



5th EuGSC

European Conference on Green and Sustainable Chemistry

5th

EuChemS Conference on
Green and Sustainable
Chemistry

Conference Proceedings

26-29 September 2021

Virtual Conference

www.5eugsc.org

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European Chemical Society

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Chemistry —



A scale-up procedure to Dialkyl Carbonates: purification, chemical physical properties, biodegradability and cytotoxicity tests

Giacomo Trapasso¹, Claudio Salaris², Evgenia Logunova³, Cristiano Salata², Klaus Kummerer³, Alberto Figoli⁴ and Fabio Aricò¹

¹Department of Environmental Sciences, Informatics and Statistics, Ca' Foscari University, Scientific Campus Via Torino 155, 30170 Venezia Mestre, Italy; email: giacomo.trapasso@unive.it

²Department of Molecular Medicine; Padua University, via Gabelli 63, 35121 Padova (IT).

³Institute for Sustainable and Environmental Chemistry, Leuphana University Lüneburg, Universitätsallee 1/C13.311b, 21335 Lüneburg, Germany.

⁴Institute on Membrane Technology, ITM-CNR, Via P. Bucci 17c, Rende (CS), 87036, Italy.

Among the different dimethyl carbonate (DMC) derivatives, dialkyl carbonates DACs are extensively investigated as safe alternatives to chlorine reagents. In fact, they can replace alkyl halides and dimethyl sulfate in alkylation and carbonylation reactions as well as phosgene and its derivatives in the alkoxycarbonylation ones.¹

In this work we explored the high yielding scale-up synthesis of non-commercially available or expensive dialkyl carbonates (DACs) via transcarbonylation reactions of an alcohol with dimethyl carbonate (DMC) promoted by a nitrogen-based organocatalyst. Compared to previously published works², the proposed procedure has been customized for DACs large scale production (up to 70 mL of product obtained). Purification of these compounds has been achieved by fractional distillation and the exceeding reagents have been recovered and recycled.

The selected DACs for this study include both symmetrical and unsymmetrical compounds, incorporating several alkyl, alkoxyalkyl, alkylamino and alkylthio functional groups. The chemical-physical properties of the new DACs have been also evaluated, as well as their water solubility. Furthermore, both biodegradability and cytotoxicity tests have been carried out to investigate the effects of the different substituents on the greenness of these potential solvents and reagents.

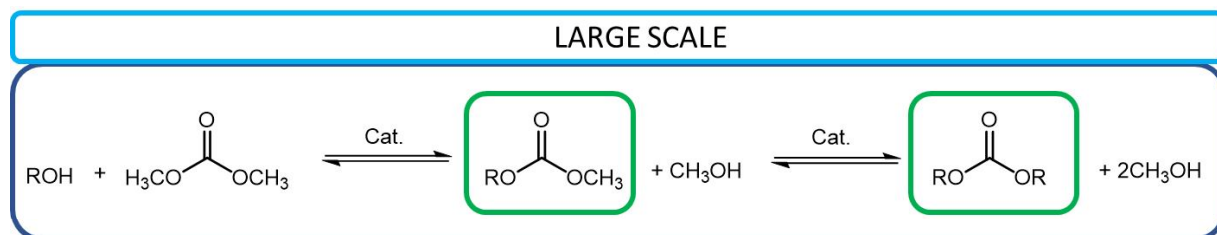


Figure 1. Symmetric and Unsymmetric DACs synthesis.

References

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