

Capillary electrophoresis as a method of pharmaceutical analysis

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Introduction. The first mention of the capillary electrophoresis method refers to the middle seventies of the XX century. This method is based on the separation of complex mixture components in the quartz capillary under the action of applied electric field. The micro-volume of analyte (nearly 2 nanoliter) should be introduced into the capillary, which is tentatively full of suitable buffer, named electrolyte. After high voltage supply (up to 30 kV) to the outlet end of the capillary, the mixture components begin to move through the capillary at different speed, which firstly depends on charge and weight (more precisely- on the magnitude of ion radius), and, accordingly the components are achieving a detection zone at different time. The sequence of peaks, which was received with detection, named electrophoregramm. While, the retention parameter (during migration) is a qualitative characteristic of the substance, and, the high and area of peak, which is proportional to the substance concentration, is a quantitative characteristic(after building a calibration dependence).

Materials and methods. Retrospective analysis of science literature and research results on a selected topic.

Results and discussion. The minimum system composition, which make it possible to carry out a method of capillary electrophoresis, must have the following components: a quartz capillary, high voltage source, sample input device, detector and information output system. There is a need to emphasize two ways to nanolitic volume introduction. First way- an application of overpressure(hydrodynamic way), second- an application of an excess voltage(electrokinetic). Besides the main system components, the additional devices is used too. They allow automating the samples supply, carry out the heat rejection from capillary(capillary refrigeration system), manage device, collect and process data(using software products). Method is characterized by simple equipment, available consumables, minimum input sample volume (1-2 nanoliter), analysis quickness and good compatibility with different methods of detection. Of the deficiencies, it must be noted a scarce application of the capillary electrophoresis method for samples, which are poorly soluble in aqueous or diluted water-alcohol solution, and low sensitivity to consider a signal registration in capillary, due to the small length of optical way. The main application areas of the capillary electrophoresis method are: ecological and technological control of water objects(cations and anions composition, pesticides); food industry (namely, the precise identification of the preservatives, sweeteners, food coloring and vitamins in drinks and juices; quality control of bottled water; assessing the authenticity of wines, monitoring the content of biogenic amines (amino acids, histamine and other); pharmacy, biochemistry and clinical medicine(analysis of medicines and bodily fluids); production control(analysis of the amount of all components); forensic examination and criminology(analysis of narcotic drugs, explosives tracks and other); scientific research.

Conclusions. Therefore, the presented method of the capillary electrophoresis is young and precision instrumental technique, which finds a widespread use in analytical practice for separation and quantitative determination the components of complex mixtures, as well as for simultaneous determination of cations and anions qualitative and quantitative content. This guaranteed the widespread using this method in such spheres, as: food industry, pharmacy, medicine, forensics, scientific research and other.

References

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