Thesis Title Study of the Kinetics of Ligand Exchange Reaction by Ion Liquid Chromatography

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ABSTRACT

Using an anion-exchange column (Waters-IC-Pak A) with EDTA as the mobile phase, it was found that the anionic complexes, $Cu(EDTA)^{2-}$, $Cu(CyDTA)^{2-}$, $Cu(DTPA)^{3-}$, $Cu(HEDTA)^{1-}$ and $Cu(EGTA)^{2-}$, eluted off the column with different retention times. Thus it was possible to monitor the exchange reaction between the incoming ligand, $CyDTA^{4-}$, $DTPA^{5-}$, $EGTA^{4-}$ and $HEDTA^{3-}$ and the leaving ligand $EDTA^{4-}$ of $Cu(EDTA)^{2-}$. The peak heights of the chromatogram are proportional to concentration of the metal complexes and are used to follow the concentration of the complexes with time.

A high concentration of leaving ligand over the $Cu(EDTA)^{2-}$ complex is employed in order to make the reaction a pseudo first-order kinetics. The data was analysed as a single exponential decay, using a non-linear least square program, ENZFITTER.

The kinetic results for the ligand exchange reaction were interpreted according to proton-assisted dissociation mechanism.