Turkish Journal

of

Agriculture and Forestry

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Turkish Journal of Agriculture and Forestry

Organic Acid Pulping of Rice Straw. I: Cooking

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Abstract: Acetic acid or formic acid treatment of rice straw with the variation of reaction variables, namely acid concentration, catalyst (HCl or H_2SO_4) concentration, reaction time, temperature and liquor ratio, was investigated to ascertain effects on the dissolution of hemicellulose, which facilitates the dissolution of lignin during alkaline extraction or peroxyacid treatment and improved the drainability of straw pulp. Maximum pentosan dissolution was observed in 80% acetic acid with 0.6% H_2SO_4 catalyst at 80 °C for 120 min. Acetic acid dissolved pentosan more slowly than formic acid. The catalytic activity of H_2SO_4 was higher than that of HCl with respect to pentosan dissolution from rice straw. The optimum pulp yields with the lowest kappa number and the highest pulp yield with the optimum kappa number were obtained with formic acid/peroxyformic acid and acetic acid/peroxyacetic acid pulping, respectively. Acetic or formic acid treated pulp did not produce a lower kappa number in alkaline extraction. Acetic acid/peroxyacetic acid pulping produces better pulp from rice straw.

Key Words: Rice straw, formic acid pulping, acetic acid pulping, peroxy acid, alkaline extraction, pentosan

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Turk. J. Agric. For., **30**, (2006), 231-239.
Full text: pdf
Other articles published in the same issue: Turk. J. Agric. For.,vol.30,iss.3.