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Cellulase pretreatment for enhancing cold caustic extraction-based separation of hemicelluloses and cellulose from cellulosic fibers

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Abstract: The effective separations of cellulose and hemicelluloses from cellulosic fibers are the prerequisite for creating high-value to the abundant and green cellulose materials. In this study, the process concept of cellulase pretreatment, followed by a cold caustic extraction (CCE) was investigated for a softwood sulfite pulp. The results showed that the cellulase pretreatment led to favorable fiber morphological changes, including the increases of the specific surface area (SSA), pore volume and diameter, and the water retention value (WVR). These changes can induce more pronounced fiber swelling in the subsequent CCE process so that the hemicelluloses removal is enhanced. After the cellulase pretreatment (cellulase dosage of 1 mg/g) and CCE process, the cellulose purity was as high as 97.49%, while the hemicelluloses removal selectivity reached 76.42%.

Keywords: Biorefinery; Hemicelluloses removal; Alpha-cellulose; Cellulase pretreatment; CCE