersion for 20% fibre loading, which was reflected in the good tensile strength properties. However, fibre agglomeration was seen at higher fibre loads. The results from thermogravimetric analysis (TGA) and derivative thermogravimetric analysis (DTG) showed three major degradations of the RFVE, which were the loss of moisture content, degradation of hemicelluloses, and degradation of cellulose. The thermal analysis showed enhancements in the residual content of the composite materials, thereby improving the thermal stability. However, there was no major difference seen in the degradation temperature.

Keyword: Roselle fibre; Vinyl ester; Mechanical properties; Thermal properties