
An assessment of water absorption of a lightweight polyester resin reinforced sawdust bio-composite

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The main objective of this study was to introduce a waste material (an equal portion mixture of Mahogany/Ginisapu sawdust) as a reinforcement filler in making polyester composites. In this study different contents of raw and alkali-treated sawdust fillers were blended with the polyester resin in 10, 20, 30, 40 and 50 wt.% basis and a series of composites were pressed at room temperature at a pressure of 35 MPa. For comparison purpose pure polyester board was also pressed under the same conditions. Sawdust was sieved to select particle sizes in the range of 14 to 30 mesh and treated with 5 %wt. NaOH for 2 h. at 90 °C. Physico-mechanical properties of polyester composites (tensile strength, density, moisture content, water absorption, thickness swell, and water retention value (WRV) were obtained. In FTIR analysis the formation of ester linkages between -OH on cellulose and carbonyl groups polyester resin was confirmed. A water absorption test was determined to evaluate the dimensional stability of composites indicated that alkali treated sawdust composites were more hydrophobic than their untreated counterparts. Water absorption capacity reached its highest value for 40 wt.% sawdust, whereas for pure polyester board reached the lowest value of 0.15%. The pure polyester board has showed the highest density of 0.0012 g mm⁻³ and gradually decreased with increasing the filler contents. Water absorption measurement for treated and untreated 40 wt.% sawdust-polyester composites were 15.68% and 18.74% respectively. Therefore, it is possible to prove that these sawdust polyester composites can be used as a valuable substrate in lightweight components.

Keywords: Sawmill waste recycling, Unsaturated polyester resins, Physical-mechanical properties, Water absorption

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