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Evaluation of capillary electrochromatography (CEC) for pharmaceutical analysis

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Much of the recent interest in capillary electrochromatography (CEC) may be traced back to the work of Smith (1994) who demonstrated that the technique could be applied highly effectively to the analysis of pharmaceutical compounds. Although much of the subsequent developmental work on CEC has involved illustrative electrochromatograms of test mixtures of simple neutral compounds, interest has been maintained by a limited but steady flow of reports of very useful pharmaceutical applications (eg Taylor *et al*, 1997; Euerby *et al*, 1997). Despite this and the very obvious attractions of CEC such as high efficiency, utilisation of equilibrium systems very similar to the very familiar systems employed in LC and better mass spec. compatibility for neutral compounds than micellar electrokinetic chromatography (MEKC), it was felt necessary to take a broader view of the potential benefits that might be had from the use of CEC for the analysis of pharmaceutical compounds. Therefore, rather than focusing on specific cases which showed the benefits of CEC in good light, it was decided to take an overview of a wide range of possible pharmaceutical applications and investigate how well the capabilities of CEC matched up with the needs of the applications.

CEC was carried out on an unpressurised capillary electrophoresis instrument using further enhancements of simplified procedures which had been developed to make the technique more readily accessible (Frame *et al*, 1998). The study covered the analysis of bulk drugs, formulated drug products and drugs in biological fluids. The suitability of CEC for each of a wide range of pharmaceutical compound classes, including neutral, basic and acidic compounds, was studied. For formulated drug products, problems presented by the presence of excipients in solutions loaded onto the packed capillary were addressed. For drug bioanalysis, the feasibility of using on-column sample focusing to facilitate lower limits of detection was addressed.

The focus of ongoing work is now on exploiting the more promising pharmaceutical application areas for CEC encountered and dealing with the issue of whether the use of a pressurised system might improve matters for the more problematic applications encountered.

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