Hemp Fibre Reinforced Cashew Nut Shell Liquid Composites

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Abstract

Hemp fibre bundles were alkalised at concentrations between 0.8 and 8% NaOH and the change in surface morphology was elucidated using scanning electron microscopy. Fibres were tested in tension and the 4 and 6% NaOH treatment resulted in the highest Young's modulus and tensile strength of 65 GPa and 1064 MPa respectively. The Young's modulus and tensile strength of untreated fibres were 38 GPa and 591 MPa respectively. The treated fibres with the highest strength were used as reinforcement for cashew nut shell liquid matrix. Nonwoven fibre mats and unidirectional fibre composites were manufactured by hand lay-up compression moulding. Tensile properties, porosity and fracture surface topography of the composites were analysed. The unidirectional fibre composites exhibited the best mechanical properties and composites with lowest porosity offered the highest mechanical properties. Increase in the moulding pressure resulted in a decrease in the mechanical properties except for untreated nonwoven hemp composites in which the presence of inherent binders in the fibres contributed to an enhanced fibre-matrix interface. The contribution of naturally occurring lignin-containing fibres with natural monomers containing similar phenolic compounds provides a compatible interaction on polymerisation hence improved mechanical properties.

Keywords

B. Interface;
B. Porosity;
C. Deformation;
Alkalisation;
Properties