

Thermal properties of low density polyethylene-filled kenaf cellulose composites.

Abstract

The main objective of this paper is to investigate the thermal properties of the kenaf cellulose (0 - 50 %wt) and the low-density polyethylene (LDPE) composites. In addition, the effect of two different weights of compatibilizing agent, polyethylene glycol (PEG), was examined. Each sample of biocomposites was subjected to the heating of the cycle between 35-600 °C to obtain their thermal behavior by thermogravimetric analysis (TGA). The differential scanning calorimetric (DSC) also was determined in the cycle heating of 25- 600 °C. By increasing cellulose content, the thermal stability was slightly improved. The thermal stability of LDPE-cellulose composites was affected by cellulose and PEG. The onset degradation temperature and the decomposition temperature of the composites were increased when the cellulose is added to the LDPE matrix. Also, the melting temperature (T_m) and the enthalpy (ΔH) of these biocomposites were slightly soared by increasing cellulose and PEG content. This enhancement of thermal stability and properties can be attributed to an improvement in the interfacial adhesion and compatibility between the cellulose and matrix, due to the treatment of compatibilizing agent.

Keyword: LDPE; Kenaf cellulose; TGA; DSC; Compatibilizing agent; Interfacial adhesion; Thermal degradation.