ABSTRACT

ELUCIDATION OF BIOLOGICAL MECHANISMS USING SMALL MOLECULE MODELS: REACTIVITY AND EXCHANGE STUDIES OF ZINC AND NICKEL CYSTEINE COMPLEXES

Inhibition of HIV and tumor-related protein functions have been linked to zinc removal from zinc finger proteins using transition metal complexes. The complex bis(O-ethyl-L-cysteinato)zinc(II), $(cysE)_2Zn$, was synthesized to mimic the N_2S_2Zn coordination in zinc fingers to determine the effect of exogenous metals such as nickel and the mechanism of exchange. Addition of $NiCl_2$ to $(cysE)_2Zn$ results in a notable color change. Absorptions at 302 nm, 382 nm, and 506 nm indicate replacement of zinc with nickel. Also several aggregates including $[(cysE)_4Ni_3]^{2+}$ and $[(cysE)_3Ni_2]^{+}$ were identified by ESI-Mass Spectrometry. $(cysE)_2Ni$ displays oxygen sensitivity, but the products from exchange studies do not. Oxygen-purged $(cysE)_2Ni$ slurries experience a distinct color change, and IR peaks at 1010 cm^{-1} and 1230 cm^{-1} from reactions in methanol indicate the formation of sulfones. A transesterification reaction led to a crystal structure of $(cysM)_2Ni$ with average bond lengths of Ni-N: 1.95 Å and Ni-S: 2.19 Å.

Teresa Leanne Mendoza
May 2008