

Accepted Manuscript

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PII: S0960-8524(14)01438-2
DOI: <http://dx.doi.org/10.1016/j.biortech.2014.10.026>
Reference: BITE 14069

To appear in: *Bioresource Technology*

Received Date: 26 August 2014
Revised Date: 2 October 2014
Accepted Date: 3 October 2014

Please cite this article as: Wu, H., Liu, Y., Zhang, J., Li, G., In situ reactive extraction of cottonseeds with methyl acetate for biodiesel production using magnetic solid acid catalysts, *Bioresource Technology* (2014), doi: <http://dx.doi.org/10.1016/j.biortech.2014.10.026>

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In situ reactive extraction of cottonseeds with methyl acetate for biodiesel
production using magnetic solid acid catalysts

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Abstract

A magnetic solid acid catalyst $S_2O_8^{2-}/ZrO_2-TiO_2-Fe_3O_4$ was prepared by coprecipitation and impregnation methods and its catalytic activity was investigated for the reactive extraction of cottonseeds with methyl acetate to produce biodiesel. The physicochemical properties of the catalyst were characterized in detail. The influences of Zr/Ti molar ratio and calcination temperature on the catalytic performance were investigated. Moreover, optimization of the reactive extraction process was performed using response surface methodology coupled with central composite design. The catalyst with a Zr/Ti molar ratio of 3/1 calcined at 550 °C showed the best activity. An optimum biodiesel yield of 98.5% was obtained under the reaction temperature of 50 °C, catalyst amount of 21.3 wt.%, methyl acetate/seed ratio of 13.8 ml/g and 10.8 h of reaction time. Reuse of this catalyst indicated that it had steady catalytic activity and high recovery rate which could be a promising catalyst for biodiesel production from

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