

# Defence of a Doctoral Thesis

## Metal-Chelate Complexes in Alkaline Solution: On Recovery Techniques and Cellulose-based Hybrid Material Synthesis

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### Abstract

For decades, aminopolycarboxylate chelating agents have been extensively used in various industrial applications. The ability of chelating agents to form stable metal-chelate complexes is the main reason for using them to manage metal ions within water-based industrial processes. Considerable quantities of industrial effluent containing chelating agents and heavy metals are produced and often discharged into the environment. The toxicity of heavy metals and the non-biodegradability of the chelating agents, as well as their accumulation in the environment, has become cause for concern. The main purpose of this thesis was to evaluate and develop processes for recovery of chelated metal complexes from aqueous solution. In this regard, the membrane electrolysis technique was evaluated for recovery of copper and aminopolycarboxylic chelating ligands such as ethylenediaminetetraacetic acid (EDTA), nitrilotriacetic acid (NTA), diethylenetriaminepentaacetic acid (DTPA), and a surface-active derivative of DTPA, 2-dodecyldiethylenetriaminepentaacetic acid ( $C_{12}$ -DTPA) from aqueous solution. By using this method, it was possible to simultaneously recover the chelating ligand for further reuse and collect the metals by electro-deposition, making the process more cost-effective and hindering the discharge of copper ions and chelating ligands as pollutants into the environment. In addition, the ion flotation technique with the chelating surfactant  $C_{12}$ -DTPA could be employed to separate metal ions, especially from their dilute solutions, and concentrate them in a foam phase. **Read the whole abstract on [www.miun.se/fscn](http://www.miun.se/fscn)**



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