

Effects of Durian seed flour on processing torque, tensile, thermal and biodegradation properties of polypropylene and high density polyethylene composites

Abstract

Composites containing various percentage of durian seed flour (DSF) in the polypropylene (PP) and high density polyethylene (HDPE) have been compounded using an internal mixer. The processing torque, tensile, thermal and biodegradation properties have been determined. The incorporation of DSF increases stabilization torque and had adversely affected the mechanical properties by reducing the tensile strength and elongation at break, while the elastic modulus is increased, as starch content increases. At similar filler content, DSF filled PP showed higher tensile strength and elastic modulus, while lower in elongation at break than DSF-filled HDPE. The scanning electron microscopy (SEM) of tensile fracture specimens revealed good adhesion and dispersion of the DSF granules in the polymer matrix. However, the SEM results showed agglomeration of the DSF at higher filler content in the polymer and hence revealed poor wetting between DSF granules and polymer. The TGA results showed that both of the composites systems with higher filler content have higher initial degradation temperatures, T_0 , degradation temperatures, T_{deg} , and total weight loss. A simple biodegradability test conducted on each composite system shows that composites are subjected to biodegradation, judging by the significant increase in carbonyl and hydroxyl index of the composites after the test.

Keywords — Durian seed flour, high density polyethylene, polypropylene, starch.