

Effect of agar on dynamic mechanical properties of thermoplastic sugar palm starch: thermal behavior

ABSTRACT

The aim of this work is to study the behavior of thermoplastic sugar palm starch (SPS)/agar blends when subjected to increasing temperature. Thermoplastic SPS/agar blends were prepared by incorporation of agar into thermoplastic SPS in the range of 10 to 40 wt%. The mixture was melt-mixed and then hot pressed at 140°C for 10 min. Dynamic mechanical testing was conducted on all samples at a temperature range of 25 to 140°C. The results show that the storage modulus of all samples decreased gradually with increase in temperature. This phenomenon indicates higher molecular movement of the materials when subjected to increasing temperature. Increasing agar weight fraction from 10 to 40wt% has decreased the storage modulus of the thermoplastic SPS/agar blends. These findings were accompanied by a decrease in the loss modulus of thermoplastic SPS which indicates less viscosity of the material when agar was introduced. The damping factor that indicates the molecular mobility of the material display increasing trend with an increase in agar concentration. In conclusion, the addition of agar has increased the molecular mobility of thermoplastic SPS which enhanced the polymer chain movement of the material at high temperature.

Keyword: Thermoplastic starch; Dynamic mechanical analysis; Sugar palm; Thermal behavior