

Optimization of blending parameters and fiber size of kenaf-bast-fiber- reinforced the thermoplastic polyurethane composites by Taguchi method

Abstract

“Kenaf-fibers- (KF-)” reinforced “thermoplastic polyurethane (TPU)” composites were prepared by the melt-blending method followed by compression molding. Composite specimens were cut from the sheets that were prepared by compression molding. The criteria of optimization were testing the specimens by tensile test and comparing the ultimate tensile strength. The aim of this study is to optimize processing parameters (e.g., processing temperature, time, and speed) and fiber size using the Taguchi approach. These four parameters were investigated in three levels each. The L9 orthogonal array was used based on the number of parameters and levels that has been selected. Furthermore, analysis of variance (ANOVA) was used to determine the significance of different parameters. The results showed that the optimum values were 180°C, 50?rpm, 13?min, and 125–300?micron for processing temperature, processing speed, processing time, and fiber size, respectively. Using ANOVA, processing temperature showed the highest significance value followed by fiber size. Processing time and speed did not show any significance on the optimization of TPU/KF.

Keywords; Composite specimens; L9 orthogonal arrays; Melt-blending methods; Processing parameters; Processing speed; Processing temperature; Thermoplastic polyurethanes; Ultimate tensile strength