Biodegradable materials of poly(3-hydroxybutyrate) and thermoplastic cornstarch

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Plastic pollution and its environmental impact have become a growing concern in recent years, inciting research into the development of biodegradable plastic materials. Among the promising biopolymers, poly-3-hydroxybutyrate (PHB) has emerged as a sustainable alternative due to its biodegradability and renewable resource origin. PHB shares physical properties related to traditional plastics like polypropylene, making it an attractive alternative for various applications, including agriculture, cosmetic, and medical fields [1]. Despite high production costs hindering PHB adoption compared to synthetic plastics, ongoing efforts aim to overcome this barrier. Strategies include enhancing bacterial strains, optimizing fermentation and recovery processes, and exploring the blending of PHB with other polymers to improve physical properties and reduce overall production costs. In this sense, blending PHB with thermoplastic corn starch (TPS) is an alternative scarcely investigated that could reduce the cost of the final materials without compromise the biodegradability. Blends of TPS with different polymers have been studied greatly. In some cases, it was necessary to employ binding agents due to the low compatibility between polymers [2]. The aim of this study was to investigate the miscibility of PHB and TPS obtaining films by melt mixing and thermocompression. Studied PHB:TPS blends were: 1:0, 0.25:0.75, 1:1, 0.75:0.25, and 0:1. Films were characterized by DSC and TGA. Melting and decomposition temperatures of TPS

and PHB in the blends were observed as separate events. DSC curves of TPS and PHB blends showed two endothermic transitions corresponding to the melting of TPS and PHB. Blends based on TPS and PHB were able to be melt-processed at the chosen processing conditions, obtaining homogenous biodegradable films with good appearance and easy to handle. The presence of TPS and PHB in the blends were corroborated by melting and thermal degradation of both biopolymers.

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