

Green High Performance Solvents and Related Formulations

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The proper choice of solvents is crucial for high performance formulations. In parallel, the quest for green liquids is more and more noticeable in many industrial sectors. However, further to marketing advantages, there is a strong need to identify solvents that are not only “greener”, but also competitive, if not better in terms of price, availability and performance.

In the present contribution, I will discuss some of these liquids that are currently still neglected or not yet widely used, but that have a significant potential for future applications. For example, gamma-valerolactone (GVL) shows very promising properties such as a very high solubility, e.g., for several polymers, together with a very low ecotoxicity, excellent biodegradability, and a complete miscibility with water [1]. Whereas the price is currently still prohibitive, this will change next year, when a new industrial plant in Germany will start its large-scale production.

Whenever food and cosmetic formulations with natural products are required, there is a particular need to carefully choose adequate solvents. Thanks mainly to Prof. Farid Chemat’s efforts, the bio-based solvent 2-methyltetrahydrofuran (MeTHF) has finally been recognized this year by the European Union as allowed food extractant and a valuable alternative to hexane [2]. We also propose alternative solvents, for example and among others (NADES) triacetine (E 1518) that can be made miscible with water by adding an appropriate amount of ethanol [3].

Finally, I will talk about an interesting class of natural hydrotropes, i.e., polyphenols and related antioxidants. Not only can they stabilise classical formulations against oxidation, but, in addition, they can help significantly increase the solubility of very hydrophobic substances in the “greenest” of all solvents, which is water [4].

References

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