Thermoplastics Blends of Starch Modified and Poly (lactic acid) by Reactive Extrusion

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Thermoplastic starch (TPS) is the lowest cost biodegradable material, with a great potential for application in the composition of plastics blends for several uses such as packaging and in agriculture. There are many researches for the production of TPS blends with other polymers to improve its properties, in special mechanical resistance and water susceptibility [1-3]. However, compatible blends are not possible due to the dissimilarities of chemical nature among starch and the majority of the polymers. Compatibilization is reached by addition of compatibility agents or by reactive compatibilization of starch. Here we describe the study of depolymerization-polymerization process of starch by reactive extrusion. The diphenyl methane diisocyanate (MDI) is a polymerization agent, while organic acids were used for depolimerization. It was necessary to add the MDI after processing TPS to ensure that the reactions occurs as the glycerol and citric acid used in TPS production can inhibit the action of the MDI. Furthermore, the TPS was processed with poly(lactic acid) (PLA). PLA increased the tensile properties and water resistance of TPS.

We investigated blends with different amounts of thermoplastic starch and PLA, to produce a material with adequate chemical, thermal and mechanical properties. For this, the blends were characterized by mechanical tests, DMTA, FTIR, X-Ray Diffraction, CAM, DSC and TGA.

Keywords: Thermoplastic starch, PLA, reactive extrusion, blends.

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