

ABSTRACT (EN)

This work is focused on two specific classes of amines. First group comprises of cyclic polyaminocarboxylates from the DOTA (1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid) family, which are important reaction intermediates in magnetic resonance imaging (MRI) contrast agent synthesis. In the development of new contrast agents, carboxyl groups are very often protected with *tert*-butyl ester groups. Among these derivatives, *t*Bu₃DO3A is of the highest importance. Therefore, reverse-phase high performance liquid chromatographic (RP-HPLC) and non-aqueous capillary zone electrophoretic (CZE) methods were evaluated for qualitative and quantitative analysis of *t*Bu₃DO3A (1,4,7,10-tetraazacyclododecan-1,4,7-tris(*tert*-butylacetate)) and two typical reaction by-products, i.e. *t*Bu₄DOTA (1,4,7,10-tetraazacyclododecan-1,4,7,10-tetrakis(*tert*-butylacetate)) and *t*Bu₂DO2A (1,4,7,10-tetraazacyclododecan-1,4-bis(*tert*-butylacetate)). These optimized methods were successfully applied to monitoring of real reaction mixtures during synthesis of a new MRI contrast agent. No further sample pretreatment was necessary.

In the second part of the thesis, proteinogenic amino acids and polyamines were used as model analytes for development of a new post-column solid-phase reactor suitable for on-line derivatization in HPLC. The solid-phase reactor is filled with fine copper(II) oxide powder. Passage of the analytes through the reactor leads to formation of copper(II) complexes. Unlike free amino acids and polyamines, the copper(II) complexes show significant absorbance in UV region and accordingly detection sensitivity of amino acids increases by two to four orders of magnitude when compared to analyses without the derivatization step. The increase of the detector response for the polyamines is from one to two orders of magnitude. The presented solid-phase reactor brings simple, inexpensive and versatile solution for UV-VIS detection of coordinating compounds, which do not normally absorb well in the UV-VIS region.