ELSEVIER

Journal of Chromatography A, 834 (1999) 1–2

JOURNAL OF CHROMATOGRAPHY A

# Foreword

The basic principle of electrophoresis, the electromigration of ions, was demonstrated over a hundred years ago, but was not used in a controlled systematic way for separations until the work of Tiselius in the 1930s. Nevertheless, widespread use involving mainly gel and paper electrophoresis did not take place until two decades later, where it had a major impact on the study of large biomolecules. However, although it was a very powerful qualitative analysis tool, problems with quantitative measurements and reproducibility meant that the technique was relatively uncommon in routine analytical laboratories. This situation was to change rather dramatically in 1981 when Jorgenson and Lukacs demonstrated that very high resolution separations could be achieved in glass capillaries. This quickly led to the development of sophisticated apparatus with on-line detection and automated sample injection which became available commercially from the late 1980s. The quantitative aspect of the technique was therefore considerably improved. These capillary electrophoresis (CE) instruments as they became known, have only been available for just over a decade, so capillary electrophoresis can still be considered as a relatively new technique. What can be confusing at first for the person new to this area is the blurring of the boundary between liquid chromatography and electrophoresis methods. Thus, the term CE also encompasses micellar electrokinetic chromatography and more recently electrochromatography, where chromatographic sorption processes are used in combination with electromigration.

Extremely high efficiencies were demonstrated early on in the development of CE, several million plates in ideal situations, and soon it became a major focus of attention as the most powerful of separation methods. Its continued use and importance for the analysis of biomolecules was undisputed and it was also predicted that CE would take the place of many high performance liquid chromatography methods for small molecules, but this has not so far happened to any great extent. This expectation was certainly the case in the area of ion determinations, where a very impressive early demonstration showing the separation of 36 anions in one and a half minutes, gave rise to the belief by a number of people that ion chromatography would soon be superseded. In contrast, there is now a suggestion in some quarters that CE will not really have the impact first expected of it. This is not really fair, as high performance liquid chromatography expanded rapidly because it was the only technique available for the investigation of non volatile compounds. Considering the high capital investment in high performance chromatography by many laboratories it is not surprising that the acceptance of CE methods will occur on a much longer timescale. Furthermore, it is just as important to consider new techniques as complementary rather than competitive where for example, the very different selectivity of CE for anions compared to ion chromatography could prove very useful.

The present situation concerning the use of CE for inorganic analysis is one of a quieter period after the initial excitement has calmed down. A number of continuing studies are seriously addressing the problems of detection sensitivity and selectivity, reproducibility and sample analysis. The special issue is therefore particularly timely bringing together recent important work from key workers in the field of inorganic analysis using CE. The collection of papers covers a wide range of investigations emphasising the versatility of the CE technique. A large propor-

0021-9673/99/$ – see front matter 
PII: S0021-9673(98)01044-9

tion of the publications deal with new and improved separation and detection strategies. There is also a significant number of publications involving element speciation studies, including a hybrid system utilizing an inductively coupled plasma detector, a combination which shows great promise for environmental and bioinorganic investigations. Last but not least there are several papers describing ''real'' sample analysis. Successful applications involving a range of ''real'' samples is after all an indication that a new method has become of age. These papers demonstrate that inorganic analysis by CE shows considerable potential in important areas of study and that CE will become yet another valuable analytical tool. Finally, a special thank you should be extended to Erich Heftmann for his untiring efforts in bringing together and processing this important compilation of papers.

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