Abstract

Micro-heterogeneous surfactant assemblies solubilize and encapsulate the active drug molecules and consequently protect them from the adverse environmental conditions. As pseudomodel of biomembranes, the associative structures of surfactant molecule are very useful for researchers to determine their role in cellular interactions. The present study reveals the molecular interactions of potential antibiotics (fixed dose combinations as well as single drugs) with cetyltrimethylammonium bromide (CTAB, a quaternary ammonium surfactant). Micellar liquid chromatography (MLC), differential absorption and emission spectrometry were performed to probe the drug–CTAB association whereas interaction modes of drug–surfactant were quantified by determining binding capacities and related Gibb's free energies at various pH conditions. The binding values of drug–CTAB obtained from micellar liquid chromatography measurements are found to be in good agreement with as measured by electronic spectroscopy. The fixed dose combination (FDC) drugs, (norfloxacin + metronidazole), (ofloxacin + ornidazole) and single drug sparfloxacin were studied at physiological condition pH 7.4. Gatifloxacin and levofloxacin were also studied at two pH values pH 7.4 and pH 5.5. Most fluoroquinolones solubilize in the aqueous medium. However for better bioavailability, improved efficacy and to overwhelm the lipophilic barrier, a physiological medium (pH 7.4) is useful for diffusion through phospholipid membrane. The spectral-luminescent measurements of these drugs interacting with cationic micelles were investigated as function of CTAB concentration from pre micellar to post micellar region. The results indicated potential solubilization of drugs in the peripheral region of micelles that may facilitate their controlled release. The values of the binding capacities of drug-micelle system have verified these results.