

Factors affecting the nucleolytic cleavage of DNA by (N,N'-ethylenediaminediacetato)metal(II) complexes, M(edda). Crystal structure of Co(edda)

ABSTRACT

M(edda) complexes (Cu, Co, Ni, Zn) have been characterized by UV-visible spectroscopy and ESI-MS to study the species in aqueous solution. The Co complex crystallizes as the octahedral diaqua(N,N'-ethylenediaminediacetato)cobalt(II) monohydrate and its crystal structure is reported. Cu(edda) cleaves plasmid DNA in the presence of hydrogen peroxide better than Co(edda) while the Zn and Ni analogues are inactive. Partial and complete inhibition of DNA cleavage can be effected by radical scavengers and Na₂H₂EDTA, respectively. The cleavage efficiency of Cu(edda) varies with the concentration of the complex, pH of the buffer and the type of buffer. The difference in nucleolytic efficiency of Cu(edda) and other complexes studied can be explained by the difference in amount of OH radicals produced, as determined by a PNDA assay. ESI-MS and CD studies on the Cu(edda) complex confirms its binding to DNA and results in a non-denaturational type of conformation change.

Keyword: (N,N'-ethylenediaminediacetato)metal(II), DNA cleavage, Crystal structure, Nucleolytic efficiency, Hydrogen peroxide