Effect of duration of sonication during gelatinization on properties of tapioca starch water hyacinth fiber biocomposite

ABSTRACT

This paper characterizes properties of biocomposite sonicated during gelatinization. The biocomposite consisted of tapioca starch based plastic reinforced by 10% volume fraction of water hyacinth fiber (WHF). During gelatinization, the biocomposite was poured into a rectangular glass mold then vibrated in an ultrasonic bath using 40 kHz, 250 W for varying durations (0, 15, 30, and 60 min). The resulting biocomposite was then dried in a drying oven at 50 °C for 20 h. The results of this study indicate that a biocomposite with optimal properties can be produced using tapioca starch and WHF if the gelatinizing mixture is exposed to ultrasound vibration for 30 min. After this vibration duration, tensile strength (TS) and tensile modulus (TM) increased 83% and 108%. A further 60 min vibration only increased the TS at 13% and TM at 23%. Moisture resistance of the biocomposite after vibration increased by around 25% reaching a maximal level after 30 min. Thermal resistance of the vibrated biocomposites was also increased.

Keyword: WHF-tapioca starch biocomposite; Mechanical and thermal properties; Moisture absorption; Vibration duration