

Hydrolysis and delignification of rice straw: effects of various pressures, duration of process and acidities

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Abstract

The purposes of this study were: a) to determine the effects of different pressures 100 and 200 kN/m² and duration of the delignification process (20, 40 and 60 min) on the changes of cellulose, hemicellulose and lignin content in rice straw powder, and b) to obtain information about the effects of different levels of acidity (pH 1.25, 1.5 and 1.75) and processing times (1.5 and 2 hours) on the amount of reducing sugar produced in the hydrolysis process of straw. Treatments, such as pressure, duration of the process and the level of acidity, were expected to destruct the rice straw so that the total area of contact of cellulose can be maximized. The increase in the total area of the contact surface of the cellulose was expected to simplify and improve the conversion of cellulose into sugar reduction. Treatments were further necessary to dismantle the structure of lignin, and separate it from cellulose and hemicellulose structures, and reduce the amount of cellulose crystals which could increase the fraction of cellulose amorph. The results showed that pressures on delignification process had demonstrated significant differences in the content of cellulose, hemicellulose and lignin. While duration of time performed no significant differences for delignification process in changes of the substances. The results of the hydrolysis showed that treatment with 1.5 pH and 2 hour processing time produced the highest reducing sugar (14.70%).