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Comment on the frequently used method of the metal complex-DNA binding constant determination from UV-Vis data

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Present contribution describes the UV-Vis study of the mixture of Cu(II) ions, pyridoxal 5'-phosphate nicotinoyl hydrazone and DNA. Neither free hydrazone nor its copper(II) complex interacts with DNA under the given concentration conditions. The changes in the UV-Vis spectra of the mixture containing metal complex and DNA are caused by partial dissociation of the coordination compound and complexation of the released Cu(II) ions with DNA. This result was obtained by the analysis of a number of the reactions that could occur in the solution of Cu(II) ions, buffer components (namely, Tris), ligand (hydrazone), and DNA.

Keywords: pyridoxal 5'-phosphate, hydrazone, DNA, binding constant, UV-Vis spectroscopy

I. Introduction

Numerous contributions [1-14] describe the interaction of metal complexes composed of different cations and ligands with DNA. One of the most frequently used method for qualitative and quantitative study of those interactions is the UV-Vis spectrophotometry. Basing on the changes in electron absorption spectra, the intrinsic constant of binding between DNA and metal complex is calculated in accordance with the modified Benesi-Hildebrand equation:

$$\frac{C_{tot}(DNA)}{\varepsilon_f - \varepsilon_a} = \frac{C_{tot}(DNA)}{\varepsilon_f - \varepsilon_b} + \frac{1}{K_b(\varepsilon_f - \varepsilon_b)} \quad (1),$$

where C_{tot}(DNA) is the total DNA concentration in base pairs, K_b is the binding constant, ε_f, ε_a and ε_b are the extinction coefficient for free complexes, the apparent