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Subcritical water hydrolysis of sugarcane bagasse: an approach on solid residues characterization

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Abstract

Reducing sugars obtained from sugarcane bagasse, as a waste biomass energy precursor, can be further transformed into fuel alcohol by fermentation or gaseous fuel by gasification. In this work, subcritical water process was used as an environmentally friendly solvent for the hydrolysis of sugarcane bagasse with the aim of producing reducing sugars using residue bagasse from a sugarcane biorefinery. Hydrolysis in subcritical water performance was studied under semi-continuous unit conditions in a 110 mL reactor. Hydrolysis was carried out using different sample loadings (3 and 5 g), flow-rates (9 and 12.5 mL min^{-1}), temperatures (100, 150, 200 and 250 °C) and pressures (5, 10, 15 MPa). The highest reducing sugar yields wereobtained at temperature above 200 °C, withthe highest reducing sugar yield reaching 15.5%. Scanning electron microscopy was used to analyze the sugarcane bagasse undergoing hydrolysis. Diffuse reflectance infrared spectroscopy was used to characterize the residual solids, with results consistent with the removal of hemicellulose during hydrolysis.