



## Kinetics and Mechanism of Ligand Exchange of Cu(methionine)<sub>2</sub> by Polyamines

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### ABSTRACT

The kinetics of ligand substitution reaction of Cu(methionine)<sub>2</sub> complex by polyamines has been followed conductometrically above pH 9.0 at 25°C. Millimolar solution of the Cu(NO<sub>3</sub>)<sub>2</sub> and methionine in 1:2 molar ratio in water shows increase in conductance with time. When a polyamine (en, dien and trien) is added to the complex, the conductance increases at a rapid rate due to substitution of methionine by polyamine leading to the formation of [Cu(polyamine)<sub>2</sub>]. It was observed that the exchange of methionine by polyamine proceeds in a first order process. Since the rate of the reaction varies with the size of polyamines they can be placed in the following, en>dien>trien. In acidic pH range the absorption spectrum varies negligibly. However, the concentration of methionine does not have any influence on the absorption spectra.

**Keywords:** Ligand exchange, Methionine, Polyamines, Copper nitrate.

### INTRODUCTION

Amino acids are essential ingredients in biological system. Since we are mimicking such systems by reacting metal ions with amino acids in vitro we have avoided chemicals to represent the biological system. Their involvement in copper transport in blood has been reported<sup>1,2</sup>. The amine and carboxylate moieties in amino acids allow them to form compounds with different metal ions<sup>1,3-8</sup>. Many

amino acids also have a metal-binding site in the side chain, which helps them to form metal complexes with a range of structural motifs. Important metal binding sites include groups like the phenol ring of tyrosine, the thiol group of cysteine, and the thioether moiety of methionine<sup>5,9,10</sup>. Although numerous transition metal ions are involved, Cu(II) has been most extensively studied in living system.

Over the past few decades, equilibrium

