



Biomass degradation: Challenges and strategies in extraction and fractionation of hemicellulose

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ABSTRACT

Extraction and fractionation of hemicellulose from complex lignocellulosic biomass are crucial steps to acquiring purified hemicellulose that can probably be used in biofuel and biochemical sectors. Yet, several challenges have impeded for obtaining the hemicellulose fraction as it involves the complexity of extracting and fractionating hemicellulose. In this study, the authors have discussed the outline of the most prospective and effective method for separation, extraction, and purification of hemicellulose-rich biomass. A current overview of challenges and problems in hemicellulose separation was addressed. Subsequently, the influence of heterogeneous biomass types, cultivation and harvesting times, accessible surface areas, acetyl and other functional groups on purity was observed. On the other hand, several proper strategies efficiently employed in hemicellulose extraction and fractionation are provided. The biochemical process gives a highly positive contribution to sustaining hemicellulose-based bioproducts. Biological pre-treatment of lignocellulose using enzymes and bacteria is convinced as the most effective and efficient method to reduce the lignin content and to improve the purity due to less inhibitory and minimal coke formation. *Saccharomyces cerevisiae* has been widely used in the hemicellulose-based bioprocess due to resulting in high conversion (>80%) and yield (>70%). The hydrothermal method followed by multistep ultrafiltration treatment generated the highest hemicellulose purity (100%) and by-product removal (94.4–99.2 wt%). Comprehensive strategies for hemicellulose extraction and fractionation involving biological and non-biological treatments are also the highlights of this article.

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