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## Properties of bio-composites based on polylactic acid (PLA)/polycaprolactone (PCL)/cinnamon oil

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The need to reduce the use and gradually replace conventional polymers to help and try to solve the pollution problems, has driven research into the development of packaging with a lower environmental impact, which retain the physical and mechanical properties necessary for the preservation of food. In this sense, to achieve this goal it has been emphasized that the use of biopolymers, as they come from renewable sources and characteristics necessary for the manufacture of food packaging. The main aim of this work was to obtain bio-composites based on PLA/PCL/essential oil. Methodology: Response surface using a multiple factorial design with level  $2^k$ , was employed to study and investigate the individual and interactive effects of process variables on response variables. The independent variables  $X_1, X_2, X_3$ ; (PLA, PCL, and essential oil) and the response variables (dependent variables Y): stress fracture, % elongation and Young's modulus were chosen. Results: The quadratic regression coefficient showed a highly significant at 95 % confidence level ( $p < 0.05$ ). The ideal conditions were 80%, 20% and 10% for PLA/PCL/cinnamon oil; exhibiting optimum values for stress fracture, % elongation and Young's modulus of 60.88 Mpa, 267.64% and 603 Mpa, respectively. All the dependent variables were in favourable range, wherewith was obtained water vapour permeability (WVP) values of  $5.73 \times 10^{-13} \text{ g m}^{-1} \text{ s}^{-1} \text{ Pa}^{-1}$  for the optimized bio-composite. Conclusion & Significance: The bio-composite with desirable bio-mechanical and barrier properties, can be applied as coating in the food packaging industry.



Figure 1: Experimental diagram of the evaluation of optimal bio-composite PLA/PCL/essential oil.

### Biography

J Rodolfo Rendón-Villalobos has his expertise in development and obtaining of biopolymers that are used to produce composites biodegradables for its potential application in the packaging industry, with the intention of reducing the use and gradually replace conventional polymers to help and try to solve the pollution problems. He coordinates the evaluation of the biopolymers and composites in its structural characteristics as spectrophotometry FT-IR, SEM, XRD; as well as biodegradation studies, rheological and thermal analysis.

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