

Development of a new kenaf bast fiber-reinforced thermoplastic polyurethane composite

ABSTRACT

A composite of thermoplastic polyurethane (TPU) reinforced with short kenaf (*Hibiscus Cannabinus* L.) fiber (KF) was prepared by a melt-mixing method. Mixing was followed by compression molding to produce sheets for specimen cutting. Five samples were cut from the composite sheet. A mean value was taken for each sample according to ASTM standards. The aims of this study were to optimize the processing parameters and fiber size of TPU/KF composite. The method used to develop this composite consisted of two main steps. First, the influence of processing parameters such as temperature, time, and speed on tensile properties was studied. Second, effects of different fiber size on tensile properties, flexural properties, and impact strength were tested. The optimum blending parameters were 190°C, 11 min, and 40 rpm for temperature, time and speed, respectively. TPU/KF composites with different fiber sizes were prepared, namely, <125, 125-300, and 300-425 μm . Tensile and flexural strength and modulus were best for fiber size range between 125 and 300 μm . Impact strength showed a slight increasing trend with an increase in fiber size.

Keyword: Kenaf fibers; Natural fiber composites; Thermoplastic polyurethane