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# Aqueous solutions of glycerol derived alkyl ethers: the study of hydrotropes in the solubilization of hydrophobic compounds

## AUTHORS

BRUNA DE PAULA SOARES / UNIVERSIDADE DE AVEIRO, CAMPUS UNIVERSITÁRIO DE SANTIAGO, AVEIRO
Tânia E. SINTRA / UNIVERSIDADE DE AVEIRO, CAMPUS UNIVERSITÁRIO DE SANTIAGO, AVEIRO
ALEJANDRO LEAL DUASO / UNIVERSIDAD DE ZARAGOZA, CALLE PEDRO CERBUNA, 12, ZARAGOZA
JOSÉ I. GARCÍA / UNIVERSIDAD DE ZARAGOZA, CALLE PEDRO CERBUNA, 12, ZARAGOZA
ELÍSABET PIRES / UNIVERSIDAD DE ZARAGOZA, CALLE PEDRO CERBUNA, 12, ZARAGOZA
SIMÃO P. PINHO / INSTITUTO POLITÉCNICO DE BRAGANÇA, CAMPUS DE SANTA APOLÓNIA, BRAGANÇA
JOÃO A. P. COUTINHO / UNIVERSIDADE DE AVEIRO, CAMPUS UNIVERSITÁRIO DE SANTIAGO, AVEIRO

## PURPOSE OF THE ABSTRACT

Enhancement of solubilization of poorly soluble substances in aqueous media plays an important role in the extraction and purification of bioactive compounds as well as in their formulation and bioavailability studies. That can be achieve using hydrotropes, which are compounds able to substantially increase the solubility of hydrophobic substances in water. Despite the large number of reviews addressing hydrotropy, its mechanism of action is not yet clearly understood.[1] Some classes of compounds such as ionic liquids and eutectic solvents were shown to be promising classes of hydrotropes, [2]-[4] but recently glycerol ethers have been also proposed for the same effect. In this particular case, it is possible to synthesize them through a green synthetic pathway and tune their physicochemical properties by changing the number, size and nature of their alkyl groups.[5],[6]
In this work, six monoalkyl glycerol ethers were selected for the solubilization of gallic acid in aqueous solutions, namely [n.0.0], with n from 2 to 6, where n is the number of carbons of the monoalkyl chain. To do so, the solubility of gallic acid was determined in aqueous solutions of each monoalkyl glycerol, at 298.15 K and various hydrotope concentrations, and compared with the results obtained with conventional organic solvents and some ionic liquids previously studied by our group.[2] In order to better understand the hydrotropic behaviour, the Kirkwood-Buffer (KB) approach [7] was applied to rationalize the experimental data. The results clearly demonstrate the exceptional capacity of the glycerol ethers to enhance the solubility of gallic acid, where [2.0.0] and [3.0.0] exhibit the greatest increase in solubility of the phenolic acid in water. Contrary to what has been shown in the literature, decreasing the alkyl chain length in the glycerol ether the higher is the gallic acid solubility enhancement, which makes the study of these compounds even more interesting to understand the hydrotropy phenomena. Furthermore, the experimental data are very satisfactorily described by the KB model.

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## FIGURES

## FIGURE 1

## FIGURE 2


## KEYWORDS

hydrotropes | solubility | glycerol ethers | Kirkwood-Buffer model


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