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Mechano-physical properties and statistical design of Jute Yarns

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Abstract:

The work describes the statistical characterization of the tensile properties of raw and treated jute yarn fibers. The yarns are treated with various alkaline sodium hydroxide concentrations (0.5, 2 and 5%) and different immersion times at room temperature (30 minutes, 2, 8 and 12 hours). Due to the scattering of the experimental results, statistical analysis was performed using both two- and three-parameters Weibull, and Anova variance methods. In terms of stress, failure strain, and Young modulus, the results obtained from uniaxial tensile yarns show a variation that depends essentially on the immersion time and the NaOH concentration. Optimum mechanical properties are obtained for a concentration of 2% of NaOH and an immersion time of 2 hours. The results are further discussed in view of an extensive Fourier Transform Infrared Spectroscopy (FTIR) analysis carried out on the different classes of yarns.

Key words:

Jute fiber, Material testing, Mechanical properties, Chemical treatment, Statistical analysis

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