

Abstract

Unstable electropherogram baseline of potassium buffer, found while studying electrophoretic mobilities of electroosmotic flow markers in different separation buffers [1], makes it harder for higher concentrations of buffers to evaluate the results. This work investigates, whether the above described phenomenon is confined to potassium ions, and if it is not, what conditions influence it.

The measure of instability of signal baseline is taken as its standard deviation and it is compared for potassium, sodium, ammonium and lithium buffers. For potassium and sodium buffers influence of high voltage on the system is studied using pressure to mobilize solution inside the capillary. It is proven that the instability for potassium buffer is increased with high voltage. The instability of the signal is then compared for different voltage levels. The results show to the influence of Joule heating.

The stability of signal baseline for all studied cations was found to be decreasing with increasing ionic strength and conductivity. This work concludes, that this phenomenon does not confine only to potassium ions. Even though the potassium buffer does not have the highest conductivity, signal instability was the highest however. The degree of instability of signal baseline for potassium buffer depends not only on the conductivity of the solution, but also on an unknown factor of potassium acetate buffer.

Finally, the influence of baseline instability on detection limit of analytical measurements is demonstrated on the example of benzoic and 4-hydroxybenzoic acids. Under identical experimental conditions, when switching from sodium to potassium buffer limits of detection of benzoic and 4-hydroxybenzoic acid increased from 0.004 g/L and 0.003 g/L to 0.010 g/L and 0.015 g/L, respectively.

Key words: Capillary zone electrophoresis, Joule heating, instability of signal baseline