

MASTER'S THESIS

Electroanalysis of amino acids and dithiocarbamates

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Electroanalysis of Amino Acids and Dithiocarbamates

Part (I) Voltammetric Analysis of Amino Acids by
In-Situ Derivatization to Dithiocarbamates

Part (II) Preconcentration and Electroanalysis of
Dithiocarbamates at Polypyrrole Modified Electrode

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ABSTRACT

The study is aimed to quantify amino acid *via in-situ* derivatization to dithiocarbamate derivative and analysed by electrochemical means. There are two parts in the thesis. Part I deals with the polarographic determination of some electroinactive amino acids (glycine, valine, leucine, serine, asparagine, glutamic acid, lysine and proline). The amino acids underwent *in-situ* derivatization with carbon disulfide in the presence of triethylamine at room temperature to give the corresponding electroactive dithiocarbamate derivatives. They were then determined in aqueous medium by differential-pulse polarography. Characteristic cathodic peak in the range from -0.51 to -0.61 V (vs. Ag/AgCl) was observed for most of the derivatized amino acids studied. Potential interference came from the by-product trithiocarbonate. However, under the optimum conditions employed, its interfering effect could be minimized. The polarographic peak current observed was rectilinear over the range from 1.6 to 20 μM of analyte concentration. For the micro determination of amino acids, the method was found to be precise (%RSD = $\pm 2.5\%$ for sample range of 10^{-7} - 10^{-6} mole; %RSD = $\pm 2.0\%$ for sample range of 10^{-6} - 10^{-5} mole) and the detection limit was estimated to be 10 μg of the amino acid.

Part II involves the voltammetric study of dithiocarbamate compounds with polypyrrole modified electrode. Dithiocarbamates can be preconcentrated into polypyrrole film modified glassy carbon electrodes when pyrrole was electropolymerized in the presence of the species. Efficiency of preconcentration was found to be related to the pyrrole concentration, the polymerization conditions (scan rate, scan cycle number and solution pH, etc.) and the nature of the dithiocarbamates. The dithiocarbamates usually showed a characteristic anodic peak in the range between +0.60 and +0.85 V (vs. SCE). The voltammetric peak currents obtained were rectilinear over the range from 1.0 to 25 μM of analyte concentration for the determination of diethyldithiocarbamate. Reproducibility was fair (%RSD = $\pm 6\%$, for $n = 10$).

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