

GEL COMPOSITES FOR CAPILLARY ELECTROCHROMATOGRAPHY

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Capillary electrochromatography is considered among one of the most efficient separation techniques. This separation technique has advantages of both capillary electrophoresis and high-performance liquid chromatography [1]. Capillary electrochromatography can be applied for analyzing various complex biological and synthetic mixtures including pharmaceuticals, chiral molecules and natural compounds [1]. Not only charged but also neutral molecules can also be separated according to their molecular mass using capillary electrochromatography. To our knowledge, yet there is no report of capillary electrochromatography for size exclusion separation of the macromolecules.

In size exclusion mode, separation is possible due to electroosmotic flow, which drives uncharged molecules through the column filled with stationary phase. Stationary phase in column acts as a molecular sieve and allows to distribute molecules according to their molecular mass. Agarose is a linear polysaccharide polymer forming three-dimensional gel that can be used as a stationary phase for capillary electrochromatography [2].

The aim of this work is to create new stationary phases for separation of neutral macromolecules using capillary electrochromatography and contactless conductivity detection [3].

Agarose gel was used to make a stationary phase for capillary columns. Neutral agarose gel was mixed with another polymer that has a charge in order to create gel composites suitable for neutral molecules separation with capillary electrochromatography. Agarose was used to create optimal pore size and provide suitable mechanical properties of gel composite and charged polymer was used to create a zeta potential of the composite. Optimal pore size and zeta potential are necessary to create electroosmotic flow. Varying the ratio of charged and uncharged polymers, we optimized electroosmosis flow which is necessary for the separation. 75 µm I.D. fused silica capillaries were filled with prepared gel composite for the analysis of neutral macromolecules using electrical field.

In order to evaluate exclusion limits of created gel composites, different molecular mass dextran standard solutions were used. Dextran standards were selected due to the fact, that in the separation medium (background electrolyte pH 3) they are neutral. Elution of dextran standards provided a possibility to build up calibration curves that are used for determination of molecular mass of neutral molecules in real samples. Obtained experimental results will be presented in this presentation.

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