

Using Xylooligomers to Study the Effects of Dilute Acid in Biomass

Pretreatment

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It is well known that hemicellulose sugar yields can be significantly improved when acid is added to a hydrothermal pretreatment step. In this paper we compare the apparent kinetics of hemicellulose xylan solubilization to the degradation of xylobiose and other short chain xylooligomers. Most pretreatment kinetic studies treat hemicellulose solubilization as if it were a homogeneous reaction occurring in a single phase. However, the reaction is clearly heterogeneous as two phases are present, suggesting that mass transfer effects may play a role in sugar release possibly masking underlying kinetic mechanisms. By using soluble short-chain xylooligomers in kinetic studies mass transfer effects may be ignored. It is shown that dilute acid increases monomer yields by accelerating depolymerization hydrolysis relative to monomer degradation and short chain xylooligomers are reasonable proxies for hemicellulose in dilute acid hemicellulose solubilization.