EuroSciCon

10th Edition of International Conference on

Biofuels and Bioenergy

March 04-05, 2019
Barcelona, Spain

Arch Chem Res 2019, Volume 3
DOI: 10.21767/2572-4657-C1-015

Integrated two stage process for biomass conversion to HMF esters using ionic liquid as green solvent and catalyst: synthesis of mono and diesters

Komal Kumar and **Sreedevi Upadhyayula**

Indian Institute of Technology Delhi, New Delhi, India

In this study a two stage process were stablished for the synthesis of HMF esters using ionic liquid acid catalyst. Ionic liquid catalyst with different strength of the Bronsted acidity was prepared and characterized using ^{1}H NMR, FT-IR and ^{13}C NMR spectroscopy. The acidity of the synthesized ionic liquid catalyst was measured using Hammett function. Catalytic performance was evaluated for the biomass conversion to (5-hydroxy methyl furfural) 5-HMF and levulinic acid (LA) in methyl isobutyl ketone (MIBK)-water biphasic system. Comparatively high yield of 5-HMF and LA was found at the different composition of MIBK: Water. In case of MIBK: Water ratio 10:0, high yield of 5-HMF was observed. High LA yield was found at MIBK: Water ratio 9:1. A high efficient conversion of biomass was found at ambient temperature 150˚C. Upgrading of 5-HMF into mono esters and diesters from the reaction of 5-HMF and reactants using biomass derived mono acid and diacid were performed. Ionic liquid catalyst having SO_3H functional group was found to be best efficient for the esterification reaction and biomass conversion. A good yield of 5-HMF esters with high 5-HMF conversion was found to be 105˚C using the best active catalyst. All mono and di-esters of 5-HMF synthesized here can be used in chemical, cross linker for adhesive or coatings and pharmaceutical industry. Theoretical density functional theory (DFT) study for the optimization of the ionic liquid structure was performed using Gaussian 09 program. The process A was the hydrothermal conversion of cellulose and monomer into levulinic acid using ionic liquid catalyst and water as a solvent. And the process B was the esterification followed by using same ionic liquid catalyst. The integrated two steps process could strengths the hydrothermal conversion of biomass with high efficient yield of the corresponding esters product.

sreedevi@chemical.iitd.ac.in