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Effect of Chemical Solution on Tensile Strength of Bamboo Fiber

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Abstract. The aim of this work is to investigate the effect of chemical solution on tensile strength of bamboo fiber. The bamboo woods were cut into the small pieces size 60 mm x 5 mm x 1 mm. Seven solution were used in this work which are distilled water (control conditions), ASH and NaOH solution with concentrations 20% 10% 5% by weight. The bamboo pieces were soaked in the solution with 11 different soaking times except soaking in distilled water for 5 different soaking times. After that processed bamboo pieces were washed and dried at room temperature for 1 week. They were separated by hand to get processed bamboo fiber with cross section size between 0.06-0.27 mm2. For all specimen, more than 5 pieces of processed bamboo fibre were tested following to ASTM D3039. The results show that cross section area in rang 0.06-0.27 mm2 from raw material have the similar tensile strength with 290 MPa [1]. The higher concentration of NaOH, the lower value of the tensile strength which decreases and reach below 100 MPa for 20% NaOH solution. For ASH solution, the values of the tensile strength as the function of soaking time are the same inclination with the different concentration. Tensile strength of processed bamboo fibres is pretty splatter between 200-400 MPa for the soaking time less than 48 hours. While tensile strengths have the range between 275-300 MPa for the soaking time more than 48 hours. Because some fungus grew on bamboo fibre surface soaked in distilled water, the tensile strength of processed bamboo fibres soaked in 20% ash solution is greater 100 MPa than tensile strength of bamboo fiber soaked in distilled water for the soaking time more than 120 hours.

References

[1] G.Wang and F.Chen 2017 Development of bamboo fiber-based composites *Advanced High Strength Natural Fiber Composites in Construction* (United Kingdom: Woodhead Publishing) chapter 10 pp 235–253