

Moisture absorption and thickness swelling behaviour of sugar palm fibre reinforced thermoplastic polyurethane

ABSTRACT

Composite materials were made from sugar palm fibre (SPF) and thermoplastic polyurethane (TPU) polymer, by melt compounding method using Haake Polydrive R600 internal mixer and followed by hot-pressing moulding. SPF/TPU composites were prepared with different fibre loading: 10%, 20%, 30%, 40% and 50% (by weight) of SPF, with the optimum processing parameters: 190 °C, 11 min, and 40 rpm for temperature, time and speed, respectively. Ten replicates were cut from the composite sheet according to ASTM standards. The density, water absorption and thickness swelling of the composites was investigated with water immersion time. The density of hybrid composites increases with increasing of sugar palm fibre. It also was found that the water absorption and thickness swelling increases with fibre content and water immersion time before an equilibrium condition was reached. It was observed that water diffusion occurred in composites, depending on the fibre content. SPF with 50% of fibre content exhibit maximum water absorption and thickness swelling during the whole duration of immersion (168 h).

Keyword: Sugar palm fibres; Thermoplastic polyurethane; Sugar palm composites; Water absorption; Thickness swelling