Synthesis, characterization and DNA binding activity of a potential DNA intercalator

ABSTRACT

A novel complex, $[Ru(dppz)_2(p\text{-MOPIP})]^{2+}$ (dppz = dipyrido-[3,2-a:20,30-c]phenazine, *p*-MOPIP = 2-(4-methoxyphenyl) imidazo[4,5-f][1,10]phenanthroline) has been synthesized and characterized by elemental analysis, ^1H Nuclear Magnetic Resonance spectroscopy, mass spectrometry, Fourier Transform Infrared analysis, Ultra Violet visible and fluorescence spectroscopy. Herein, the complex was designed by adding *p*-MOPIP as an intercalating ligand and dppz as the ancillary ligand. The DNA binding properties of the complex with Calf Thymus DNA (CT-DNA) were investigated using spectroscopic methods. The UV-visible absorption band observed at 460 nm corresponded to the metal-to-ligand charge transfer (MLCT) while bands at 358 and 281 nm corresponded to intra-ligand (IL) π-π^* transitions of the ligand scaffold in *p*-MOPIP and dppz. The intrinsic binding constant, K_b for this complex was 1.67×10^6 M^{-1} and this suggested that this complex, $[Ru(dppz)_2(p\text{-MOPIP})]^{2+}$ bound to DNA *via* the intercalative mode. Interestingly, the interaction of this complex with CT-DNA also had a 'molecular light switch' effect.

Keyword: Ruthenium; DNA binding; Molecular light switch

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