

Rheological and thermal properties of palm kernel shell–filled low-density polyethylene composites with acrylic acid

Abstract

The melt flow behaviours of low-density polyethylene (LDPE)/palm kernel shell (PKS) composites were studied. Acrylic acid (AA) was used as a chemical modifier for PKS. The effect of filler loading and the presence of AA in melt flow behaviour of composites were determined. The melt flow index of the composites decreased with the increase in the filler loading. The apparent viscosity of the composites was found to exhibit linear relationship with reciprocal of the temperature. The study on the thermal properties showed that higher filler loading tend to reduce the onset temperature as the PKS possessed lower degradation temperature compared to the LDPE. The presence of the filler in LDPE polymeric matrix improved the thermal stability of the composites. The addition of AA provided better interfacial bonding between the LDPE matrix and the PKS filler, where higher onset temperature and lower weight loss were observed for LDPE/PKS composites with AA. The activation energy of the LDPE/PKS composites was increased with increasing filler loading. At similar filler loading, the addition of AA increased the activation energy of the LDPE/PKS composites.

Keywords — Acrylic acid, low-density polyethylene, palm kernel shell, rheological and thermal properties