

Abstract

Capillary electrophoresis (CE) is highly efficient separation method based on the different migration velocity of ions in liquid media in electric field. It is commonly used in analytical laboratories and due to the different separation principle it is applied as a complementary method to the chromatographic methods (HPLC and UHPLC). Beside the applicability of CE for quantitative/qualitative analysis, the method can be used also for physico-chemical characterization of compounds (e.g. determination of acid dissociation constants of weak electrolytes or stability constants of complexes). This work is focused on the applicability of CE methods for determination of physico-chemical characteristic of compounds (acid dissociation constants of triazole fungicides and stability constants of dibenzo-18-crown-6, benzo-18-crown-6 and 18-crown-6 ether complexes with metal ions in hydro-organic solvent mixtures) and on the possibility to use affinity CE (ACE) with electrospray ionization-mass spectrometric detection (ACE-ESI/MS) for the study of non-covalent interactions of compounds. For the online hyphenation of CE and ESI/MS, two highly sensitive CE-ESI/MS interfaces were tested: i) porous tip and ii) nano-sheath liquid flow. The ability of the CE-ESI/MS interfaces to effectively decouple spray and separation voltage and sensitivity of the interfaces were tested. Stability constants of selected reference potassium-crown ether complexes were determined by ACE-ESI/MS detection with both CE-ESI/MS interfaces and compared to the stability constants determined by ACE-UV. It was found that the spray voltage was effectively decoupled in the case of nano-sheath liquid flow CE-ESI/MS interface. The sensitivity, accuracy and reproducibility of this CE-ESI/MS interface were better than those of porous tip interface. Moreover, the measurements using the ESI/MS detection allowed determination of stability constant potassium-crown ether complex (K^+ -18-crown-6), which cannot be detected by UV/vis method.