

Rheological behaviour of polypropylene/kenaf fibre composite: effect of fibre size

ABSTRACT

In evaluating thermoplastics for their effective performance during processing, rheology properties are very useful. Similarly, in designing processing apparatus, knowledge of rheological behavior of composite melt is critical. In this study, melt flow and viscosity behavior of polypropylene/kenaf fibre composite was investigated using a single-screw extruder. Subsequently, flow behavior of the compounded formulation were evaluated by comparing the melt flow index, flow curve and viscosity curve of the PP and that of the composites at 190oC processing temperature and varying the fibre size. There appears to be a positive linear increase of the apparent shear stress with increase in the apparent shear rate and, as expected, viscosity values for the composite samples are much higher than the PP especially at larger fibre size. The additional of kenaf fibre in composite reduces the MFI value basically because of the hindrances in the plastic flow of the polymer. In addition the increase in viscosity with increase in fibre loading might contributed to the high specific area of the fibre in the matrix thereby increasing the shear stress in the composite. Moreover loading of polymer system with fibre tends to disturb or disorganize the normal free movement of the polymer and certainly hindered the mobility chain segments in flow.

Keyword: Rheology; Composites; Apparent viscosity; Apparent shear stress; Kenaf