

Dialkyl carbonates: scale-up synthesis and application as green solvents for PVDF membranes preparation

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- DACs were produced in large scale (up to 100 mL), purification has been achieved by fractional distillation and the exceeding reagents have been recovered and recycled;
- Chemical-physical properties of the new DACs have been also evaluated, as well as their water solubility, biodegradability and cytotoxicity;
- DACs were employed as green solvents for membrane preparation, using phase separation techniques (NIPS and VIPS), achieving both porous and plain membranes. Membrane proprieties were compared with those obtained using commercially available cyclic carbonates (ethylene carbonate – EC and propylene carbonate – PC).
- Morphology, additives effect, physical-chemical and mechanical proprieties as well as their performances in terms of water permeability and rejection were evaluated.





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References

P. Tundo et al., *Green Chem.*, 2018, 20 28-85; G. Trapasso et al, *Sustain. Chem. Pharm.*, 2022, 26 100639; D. Chevella et al. *Green Chem.*, 2019, 21 2938–2945; H. Mutlu et al., *Green Chem.*, 2012, 14 1728-1735; G. Trapasso et al., *ACS Sustainable Chem. Eng. 2023*, *11*, *8*, 3390–3404.



A library of DACs was effectively synthesized in large scale with a single simple procedure. Excluding nitrogen-based compounds, DACs did not display acute toxicity an half of them could be readily be degraded in the environmernt. From a single family of compounds having very similar chemical structure, it was possible to produce a wide variety of dense and porous PVDF membranes having different characteristics and morphology. Membranes obtained using these synthetic solvents displayed higher mechanical stability and smaller pore size (0.32-0.10 μ m – microfiltration range) compared to their cyclic counterparts. Future work is required to deeply test the possible applications of these newly reported membranes.