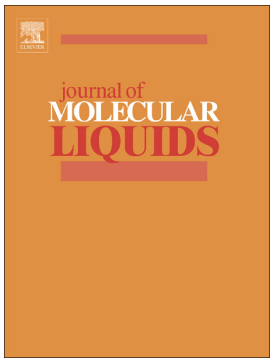

Local anesthetic-bovine serum albumin interactional behaviour: Characterization by volumetric, calorimetric, and spectroscopic methods

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Local anesthetic-bovine serum albumin interactional behaviour: Characterization by volumetric, calorimetric, and spectroscopic methods

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Abstract

The main aim of the current work is to figure out the effect of concentrations of local anesthetics on globular protein's molecular and functional properties. For this, volumetric parameters *i.e.* partial specific volume (V), expansibility (E^o), and adiabatic compressibility (K_s) of bovine serum albumin (BSA) have been calculated in buffered solutions of two local anesthetics: procaine hydrochloride (PC) and tetracaine hydrochloride (TC) using density and sound velocity meter at different temperatures. The variation in V, E^o, and K_s with temperature and drug concentrations indicate the larger polar interactions/or dehydration phenomenon in the interaction of TC with BSA at both lower and higher concentrations of TC whereas polar interactions at lower and non-polar interactions at higher concentrations of PC have been observed in the association of PC with BSA. Both drugs interacts *via* hydrophobic/ or hydration phenomenon at intermediate concentrations. These observations have also been supported by microcalorimetry. In addition to ionic, hydrogen bonding, hydrophobic, and π-π interactions, additional cation–π interactions have been addressed in case of PC-BSA from NMR. Due to the higher hydrophobicity of PC cation, it partially occupies the binding cavity of protein. The absorption spectroscopic measurements indicate the higher affinity constant for PC-BSA as compared to TC-BSA. The chromophoric environment of protein has not been disturbed by the interaction of PC and TC.

Keywords: Bovine serum albumin, Local anesthetics, Volumetry, Calorimetry, Spectroscopy.