研究论文

迁移时间归一化法改善毛细管电泳表征中药大黄的重现性

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摘要　　探讨了迁移时间归一化法改善中药毛细管电泳分析迁移时间重现性的原理, 并将其应用于实际样品的分析。迁移时间归一化法认为, 在相同的操作电压、缓冲液组成和温度条件下, 多次电泳实验中迁移时间产生差别的主要原因是多次电泳实验中电渗流产生了差异。迁移时间归一化法就是通过选择电泳谱图中的一个或两个峰作为标记峰, 将各次电泳实验的迁移时间都归一到第一次电泳实验中的迁移时间。比较多次电泳实验中迁移时间(t)的相对标准偏差(RSD)、经单峰归一化处理的迁移时间(t′)的RSD、经双峰归一化处理的迁移时间(t″)的RSD、迁移时间比(t/tistd, istd代表所选择的标记物)的RSD, 发现RSD(t″)

关键词　　毛细管电泳　迁移时间归一化法　重现性　大黄　中药

Improvement of reproducibility in capillary electrophoretic characterization of rhubarb by normalization of migration time

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Abstract

The principle of the normalization of migration time and its application on the traditional Chinese medicine (TCM) analysis by capillary electrophoresis (CE) are presented. It is the core of the normalization of migration time that the fluctuation of apparent migration velocity for each component at different runs is attributed to the difference of electroosmotic flow velocity. To transform migration time (t) to normalized migration time, one peak or two peaks in the original electropherogram are selected as internal peak. The normalization of migration time is therefore classified into two types based on the number of selected internal peaks, one-peak and two-peak approaches. The migration times processed by one-peak normalization and by two-peak normalization are conducted by the following equations, respectively: (t′ i)j1/ ｛1/(ti)j~［1/(tistd)j~1/(tistd)1］｝ and (t″ i)j1/ ｛1/(ti)j~｛［1/(tistd,1)j~1/(tistd,1)1］+［1/(tistd,end)j~1/(tistd,end)1］｝/2｝, where (t′ i)j and (t″ i)j are the normalized migration times obtained by one-peak and two-peak approaches in the jth run for component i, respectively; (ti)j and (tistd)j are the migration times in the jth run for component i and the selected internal standard in the sample, respectively; (tistd,1)j and (tistd,1)1 are the migration times for the first peak selected as internal peak in the jth run and the first run, respectively; (tistd,end)j and (tistd,end)1 are the migration times for the last peak selected as internal peak in the jth run and the first run, respectively. One of the commonly used traditional Chinese medicines (TCM), rhubarb, was chosen as a model to verify the advantage of migration time normalizations in improving reproducibility of CE. Both of the experiments, the five parallel micellar electrokinetic chromatography for rhubarb extract and the capillary zone electrophoresis for the samples prepared by mixing rhubarb extract with various solutions, showed RSD(t″)

Key words　capillary electrophoresis (CE)　normalization of migration time　reproducibility　rhubarb　traditional Chinese medicine (TCM)

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