Furfural production from rice husks

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Introduction

Rice husks are a residue of the production of rice, which are generated in rice mills during the peeling process. It is mainly used for power generation. Furfural is a platform chemical produced only from biomass and is used as a precursor in several industries. The present work is focused on the valorisation prior to combustion of rice husks through the production of furfural.

Materials and Methods

Rice husks and sulfuric acid of varied concentrations (0.10-3.0\%) were mixed in a ratio 1:10 in a Parr reactor. Assays were performed also varying operation temperature (160–230°C) and time at this operation temperature (1–105 min). The liquid fraction was analysed for sugars, acids and by-products, while the solid fraction was used to determine the solid yield after the treatment.

Results and Discussions

Regarding furfural production, yields were in the range between 6.4 – 64\% of the theoretical, while the solid yield was in the range between 20.4 – 68.7\%. Conditions for the best furfural yield are 185°C, 1.5\% acid content and 10 min. However, the best conditions for the combination of both processes (furfural production and power generation) are 190°C, 0.1\% acid content and 90 min, which present a furfural yield of 60\%, a solid yield of 63\% and a decrease in higher heating value of only 2\%. Moreover, acetic and levulinic acid were produced with values of 1.8 and 5.9 g/kg of RH respectively for this condition.

Conclusion

Furfural production from rice husks in batch mode was possible, and the maximum value obtained was 70 g/kg of RH. In addition, by-products such as acetic and levulinic acid may contribute to the valorization of rice husks. It is found that the use of less acid is beneficial to obtain higher solid yields, while high furfural yields can also be achieved in these conditions.

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