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Synthesis and characterization of new unsymmetrical Schiff base Zn (II) and Co (II) complexes and study of their interactions with Bovin Serum Albumin and DNA by spectroscopic techniques

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Abstract

Two novel tetra-coordinated Cobalt(II) and Zinc (II) chelate series with the general formula of [Co (L).2H₂O] (1) and [Zn (L)] (2) [L = N-2-hydroxyacetophenon-N'-2-hydroxynaphthaldehyde-1,2 phenylenediimine] with biologically active Schiff base ligands were synthesized and recognized by elemental analysis and multi-nuclear spectroscopy (IR and ¹H and ¹³C NMR); then, their biological activities including DNA and protein interactions were studied. The interaction of the synthesized compounds with bovine serum albumin (BSA) was investigated via fluorescence spectroscopy, showing the affinity of the complexes for these proteins with relatively high binding constant values and the changed secondary BSA structure in the presence of the complexes. The interaction of these compounds with CT-DNA was considered by UV-Vis technique, emission titration, viscosity measurements, helix melting methods, and circular dichroism (CD) spectroscopy, confirming that the complexes were bound to CT-DNA by the intercalation binding mode. Furthermore, the complexes had the capability to displace the DNA-bound MB, as shown by the competitive studies of these complexes with methylene blue (MB), thereby suggesting the intercalation mode for the competition. Finally, the theoretical studies carried out by the docking method were performed to calculate the binding constants and recognize the binding site of the BSA and DNA by

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