Extraction of natural compounds using sustainable solvents

Jean-Baptiste Chagnoleau[a], Xavier Fernandez[a], Nicolas Papaiconomou[a]
[a]*Université Côte d'Azur, CNRS, Institut de Chimie de Nice, UMR 7272, Nice, France*
jean-baptiste.chagnoleau@univ-cotedazur.fr

Plant extracts are valuable ingredients for a wide range of applications including in cosmetics and perfumery. However, the majority of currently extraction processes involve volatile organic solvents (VOCs) and exhibit significant environmental impacts. In order to tackle these issues and be in line with the principles of sustainable chemistry and ecoextraction, sustainable alternative solvents have been developed as replacements to VOCs.[1] Among these solvents, biobased solvents (BioSol)[2], deep eutectic solvents (DES)[3] and ionic liquids (IL)[4] have been the subject of numerous studies. In addition, in the context of circular economy, by-products are now seen as an alternative source of natural compounds.

Therefore, this work presents results on the extraction of two different type of natural compounds: non-volatile bioactive compounds and volatile fragrance compounds, originating from an agriculture by-product and an emblematic perfumery plant, respectively.

In the case of non-volatile compounds, valorisation of discarded kiwis was proposed by extraction of bioactive compounds using DES. Results show that kiwi peels extracts obtained with DES exhibit improved antioxidant activity compared to conventional solvents.[5]

In the case of volatile compounds, extracts of *Rosa centifolia* petals were obtained by solid-liquid extraction in BioSol, DES and IL. Notably, BioSol improved extraction yields and extractions of 2-phenylethanol, the major volatile compound of *Rosa centifolia*. Additionally, perfumers' evaluations revealed that the extracts produced with Biosol, IL or DES had distinct olfactory characteristics compared to the reference *Rosa centifolia* absolute derived from hexane extract.

References

[1] F. Chemat, *Eco-Extraction Du Végétal: Procédés Innovants et Solvants Alternatifs*, **2011**.
[2] J. Vovers, K. H. Smith, G. W. Stevens, in *Appl. Green Solvents Sep. Process.*, Elsevier Inc., **2017**, pp. 91–110.
[3] D. Rodríguez-Llorente, A. Cañada-Barcala, S. Álvarez-Torrellas, V. I. Águeda, J. García, M. Larriba, *Processes* **2020**, 1–54.
[4] H. Passos, M. G. Freire, J. A. P. Coutinho, *Green Chem.* **2014**, *16*, 4786–4815.
[5] J. B. Chagnoleau, A. M. Ferreira, J. A. P. Coutinho, X. Fernandez, S. Azoulay, N. Papaiconomou, *Food Chem.* **2023**, *401*, 133992.