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Rapid Separation of Biomolecules and Neutral Analytes with a Cationic Stationary Phase by Capillary Electrochromatography

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Abstract : The unique properties of capillary electrochromatography (CEC) such as high performance, high selectivity, low consumption of both reagents and analytes ensure this technique an attractive one for the separation of biomolecules including nucleosides and nucleotides, peptides, proteins, carbohydrates. Monoliths have become a well-established separation media for CEC in the format that can be compared to a single large 'particle' that does not include interparticular voids. Convective flow through the pores of monolith significantly accelerates the rate of mass transfer and enables a substantial increase in the speed of the separation. In this work, we propose a new approach for the preparation of cationic monolithic stationary phase for capillary electrochromatography. Instead of utilizing a charge bearing monomer during polymerization, the desired charge-bearing group is generated on the capillary monolith after polymerization by using the reactive moiety of the monolithic support via one-pot, simple reaction. Optimized monolithic column compensates the disadvantages of frequently used reversed phases, which are difficult for separation of polar solutes. Rapid separation and high column efficiencies are achieved for the separation of neutral analytes, nucleic acid bases and nucleosides in reversed phase mode. Capillary monolith showed satisfactory hydrodynamic permeability and mechanical stability with relative standard deviation (RSD) values below 2 %. A new promising, reactive support that has a 'ligand selection flexibility' due to its reactive functionality represent a new family of separation media for CEC.

Keywords : biomolecules, capillary electrochromatography, cationic monolith, neutral analytes
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