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Feasibility of reusing the black liquor for enzymatic hydrolysis and ethanol fermentation

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Abstract: The black liquor (BL) generated in the alkaline pretreatment process is usually thought as the environmental pollutant. This study found that the pure alkaline lignin hardly inhibited the enzymatic hydrolysis of cellulose (EHC), which led to the investigation on the feasibility of reusing BL as the buffer via pH adjustment for the subsequent enzymatic hydrolysis and fermentation. The pH value of BL was adjusted from 13.23 to 4.80 with acetic acid, and the alkaline lignin was partially precipitated. It deposited on the surface of cellulose and negatively influenced the EHC via blocking the access of cellulase to cellulose and adsorbing cellulase. The supernatant separated from the acidified BL scarcely affected the EHC, but inhibited the ethanol fermentation. The 4-times diluted supernatant and the last-time waste wash water of the alkali-treated sugarcane bagasse didn't inhibit the EHC and ethanol production. This work gives a clue of saving water for alkaline pretreatment.

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