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BIO-BASED PLATFORM CHEMICALS AND DIALKYL CARBONATES: A GREEN MATCH

In the last twenty years biorefinery has gained exceptional attention prompted by the need of substituting petroleum-based compounds with renewable one so to establish a bio-based economically self-sustained industry. The US Department of Energy (DOE) has published a list of 15 target molecules, namely "Top 10", that are considered of special interest for biorefinery development.[1] These compounds have been selected by taking into consideration factors such as available processes, economics, industrial viability, size of markets and their possible employment as a platform to produce derivatives.
Over the years, due to the considerable progress in biorefinery development, this list, as well as the criteria used to identify bio-based products has been revised. Several new compounds substituted the ones that have not received a great research interest. However, among the original selected chemicals, D-sorbitol, together with 5-hydroxymethylfurfural (HMF) derivatives still occupies a top position in the list as they encompass all of the desired criteria for a bio-based platform chemicals. In fact, these building blocks have found numerous applications in the synthesis of chemicals, materials, and bio-based polymers.
In this perspective, it is herein reported our recent work on the reactivity and upgrading of D-sorbitol, and HMF with organic carbonates employed as green reagents and solvents. Several industrially appealing products have been achieved with potential applications as high boiling green solvents (i.e. dimethyl isosorbide), biofuels candidates (2,5-bis-alkoxymethylfurans - BAMF) and monomers for bio-polymers [2].

Keywords: Biorefinery; Green chemistry; Organic carbonates; Carbohydrates

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