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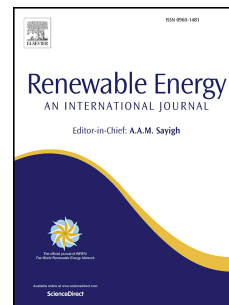
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Catalytic Production of Furfural by Pressurized Liquid Water Liquefaction of Flax Straw

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Abstract

In this study, the throughput and kinetics of furfural production by the liquefaction of wet flax straw was conducted. The reaction was carried out in the temperature range of 200 to 325 °C, pressure of 0 to 60 bar, retention time in the range of 0 to 120 min, catalyst amount of 0.5 to 1.5 g, and a flax straw mass fraction of 10% using three types of solid acid catalysts: γ -alumina, H-ZSM-5, and silica-alumina. The results show that the highest yield of furfural was obtained using γ -alumina catalyst of weight of 1 g and the highest conversion of 66% at 325 °C. It was found that the acidity of the catalyst is key to enhance the production of furfural with a direct correlation with the number of the Lewis acid sites. The catalysts in order of the number of Lewis acid sites was found to be γ -alumina > H-ZSM-5 > silica-alumina. The kinetic data were also developed using an empirical rate model. The apparent activation energy was found to be 9.46 kJ/mol and the reaction order was 2.0. Also, the model-predicted rate showed a good agreement with the experimental rates with more than 91% accuracy.

Keywords: Flax straw, *linum usitatissimum*, solid catalyst acidity, furfural, kinetics.

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