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Effects of Accelerated Environment Aging on the Mechanical Properties of a Coir Fiber Reinforced Polyester Composite

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Abstract : Coir natural fiber reinforced polyester composites were exposed to an accelerated environment aging in order to study the influence on the mechanical properties. Coir fibers were obtained in local plantations of the Caribbean coast of Colombia. A physical and mechanical characterization was necessary to found the best behavior between three types of coconut. Composites were fabricated by hand lay-up technique and samples were cut by water jet technique. An accelerated aging test simulates environmental climate conditions in a hygrothermal and ultraviolet chamber. Samples were exposed to the UV/moisture rich environment for 500 and 1000 hours. The tests were performed in accordance with ASTM G154. An additional water absorption test was carried out by immersing specimens in a water bath. Mechanical behaviors of the composites were tested by tensile, flexural and impact test according to ASTM standards, after aging and compared with unaged composite specimens. It was found that accelerated environment aging affects mechanical properties in comparison with unaged ones. Tensile and flexural strength were lower after aging, meantime elongation at break and flexural deflection increased. Impact strength was found that reduced after aging. Other result revealed that the percentage of moisture uptake increased with aging. This results showed that composite materials reinforced with natural fibers required an improvement adding a protective barrier to reduce water absorption and increase UV resistance.

Keywords : coir fiber, polyester composites, environmental aging, mechanical properties
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