

ESTERIFICATION AND PLASTIFICATION OF BEAN WASTE STARCH TO IMPROVE COMPATIBILITY IN POLYBUTYLENE SUCCINATE (PBS)/STARCH BLENDS

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Biodegradable polymer blends from agricultural wastes are of interest as an alternative to traditional polymers. Bean starch from discarded or waste was modified and plasticized (TPS) in one step with citric acid (CA) and glycerol by melt mixing to improve its compatibility and promote good dispersion and morphology in blends with polybutylene succinate (PBS) at different proportions. Fourier transform infrared spectroscopy (FTIR), scanning electron microscope (SEM), and capillary rheology were used. The FTIR confirmed the esterification of starch by a dry method (melt mixing). In the blends, the OH bonding of starch was noticeable, and the intensity varied according to the starch proportion in the blend. The morphology of the blends showed that CA modification allows for better compatibility and homogeneity between PBS and starch because the starch particles were well dispersed and exhibited a smaller particle size in comparison to blends prepared with unmodified starch. Rheological measurement showed that PBS/TPS blends had a Pseudoplastic behavior because the viscosity is dependent on shear rate. However, the starch decreased the viscosity of PBS, which is desirable in some applications such as injection molding where blends can be possibly applied in medical, optical, electrical, and electronic applications.

Keywords: PBS, STARCH, RHEOLOGY

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