



EFFECT OF PROCESSING CONDITIONS ON THE RHEOLOGY, MECHANICAL PROPERTIES AND STABILITY OF STARCH-BASED POLYMERS

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The effect of process residence time, set temperature and drying time on the rheological and mechanical properties of a commercially available starch based polymer blend is reported. Capillary rheometry was used to measure the rheology, melt strength and time-dependent degradation of the polymer. Tensile specimens were then injection moulded at a range of set temperatures and residence times, and mechanical properties subsequently measured. Results showed that the viscosity of the polymer reduced significantly with time held at process temperature, although melt strength was less affected. The colour of the polymer was seen to darken with increasing temperature and residence time. Processing behaviour during injection moulding was observed to reflect the rheological changes with temperature and residence time. Mechanical properties were found to improve with increasing processing temperature, and with drying before injection moulding. Increasing process residence time was found to cause a slight reduction in mechanical properties, but less significant than the observed differences in rheology. Near infra-red spectroscopy was used to characterise the moulded samples and was found to be sensitive process-induced material changes. SEM was used to investigate sample morphology and mixing of the two phases.