



ORGANIC CARBONATE MEDIATED FUNCTIONALIZATION OF ISOSORBIDE AND ITS EPIMERS

D. Dalla Torre^{*1}, G. Trapasso¹, F. Aricò¹

1.Department of Environmental Sciences, Informatics and Statistics, Ca' Foscari University of Venice,
Scientific Campus Via Torino 155, 30170 Venezia Mestre, Italy.

^{*}davide.dallatorre@unive.it

Within the biorefinery framework, the so-called bio-based platform chemicals play an important role and among C6 carbohydrates, D-sorbitol and its cyclic derivative form, isosorbide, are of particular interest.[1] Isosorbide is a very important building block for a wide range of applications and it can be used as a monomer of natural origin for the synthesis of bio-based polymers, such as polycarbonates and polyesters. [2] Moreover, the functionalization of the two hydroxyl groups has allowed the synthesis of numerous derivatives with various applications such as surfactants, plasticizers, flame retardants and coalescent paint derivatives.[3] From these premises, the present work focuses on different strategies for the functionalization of isosorbide, with particular emphasis on the use of dialkyl carbonate (DAC) chemistry; DACs are well-known green solvents and reagents that can act as alkylating and carboxyalkylating agents.[4] In the first case, a comprehensive synthesis of dimethyl isosorbide (DMI) using dimethyl carbonate was carried out in an autoclave. Reaction conditions were optimized with a nitrogen organocatalyst (N-methyl pyrrolidine) and heterogeneous acid catalyst (Amberlyst-36 and Purolite CT275DR). In the second case, dialkyl carbonate chemistry was used for the preparation of dipropargyl derivatives of isosorbide via alkoxycarbonylation reaction conducted in mild conditions using catalytic amount of 1,5,7-triazabicyclo[4.4.0]dec-5-ene (TBD). In both cases, the best reaction conditions were applied for the functionalization of isosorbide epimers, isoidide and isomannide, and for some preliminary scale-up tests.

References:

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