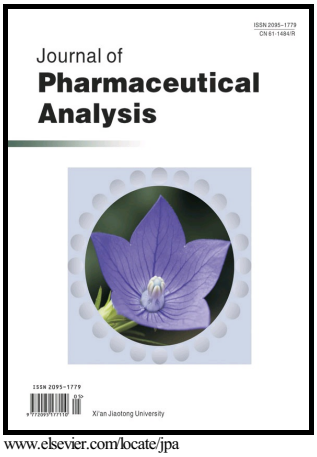

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Binding interaction of phosphorus heterocycles with bovine serum albumin: A biochemical study

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Abstract

Interaction between bovine serum albumin (BSA) and phosphorus heterocycles (PHs) was studied using multi-spectroscopic techniques. The results indicated the high binding affinity of PHs to BSA as it quenches the intrinsic fluorescence of BSA. The experimental data suggested the fluorescence quenching mechanism between PHs and BSA as a dynamic quenching. From the UV-vis studies, the apparent association constant (K_{app}) was found to be 9.25×10^2, 1.27×10^4 and 9.01×10^2 L/mol for the interaction of BSA with PH-1, PH-2 and PH-3 respectively. According to the Förster's non-radiation energy transfer (FRET) theory, the binding distances between BSA and PHs have been calculated. The binding distances (r) of PH-1, PH-2 and PH-3 were found to be 2.86, 3.03, 5.12 nm, respectively indicating energy transfer occurs between BSA and PHs. The binding constants of the PHs obtained from the fluorescence quenching data were found to be decreased with increase of temperature. The negative values of the thermodynamic parameters ΔH, ΔS and ΔG at different temperatures revealed that the binding process is spontaneous; hydrogen bonds and van der Waals interaction were the main force to stabilize the complex. The micro-environment of the protein-binding site was studied by synchronous fluorescence and circular dichroism (CD) techniques and data indicated that the conformation of BSA changed in the presence of PHs. Finally, we studied the BSA-PHs docking using auto dock and results suggest that PHs is located in the cleft between the domains of BSA.

Keywords: BSA; Interaction; Spectroscopy; PHs; Docking.

Introduction