Accepted Manuscript

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PII: S0960-8524(18)30932-5
DOI: https://doi.org/10.1016/j.biortech.2018.07.035
Reference: BITE 20165

To appear in: *Bioresource Technology*

Received Date: 4 May 2018
Revised Date: 5 July 2018
Accepted Date: 7 July 2018

Please cite this article as: Tyagi, U., Anand, N., Kumar, D., Synergistic effect of modified Activated Carbon and Ionic Liquid in the conversion of microcrystalline cellulose to 5-Hydroxymethyl Furfural, *Bioresource Technology* (2018), doi: https://doi.org/10.1016/j.biortech.2018.07.035

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Synergistic effect of modified Activated Carbon and Ionic Liquid in the conversion of microcrystalline cellulose to 5-Hydroxymethyl Furfural

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ABSTRACT

This study highlights cellulose conversion for the production of 5-Hydroxymethyl Furfural using synergistic effect of modified activated carbon and ionic liquid under moderate reaction conditions. Modified Activated carbon after acid treatment (ACS, ACP, ACH) were used to examine their catalytic activity on hydrolysis of cellulose in [Bmim]Cl medium. Changes in physical-chemical properties were characterized using XRD, FE-SEM, EDX, FT-IR and BET surface area analyser techniques. Modified activated carbon is found competent in enhancing cellulose conversion to Total Reducing Sugars and 5-Hydroxymethyl Furfural. Further, the effect of six metal ions i.e Cr^{+3}, Fe^{+3}, Cu^{+2}, Zn^{+2}, K^{+} and Al^{+3} impregnated on sulfuric acid treated activated carbon (ACS) was explored. The catalytic performance improves with the impregnation of metals in the decreasing order: Cr^{+3}> Fe^{+3}> Cu^{+2}> Zn^{+2}> Al^{+3}> K^{+}. These modified catalysts with ionic liquid as solvent are found promising to generate eco-friendly system and cost effective cellulose conversion to value added products.

Keywords: Microcrystalline cellulose, [Bmim] Cl, Activated carbon, Metal Immobilization.

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1. Introduction

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