

The development of biodegradable adhesives by transesterifications of starch with poly (vinyl acetate) and poly (vinyl acetate-co-butyl acrylate)

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Abstract

The application of starch as adhesive raw materials is a long-standing tradition. Although the characteristics of synthetic polymers are, in many ways, superior to starch and starch derivatives, there are still reasons for the continued use of starch-based adhesives. Starch, which has positive tendencies concerning degradability and physiological characteristics, is a renewable material. It is for these reasons that, in some cases, starch and starch derivatives replace synthetic adhesive raw materials. In this work, wheat starch was reacted with poly (vinyl acetate) (PVAc) and poly (vinyl acetate-co-butyl acrylate) (PVB) in an internal mixer at 150°C in the presence of sodium carbonate, zinc-acetate and titanium(IV) butoxide. The resulted blends were pressed into film and characterized by ¹H NMR, ¹³C NMR spectroscopy, differential scanning calorimetry (DSC), mechanical testing, dynamic mechanical thermal analysis (DMTA). Partial transesterification took place between wheat starch and the polymers. The blends of starch and polymers appeared as homogenous, translucent films with one glass transition temperature range. The increase in the ratio of starch to PVAc resulted in the improvement of the mechanical strength after thermal treatment at 150°C for 60 min. The blends of wheat starch with PVB resulted in improved mechanical strength compared to PVB.

References

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