



Book of abstracts

CONNECTING CHEMICAL WORLDS



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C6-carbohydrate upgrading via dimethyl carbonate: an overview

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D-sorbitol and 5-(Hydroxymethyl)furfural have been indicated by the US Department of Energy among the 15 target molecules of special interest for biorefinery.[1] This presentation focuses on the reactivity of these molecules with green reagent and solvent dimethyl carbonate (DMC).[2] Dehydration of D-sorbitol via DMC (solvent and reagent) in the presence of a base resulted to be an efficient and viable process for the preparation of isosorbide. This procedure is "chlorine-free", one-pot, environmentally friendly and high yielding. The reactivity of HMF with DMC is equally interesting as it can lead to the formation of dicarboxymethyl isosorbide (DCI) in high yield without any time-wasting purification.[3] DCI has been used as monomer for isosorbide-based polycarbonate. Dimethyl isosorbide (DMI)[4] - a well-known bio-based solvent used as green alternative to conventional dipolar media - was also obtained by reaction of isosorbide and DMC. The methylation of isosorbide can be promoted by a strong base (NaOMe), a superbase (1,8-Diazabicyclo(5.4.0)undec-7-ene - DBU) or USING a simple nitrogen base (N-methyl pyrrolidine). Furthermore, the direct conversion of D-sorbitol into DMI via DMC chemistry was also investigated using ,5,7-triazabicyclo[4.4.0]dec-5-ene (TBD) as catalyst. In this procedure, DMC takes part in different steps of the process as carboxymethylating, leaving-group (cyclization), and methylating agent, besides being also the reaction media.

Recently we have also investigated new synthetic approaches for another C-6 carbohydrate derivative, HMF and its derivatives via DMC chemistry focusing on gram scale procedures employing commercially available catalysts, green solvents and mild reaction conditions.

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