

Abstract

Micellar electrokinetic chromatography is a widely used analytical separation technique. To achieve separation, it uses interaction of analytes with charged micelles present in the background electrolyte (BGE). Not only the mobilities of analytes but also mobilities of small inorganic ions, usually contained in the BGE, are influenced by the presence of micelles. Description of interactions between inorganic ions and micelles is needed for better understanding electrophoretic separations in BGEs containing micelles.

Determination of physico-chemical constants (interaction constants, mobilities of complexes) by capillary electrophoresis is based on accurate determination of effective mobilities. For this reason, accurate determination of mobility of electroosmotic flow (EOF) is also necessary but complicated in BGEs containing charged micelles, because the neutral EOF marker can be mobilized by interaction with the micelles.

In this work a new two-detector method for determination of effective mobility in interacting BGEs was proposed. In this method the analyte is placed in the BGE containing charged micelles, while the marker zone is in the BGE without micelles and so the possible interaction is avoided.

Using this method, dependence of sodium cation mobility on concentration of lithium dodecylsulphate forming micelles was measured. Several approaches of experimental data treatment were compared and possible simplifications that do not cause loss of precision were considered. Results of the two-detector method showed that thiourea is a suitable EOF marker for BGEs containing dodecylsulfate micelles.

As the two-detector method uses a pressure mobilization of capillary content, its precision can be influenced by reliability and reproducibility of this mobilization. Therefore viscosity measurements were performed using equipment for capillary electrophoresis. Influence of experimental factors and data treatment on determined viscosity was examined. Results showed that even though the capillary electrophoresis instrumentation is not fully suitable for viscosity determination, the inaccuracy will not influence results and precision of the two-detector method.

Dependences of alkaline cations mobilities on lithium dodecylsulfate concentration were measured using thiourea as a suitable EOF marker. Evaluation of experimental results with models used so far provides unrealistic mobilities of complexes of cation with the micelle. It means that such model is not suitable for small inorganic ions. Further studies will be needed to get a better insight to the problem.