Online rheometry for monitoring polyester-cotton waste hydrolysis

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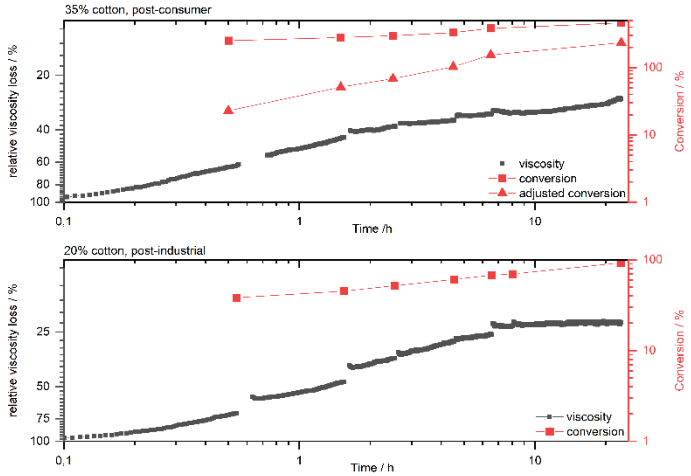
Polyester-cotton blends are a subfraction of textile waste that is difficult to recycle via traditional methods for the singular components. Biocatalytic degradation of the cotton offers a chance to regain pure polyester while providing glucose as a useful secondary product [1]. Reaction progress can be monitored using refractive index (RI) or spectroscopic measurements of the glucose concentration. However, these methods are influenced by the presence of contaminants [2,3] . The aim of this work is to investigate the flow resistance of the suspension as an alternate process monitoring method that is independent of present contaminants. Therefore, viscosity of the suspension was measured continuously while RI samples were taken at fixed intervals. Viscosity decreases and RI increases over time, following power law behavior and reaching a plateau after 24h. RI was used successfully to assess reaction progress for post-industrial (homogenous) materials. However, for mixed post-consumer materials incorrect conversion results appear even after adjusting for increased starting RI values. Viscosity measurements therefore offer a promising alternative, which may also be implemented cost-effectively at larger scale by monitoring of impeller torque.



Monitoring of viscosity and conversion (via glucose concentration) the hydrolysis of post-industrial and post-consumer textile waste

Keywords: reaction monitoring, online measurement, flow behavior

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ADDIN CitaviBibliographyReferences

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