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Opportunities and constraints in the use of hemicellulose streams of lignocellulosic biomass

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The hemicellulose component of abundantly available lignocelluloses makes up about 30% of biomass. It is relatively much more water soluble than the other two major components, cellulose and lignin. Utilization of this component in integrated plants is likely to make the use of such substrates economically feasible. Considerable research focus has been on pretreatment of lignocelluloses with the principle aim of making its cellulose component more accessible to hydrolysis. The hemicellulose streams released in the first step of most such processes can potentially be used for the production of value added products. Depending upon the pretreatment method, the hemicellulose prehydrolyzate typically contains various oligosaccharides, lignin degradation products (phenolic compounds), sugar degradation products (furan derivatives) and organic acids (formic acid and acetic acid). The applications of prehydrolysate are limited due to its complex composition of sugars. The sugars from the prehydrolysate mixture need to be separated before they can be used. During the hydrolysis of the polymers separated, some inhibitory compounds limit their use. The fermentation of the pentose sugar xylose for the production of ethanol is found to have low yields. In this talk the development of some hydrolytic methods that reduce the production of inhibitory compounds, the use of efficient ways to remove them without losing too much sugar and the production of important platform chemicals like succinic and levulinic acid will be presented.

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