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Title: NaDES ability for natural molecules dissolution

Abstract:

Natural deep eutectic solvents (NaDES) have attracted a great deal of attention in recent times as promising green media for extracting secondary metabolites from plants and for dissolving water insoluble compounds. Many biological properties are ascribed to resveratrol, a naturally occurring stilbenoids, such as antioxidant activity. However the formulation of this secondary metabolite is difficult due to its low solubility in polar solvents. The aim of this study was to identify a hydrophilic NaDES that could dissolve, stabilize and maintain the antioxidant activity of resveratrol.

25 solvents NaDES and conventional were compared in a dissolution study of resveratrol and piceid (resveratrol glycoside). Solubility was measured through RP-HPLC-UV analysis. It was shown that the maximal solubility reached for some NaDES was equal or higher than that of the best conventional solvents. NaDES solution containing 5 and 15% of resveratrol were then tested for stability and analysed through RP-HPLC-UV chromatography and DPPH assay. It was shown that the chemical and radical scavenging activity stabilities were interesting for NaDES solution in comparison with conventional solvent solutions. Furthermore, the formulation study of a NaDES solution enriched with resveratrol in emulsion was evaluated. This work leads to a demonstration that stable "oil in NaDES" emulsion is feasible. Finally, because the chemical rules of plant extraction are not entirely depending on dissolution and solvation features of a solvent, an extraction study of resveratrol and piceid from root of *Polygonum cuspidatum* was performed in order to compare the extractive performance of NaDES *versus* best conventional solvents. Interesting stilbenoids yield and radical scavenging activity of a NaDES extract was highlighted.

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Benoit CAPRIN is working on Gattefossé Research and Development department since 2009. His first experiences concern industrial scale-up and development of extraction process (bio-based ethanol and supercritical CO₂). Nowadays, his main researches are related to the development of NaDES suitable for the cosmetic industry.

He graduated as process engineer at the chemical engineer school in Clermont-Ferrand. The development and the application of his research has always been directed to natural products and green chemistry applied to the cosmetic market.