

Accessibility to glycosidic bonds: a key to improving activity of cellulases for hydrolysis of lignocellulosic biomass

Valdeir Arantes and Jack N. Saddler

Forest Products Biotechnology and Bioenergy Group

University of British Columbia, Vancouver BC, Canada

varantes@forestry.ubc.ca

Over the last forty to fifty years, many excellent research groups have been assessing the ability of carbohydrate degrading enzymes to depolymerize the cellulosic component of lignocellulosic substrates into soluble, fermentable sugars. However the efficient, fast, and near complete enzymatic hydrolysis of lignocellulosic materials using low protein loadings has proven to be one of the major technical and economical bottlenecks in the overall lignocellulose-to-ethanol bioconversion process. We have been assessing the various substrate- and enzyme-related factors that are thought to be primarily responsible for the slowdown in the rate and, in many cases, the incomplete hydrolysis of cellulosic materials. We have found that accessibility to cellulases is a key determinant in the effectiveness of hydrolysis of a range of pretreated lignocellulosic substrates when statistically optimized minimal enzyme loading were used. By increasing the accessibility of the cellulose within pretreated lignocellulosic substrates we were able to substantially increase the effectiveness of cellulases. The possible role of amorphogenesis, with the goal of reducing the overall enzyme loading required to carry out effective cellulose hydrolysis, will be discussed.

Keywords: cellulose, hydrolysis, cellulose, accessibility, lignocellulose

This document was created with Win2PDF available at <http://www.win2pdf.com>.
The unregistered version of Win2PDF is for evaluation or non-commercial use only.
This page will not be added after purchasing Win2PDF.