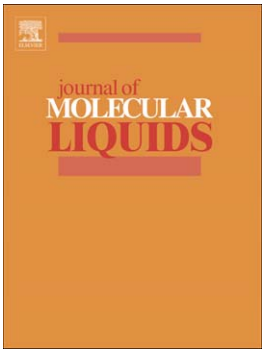

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Study of interaction between cationic surfactant (CTAB) and paracetamol by electrical conductivity, tensiometric and spectroscopic methods

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Abstract

The interaction of a hydrophilic drug, paracetamol with the cationic surfactant cetyltrimethylammonium bromide (CTAB) in an aqueous media have been investigated by using conductometric, tensiometric and spectroscopic methods. The critical micelle concentration (CMC) values have been determined by two different methods and both the methods yielded identical CMC values. The experimental data of conductance and surface tension have been correlated against temperature and concentration using standard relations. The pseudophase separation model has been adopted for calculation of various thermodynamic parameters such as standard free energy ΔG^0_m, enthalpy, ΔH^0_{mic}, and entropy, ΔS^0_{mic}, of micelle formation. The increase in the micellization with rising temperature is attributed towards the prevailing hydrophobic-hydrophobic increased interactions between the surfactant-drug aqueous mixtures. From the surface tension data the interfacial parameters such as the maximum surface excess concentration, Γ_{max}, standard Gibbs free energy of adsorption at the air/solvent interface, ΔG^0_{ad}, and the minimum surface area pre molecule, A_{min}, were evaluated. Moreover, Fourier transform infrared analysis (FTIR) was carried out to estimate the possible interactions prevailing in the miceller systems.

Keywords: Paracetamol, Cetyltrimethylammonium bromide, Thermodynamic parameters, CMC, Hydrophobic-hydrophobic interactions, FTIR analysis.

1. Inroduction

Molecular polarity is an essential parameter with respect to drugs and their distribution. Human cell membranes are composed of the hydrophilic and hydrophobic cell components of glycoproteins and phospholipid [1]. Lipophilic non-polar drugs are distributed in the adipose tissue and can also pass through the blood-brain barrier [2]. A problem that exist to the polar hydrophilic drugs as they are not able to reach the target tissues with an appropriate concentration [3]. However, polar hydrophilic drugs are known to be distributed in the lean body tissues. This unsuitable

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