

Thermal and dynamic mechanical properties of grafted kenaf filled poly (vinyl chloride)/ethylene vinyl acetate composites

ABSTRACT

The effects of kenaf and poly (methyl methacrylate grafted kenaf on the thermal and dynamic mechanical properties of poly (vinyl chloride), PVC and ethylene vinyl acetate, EVA blends were investigated. The PVC/EVA/kenaf composites were prepared by mixing the grafted and ungrafted kenaf fiber and PVC/EVA blend using HAAKE Rheomixer at a temperature of 150 °C and the rotor speed at 50 rpm for 20 min. The composites were subjected to Differential Scanning Calorimetric (DSC), Thermogravimetric analysis (TGA), dynamic mechanical analysis (DMA), Fourier transform infrared (FTIR) and Scanning Electron Microscopy (SEM) studies. The DSC data revealed that the crystallinity of the EVA decreased with the addition of 30% grafted and ungrafted kenaf fibers. TGA and derivative thermogravimetric (DTG) curves displayed an increase in the thermal stability of the composites upon grafting of the fiber. Studies on DMA indicate that the T_g of the PVC and EVA in the PVC/EVA/kenaf composites has been shifted to higher temperature with the addition of the kenaf fiber. The presence of PMMA on the surface of grafted kenaf fiber was further confirmed by the analytical results from FTIR. The morphology of fractured surfaces of the composites, which was examined by a scanning electron microscope, showed the adhesion between the kenaf fiber and the PVC/EVA matrix was improved upon grafting of the kenaf fiber.

Keyword: Chemical reactions; Thermal analysis; Adhesion; Graft copolymerization; Kenaf