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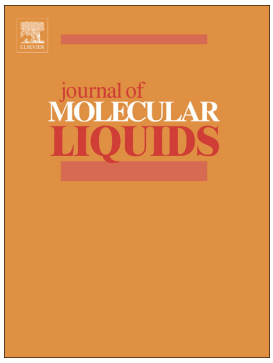

Interactions of diazepam with sodium dodecylsulfate and hexadecyl trimethyl ammonium bromide: Conductometric, UV–visible spectroscopy, fluorescence and NMR studies

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ACCEPTED MANUSCRIPT

Interactions of Diazepam with Sodium dodecylsulfate and Hexadecyl trimethyl ammonium bromide: Conductometric, UV-Visible spectroscopy, Fluorescence and NMR Studies

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ABSTRACT

The interactions between anti-anxiety drug diazepam (DZM) and ionic surfactants [sodium dodecyl sulfate (SDS) and hexadecyltrimethylammonium bromide (HTAB)] in 0.57 mol% aqueous ethanol solution have been studied by employing conductivity measurements over a range of temperature [288.15 to 318.15 K in case of SDS and 298.15 to 318.15 K in case of HTAB]. From these measurements, critical micelle concentration (CMC), degree of dissociation of counter ion (α), standard free energy (ΔG_{m}), standard enthalpy (ΔH_{m}) and standard entropy (ΔS_{m}) of micellization were calculated. UV-Visible and fluorescence studies were carried out for DZM-sufactant complex in the pre-micellar and post-micellar region. From these studies various parameters like partition coefficient (K_{x}), binding constant (K_{b}), free energy of partition (ΔG_{x}), free energy of binding (ΔG_{b}) and number of drug molecules per micelle (n) were calculated. Proton (^{1}H) NMR studies show upfield shift which indicates shielding of protons of SDS and HTAB. From UV-visible, fluorescence and ^{1}H NMR studies it was concluded that drug molecules lie in the palisade layer or the interface of the SDS/HTAB micelles.

***Keywords*:** Diazepam; Sodium dodecylsulfate; Hexadecylrimethylammonium bromide; Conductivity; UV-Visible spectroscopy; Fluorescence; ^{1}H Nuclear Magnetic Resonance Spectroscopy.

INTRODUCTION

The study of drug-surfactant interactions is an important area of research because of widespread applications of surfactants in pharmaceutical industry. Surfactant micelles have ability to solubilize hydrophobic drugs [1-3]. Solublization of a drug depends on the hydrophobicity and the electrostatic interactions of the drug with surfactants [4-6]. Therefore, micellar system provides a better drug delivery system by encapsulating the drug and thus increases their

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