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HADAMARD TRANSFORM CAPILLARY ELECTROPHORESIS IN UNMODIFIED COMMERCIAL EQUIPMENT

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Existing capillary electrophoresis (CE) equipment (Beckman P/ACE 5500) was used for Hadamard transform CE (HT-CE) experiments under non-stacking and stacking conditions. Complex injection sequences were introduced into capillary by switching sample and background electrolyte vials according to a pre-programmed order. Hydrodynamic and electrokinetic injections of buffer and sample were compared in different combinations. Injection sequences of different randomization modes were compared. Maximum practical signal-to-noise (S/N) ratio gain was achieved with the sequence where both the size and the interval of injections were randomized.

In P/ACE instrument the whole injection sequence must fit into the effective length of the separation capillary as the instrument is not capable of injecting sample and registering data at the same moment of time. Because of the nature of the auto-sampler used, no sequence could be injected in commercial instrument without high voltage (HV) interruptions. A high number of HV interruptions lowers the precision of the injection system and causes low frequency noise in correlated electropherograms, limiting S/N ratio gain. Satisfactory S/N ratio improvement could be achieved with simple sample mixtures. Specific ways of programming the injection sequence and use of modified injection sequence in the correlation process have been used to overcome the deleterious effect caused by this sample injection. Overall conclusion can be drawn that existing CE equipment makes HT-CE potentially possible, but only in case of limited sequence length (with limited S/N gain).