

Abstract

This diploma thesis deals with hyphenation of liquid chromatography with mass spectrometric detection based on microfluidic chip. Firstly, a miniaturized ion source for atmospheric-pressure chemical ionization (APCI), and atmospheric-pressure photoionization (APPI) was constructed. The main component of this source was a glass microfluidic chip. Geometry and the working conditions of the chip were optimized. Since both ion sources work under the same conditions, possible advantages resulting from APCI/APPI combination were investigated. Furthermore, the performance characteristics of the sources were evaluated, and compared to the conventional high flow-rate sources. The best performing source, APCI, was then hyphenated with HPLC using low flow-rate. A method for separation of fatty acids methyl esters using Supelco 37 standard was developed. The separation conditions were as follows: C18 reversed stationary phase, and acetonitrile containing 0.1 % formic acids was used as the mobile phase. A temperature gradient was used in order to enhance the speed of the separation. The limits of detection and quantitation of for selected analytes using the chip micro-APCI were calculated, and compared to the ones obtained using a commercially available micro-APCI source. The method was used for separation of fatty acids methyl esters found in transesterified samples of jojoba oil and blackcurrant oil.

Key words: atmospheric-pressure chemical ionization, atmospheric pressure photoionization, fatty acids methyl esters, microfluidic chip