Reactive Extrusion of Thermoplastic Starch: Preparation of Mixed Esters from Anhydride Acetic and C-18 Acids

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Thermoplastic starch (TPS) is one of the most important biodegradable polymers totally produced from renewable resources. The modification of TPS by new process such as reactive extrusion is one very interesting alternatives which can be used to increase its use as a plastic material. In this work, thermoplastic starch (TPS) modified by reactive extrusion using mixed anhydrides produced from the reaction of acetic anhydride and oleic acid were produced in a 16 mm, L / D 40 single screw extruder. The reaction conditions and the mixed anhydride/starch proportion were investigated. The produced materials were characterized by Fourier transform infrared spectroscopy and by mechanical tests. The modified TPS was pressed at 150 ºC to form plates which were cut in dumbbell specimens for mechanical tests. The extent of esterification reaction was evaluated by tritation with NaOH solution. The characterization of the chemical reaction that takes place is complex and is under course. The expected results are to produce new and innovative materials from starch for several applications including nanocomposites and blends. The results showed that this kind of starch modification is a promising process for tunable TPS compositions.
Keywords: Thermoplastic starch, chemically modified starch, biodegradable polymers, acetic anhydride, oleic acid.

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