Physico-chemical properties of new hydrotropes based on di-alkyl glycerol ether: A promising alternative to the petro-sourced short-chain glycol monoethers.

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PURPOSE OF THE ABSTRACT
Short chain glycol monoethers CiEj are widely used nonionic hydrotropes. They have found many industrial applications as solubilizing agents in detergency, coatings, pesticides, pharmacy and cosmetics. But due to the reprotoxicity of some CiEj, recent research is focused on the search for safer bio-based hydrotropic compounds. Short-chain alkyl glycerol ethers CiGlyj where i = [1-6] have been developed in our laboratory and their hydrotropic properties have been investigated with regard to their amphiphilicity, their volatility and their solubilizing power. [1][2] Those which exhibit a significant volatility are called ?solvo-surfactant?.

In this work, hydrotropic properties of new bio-based short-chain di-alkyl glycerol ethers are studied in order to highlight their applicability as alternative to the CiEj. Furthermore, the influence of the methylation of primary or secondary alcohol of the glyceryl moiety and the branching of the alkyl chain on the physico-chemical properties is investigated.

To do so, several hydrotropic properties (critical aggregation concentration, volatility) of a series of isomers of di-alkyl with a butyl as a principal chain were investigated and the results were compared with classical glycol monoethers and monoalkyl glycerol. The phase behavior of the isomers was studied in a binary hydrotrope/water system. These experiments pointed out that, unlike the mono alkyl glycerol ether [4.0.0], the di-alkylated exhibit an upper miscibility gap between 0-100°C, which can be exploited for temperature sensitive extraction methods. [3] Furthermore the study of the ternary system hydrotrope/oil/water, highlighted their capacity to form microemulsions. The effect of various salts (salting in and salting out) on the binary phase behavior in water was investigated and revealed that the bio-based di-alkyl glycerol ethers are more salt tolerant than the petro-based C4E1. The results were rationalized with the COSMO-RS method which combines quantum chemical treatment of solutes and solvents with statistical thermodynamics, and in turn enables the efficient calculation of many properties, e.g. solubility, partition coefficient, boiling points etc.
FIGURES

FIGURE 1
Figure 1.
Hydrotropes studied

FIGURE 2

KEYWORDS
Hydrotropes | Solvo-surfactants | Di-alkyl glycerol ethers

BIBLIOGRAPHY