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Novel method for the conversion of saccharides into sugars and furans using acidic ionic liquids

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Extensive literature available on the conversion of xylose into furfural and very few reports on the direct conversion of hemicellulose into furfural and raw biomass into furfural. The reported methods show the use of mineral acids, solid acids and ionic liquids (ILs) as catalysts for the hydrolysis and dehydration reactions of saccharides. The drawbacks with the known methods are 1) Use of mineral acid makes reaction system homogeneous and has a serious problem of recyclability of catalyst, lower selectivity, corrosiveness and environmental issues. 2) Use of solid acid catalysts shows lower yields of desired products and the catalyst is not stable in most of the cases under reaction condition. 3) Very high quantity of ILs (as a solvent) is used and in some reports, it is used along with metal halide or mineral acids. To avoid above mentioned drawbacks, it is very important to develop an efficient catalytic method for the synthesis of sugars and furans (furfural & HMF) directly from non-edible biomass. For this, ILs reported in the literature can be replaced with catalytic amount of Brønsted acidic ionic liquids (BAILs) and these catalysts can be used without metal halide and mineral acid.

Methodology used: Various BAILs with various cations and anions were synthesized and characterized using NMR, FTIR, TGA & CHNS characterization techniques. Further these BAILs were used in the hydrolysis and dehydration reactions of saccharides for understanding the effect of cations and anions of BAILs in these reactions. The BAIL used in this study showed exceptionally high yield of C5 sugars (88%) and furfural (73%) from raw biomass such as bagasse.

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