

Effect of Potassium Permanganate on Tensile Properties of Sugar Palm Fibre Reinforced Thermoplastic Polyurethane

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Abstract

Background: The high-performance engineering products derived from natural resources are in great demand worldwide, based on renewability and environmental problems. **Method:** The outcome of Potassium Permanganate (KMnO_4) treatment on the tensile behaviours of treated Sugar Palm Fibre (SPF) with 6% NaOH reinforced thermoplastic polyurethane composites was investigated. The sugar palm fibres were treated by 6% NaOH solution, followed by KMnO_4 surface treatment of the alkali treated sugar palm fibres. Three different concentrations of KMnO_4 (i.e. 0.033, 0.066, and 0.125 %) were applied in the treatment. The extruder and hot press machines were used to mix the sugar palm fibres and polyurethane resin, to get the desired polyurethane composites. Tensile behaviours including (tensile strength and modulus, and the elongation at break) were investigated by following the ASTM D-638 standard. **Findings:** The highest tensile strength recorded was 8.986 MPa with KMnO_4 concentration of 0.125 %, with 6 % alkali pre-treatment. Therefore, the KMnO_4 concentration ~0.125 % exhibited best results for tensile test. **Improvements:** This study aids an improvement in the alkaline activation method for the TPU/SPF composite fabrication.

Keywords: KMnO_4 Treatment, NaOH Treatment, Sugar Palm Fibre, Tensile Properties, Thermoplastic Polyurethane