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PREFACE

The Fourth Symposium on Ion Exchange was held on 27-30 May, 1980 at Siófok (Lake Balaton), Hungary. The Symposium was organised by the Hungarian Chemical Society and by the University of Veszprém, sponsored by the Federation of European Chemical Societies (16th event of FECS) and supported by the Nitrochemical Works at Balatonfüzfő.

The aim of this Symposium, like that of the previous ones, was to provide a forum for scientists working in the field of ion exchange to exchange experiences and discuss their results concerning theory, syntheses and applications. Five invited plenary lectures dealt with the main trends and developments in these fields [J. A. Marinsky (U.S.A.); V. S. Soldatov (U.S.S.R.); E. Blasius (G.F.R.); Cs. Horváth (U.S.A.); L. V. C. Rees (Great Britain)].

The contributed papers were classified into four sections: theory of ion exchange; ion-exchange materials; analytical applications; and technological applications. It was interesting that the number of contributed papers dealing with problems of *technological* interest was quite high, in a full agreement with one of the demands of our age, *i.e.*, the search for technologies of high efficiency. The necessity of recovering precious compounds or elements from dilute solutions, of saving the environment by eliminating poisonous or toxic contaminants and of using low grade raw materials for industrial production places increasing importance on ion-exchange technologies. In many cases, previously expensive ion-exchange technologies have become more and more profitable.

Among new *materials*, the immobilized crown compounds have made possible completely new ways of carrying out highly specific reactions, separations of optical isomers, etc.

In the field of *analytical applications*, recent developments have not been very spectacular because there is a fundamental problem with high-performance ion-exchange chromatography: the lack of packing materials, which are chemically and mechanically stable and possess fast mass-transfer characteristics. All commercially available ion exchangers have some drawbacks. It was no surprise that ion-pair chromatography had quick success in the last few years, since both the theory and practice of partition and reversed-phase chromatography, as well as the chemistry of ion-pair formation, had been developed earlier. Through ion-pair chromatography—which itself is a hybrid of ion-exchange and reversed-phase chromatography—many kinds of separations can be realised. Using complex-forming metal ions the principles of ligand-exchange chromatography can also be utilised. Ion-pair chromatography does not require a conventional ion exchanger as stationary phase, only a traditional or surface-bonded hydrocarbon.

Classical ion-exchange chromatography has an advantage over all other chromatographic methods: retention is controlled by chemical reactions. This means that retention and selectivity can be varied over a very wide range using suitable eluents, and the optimal conditions for separation can be predicted. We should not lose the hope that eventually a stable and highly efficient ion exchanger will be found.

Investigations of the *theory of ion exchange*, in spite of its background of 40 years, are still fruitful. Studies of the properties of resin-gel systems, the use of membranes and the structure of electrolytes may lead to explanations of the mechanisms of the living cell.

After so many years since the development of the first ion exchangers, it is still exciting for any scientist to work with them. In this way he can contribute significantly to the solution of some of the main problems of our age: to provide insight into the living organism, to improve health and agricultural production, to develop analytical methods of high selectivity in order to determine dangerous contaminants in very low concentrations both in space and on the Earth, to provide methods of avoiding pollution, and to develop industrial processes of low energy consumption. Ion exchangers are tools for all these purposes.

Elsevier has undertaken publishing the papers from the Symposium in the *Journal of Chromatography*, so making accessible the proceedings to the participants and also to those who were not able to be present, but are interested in the latest results of ion-exchange techniques.

I would like to express my gratitude to Dr. M. Lederer for his personal interest in editing this special issue, and for the tremendous amount of work which assured the rapid collection and publication of the full text of the papers within a reasonable period of time. Thanks are also due to the lecturers and contributors, whose valuable work, results and enthusiasm led to the success of the Symposium.

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