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BIODEGRADATION BEHAVIOR OF POLY(VINYL ALCOHOL) – WOOD COMPOSITES

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Abstract

A study on the biodegradability of several formulations based on poly[vinyl alcohol] (PVA) and wood flour has been carried out. Basically, all formulations are based on PVA and wood flour, and the influence of starch, glycerol and/or polyvinyl chloride (PVC) incorporated in some of them was investigated. Biodegradation was performed by incubation of the composites with a selected *Aspergillus niger* strain able to act as a polymer biodegrading agent. The composites biodegradation was evaluated by using SEM observations, FTIR and TGA analysis before and after incubation with microorganism. The surface morphology obtained from SEM showed that fungal strain colonizes the polymer surface of samples VACW (supplemented with glycerol and PVC), and especially of samples VAA (supplemented with glycerol and starch), developing dense hyphae networks and conidia accumulations. The microbial attack on composites with more than two components has led to the increase of the peak around 1740 cm⁻¹, due to oxidation of PVA hydroxyl groups to carbonyl groups, proving in this way the beginning of the biodegradation process. TGA analysis demonstrated that the number of thermal decomposition steps depends on composition, from three steps for VA samples (only with the two basic components, PVA and wood flour), up to four steps for VAW samples (supplemented with glycerol) and VAA samples, and even five steps for VACW. The experiments confirmed the biodegradation process of the VAA and VACW samples that are more accessible to the fungal activity.

Keywords: *Aspergillus niger*, polymer biodegradation, poly(vinyl alcohol)-wood composites

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