Abstract

Charles University in Prague, Faculty of Pharmacy in Hradec Králové

Department of Analytical Chemistry

Candidate: Daniela Nováková

Supervisor: prof. PharmDr. Lucie Nováková, Ph.D.

Title of the diploma thesis: Evaluation of properties of new types of zwitterionic stationary phases in HILIC

The aim of this thesis was to compare six new zwitterionic Astra ZWIX columns (3 µm, 2,1 x 100 mm) from Chromservis s.r.o. Five groups of compounds were used for the analysis, namely nucleic bases and nucleosides, nicotinic acid derivates, hydrophilic vitamins, beta-blockers, and phenolic acids. These groups of compounds were also analysed on commercially available columns – BEH Z HILIC, SYNCRONIS, OMEGA SUGAR, BEH HILIC and BEH AMIDE (OMEGA SUGAR 3 µm, 2,1 x 100 mm; other columns 1,7 µm, 2,1 x 100 mm). The investigated parameters were retention time, peak resolution, peak symmetry, and peak width at half height. Optimisation to improve peak separation of nucleic bases and nucleosides, hydrophilic vitamins, and beta-blockers was also carried out. The mobile phase gradient was optimized, as well as the column temperature, and mobile phase flow rate.

The selectivity of the columns was found not to differ within the batch. The retention time repeatability condition was met for all analytes on all columns, except for 3,5-DHBA on column A00280 at pH 3. The peaks of the analytes are mostly symmetrical, with only a few showing slight fronting or tailing.

Compared to commercially available columns, Astra ZWIX columns have slightly worse properties - peaks on Astra ZWIX columns have lower resolution values, higher asymmetry values and wider peaks, which is due to the Astra ZWIX columns having larger particles.

Keywords: HILIC, zwitterionic columns, Astra ZWIX, nucleic bases, nucleosides, nicotinic acid derivates, hydrophilic vitamins, beta-blockers, phenolic acids