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# Self-aggregation of bio-surfactants within ionic liquid 1-ethyl-3-methylimidazolium bromide: a comparative study and potential application in antidepressants drug aggregation

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## Abstract

Aggregation behavior of bio-surfactants (BS) sodium cholate (NaC) and sodium deoxycholate (NaDC) within aqueous solution of ionic liquid (IL) 1-ethyl-3-methylimidazolium bromide [Emim][Br] has been investigated using surface tension, conductivity, steady state fluorescence, FT-IR and dynamic light scattering (DLS) techniques. Various interfacial and thermodynamic parameters are determined in the presence of different wt% of IL [Emim][Br]. Information regarding the local microenvironment and size of the aggregates is obtained from fluorescence and DLS, respectively. FT-IR spectral response is used to reveal the interactions taking place within aqueous NaC/NaDC micellar solutions. It is noteworthy to mention that increasing wt% of [Emim][Br] results in an increase in the spontaneity of micelle formation and the hydrophilic IL shows more affinity for NaC as compared to NaDC. Further, the micellar solutions of BS-[Emim][Br] are utilized for studying the aggregation of antidepressants drug promazine hydrochloride (PH). UV-vis spectroscopic investigation reveals interesting outcomes and the results show changes in spectral absorbance of PH drug on the addition of micellar solution (BS-[Emim][Br]). Highest binding affinity and most promising activity are shown for NaC as compared to NaDC.

**Keywords:** Ionic Liquid, Bio-surfactant, Critical micelle concentration, Aggregation Behavior, Spectroscopy.

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