

Impact of the Water Content in the Therapeutic Deep Eutectic Solvents

Noam Lewit, James Stewart, Oluseyi Olawuyi, Mohammed A. Halim

Department of Chemistry and Biochemistry, Kennesaw State University, Kennesaw, GA 30144, USA

Deep eutectic solvent(s) (DES) are the new generation of greener and more sustainable solvents, formulated by the complex of hydrogen bond in the molecules. The solvents allow us to achieve a significantly lower freezing point compared to its components, an affordable formulation and a technology that is typically formulated to improve the bioavailability of a drug. In this research project, we synthesized an ibuprofen-menthol based therapeutic deep eutectic solvent and investigated how water content affects the structure and dynamics of the solvent. For synthesizing the ibuprofen-menthol DES, 2.0629 g of Ibuprofen and 4.6881 g of menthol were placed in a small breaker to achieve a 1:3 molar ratio. The mixer was covered by parafilm paper and was then heated on a hot plate at temperature of 50 °C with 600 rpm for 30 minutes until a clear liquid was observed. In the infrared spectrum of the DES, a strong C-H stretching is noticed at 2800-2950 cm^{-1} , OH bonds at 3345.57 cm^{-1} which involves in hydrogen bonding, and a less strong peak for the C=O stretching is detected at 1708.41 cm^{-1} . Raman spectroscopy results showed that 10% and 20 % of water do not interrupt the ibuprofen-menthol's Raman shift compared to the pure DES, however, significant change is observed while 30% and 40 % water were added to the system.