

# **Influence of low pressure plasma treatment on the durability of thermoplastic composites LDPE-flax/coconut under thermal and humidity conditions**

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## **Abstract-**

The aim of this work is to study the influence of low pressure plasma (LPP) treatment on the durability of thermoplastic composites using flax and coconut fibres as reinforcement. Two different aging conditions were evaluated, high temperature (73°C) and high temperature plus water immersion, both cases during five aging times, 1, 2, 8, 30 and 60 days. Composite materials were prepared with treated and untreated flax and coconut fibres with 30% of fibre content and a low density polyethylene (LDPE) matrix. Composites were manufactured using a rotor mixer and a hot plates press. The influence of the aging conditions on each fibre type, flax or coconut, as well as the plasma treatment effect in all composites materials were studied by determining water absorption and mechanical properties. Mechanical properties were assessed by three point bending tests and the water uptake was determined by weight measurements. Thermal properties were also studied by Differential Scanning Calorimetric (DSC) technique. Finally, the liquids where the specimens were submerged were evaluated with ultraviolet spectroscopy to analyse cellulose or lignin amounts dissolved. In all cases, durability was mainly affected by the humidity but not so much by high temperature, obtaining better bending strength and Young's modulus in the LPP treated materials especially those with flax fibre reinforcement.

**Index Terms-** Natural fibre, composite, durability, low pressure plasma.

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**Citation:**

*Enciso, B.; Abenojar, J.; Paz, E.; Martínez, M.A. "Influence of low pressure plasma treatment on the durability of thermoplastic composites LDPE-flax/coconut under thermal and humidity conditions", Fibers and Polymers, vol.19, no.6, pp.1327-1334, June, 2018.*