A Comparison of the Supercritical Fluid Impregnation of Mango Extract in Different Polymers with Biomedical Application

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The finding of new polymers from natural resources has brought about a major change in the field of biomedicine. These polymers are great alternatives for conventional devices or therapies and the manufacture of biomedical materials, as they are biodegradable, renewable, and compostable materials. Some of them also have the necessary porosity to incorporate new drugs which benefit the biocompatibility of the device when released into the host organism. Some drugs used in these materials are natural extracts with pharmaco-active properties. Mango (*Mangifera indica L.)* leaf extracts have been proved to present great activity important benefits in health. In addition, one of the newest techniques for the incorporation of these active substances is supercritical fluids, especially using carbon dioxide.

The objective of this work is to study the supercritical impregnation of mango leaf extracts in different polymers (ABS, PETG, TPU, PC y PCL). The influence of temperature and pressure on the structures of the polymers (foaming process), the impregnation yield, and the bioactive properties of impregnated filaments are analyzed. The results obtained confirm the potential of these polymers in the biomedical sector. All the polymers present a different behavior. On one hand, some polymers as TPU experience minimal modification of their structure; on the other hand, there are polymers in which foaming occurs, such as PETG. Furthermore, these polymers keep the bioactive capacity of the extract, achieving 26% of antioxidant activity for TPU at 35 ºC and 100 bar and 33% of antioxidant activity for PETG at 75 ºC and 400 bar.