

EUROANALYSIS III

Reviews on Analytical Chemistry

**Edited by
D. M. CARROLL**



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EUROANALYSIS III

Reviews on Analytical Chemistry

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EUROANALYSIS III

Reviews on Analytical Chemistry

Reviews on Analytical Chemistry

Series Editors: W. FRESenius and H. MALISSA

This volume contains a collection of plenary and keynote lectures presented at Euroanalysis III, Dublin, 20–25 August 1978, produced by the Working Party on Analytical Chemistry of the Federation of European Chemical Societies.

Euroanalysis is the triennial conference of the Federation of European Chemical Societies representing societies in Austria, Belgium, Bulgaria, Cyprus, Czechoslovakia, Denmark, Finland, France, Federal Republic of Germany, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, Turkey, United Kingdom, USSR and Yugoslavia.

Euroanalysis III was hosted by the Institute of Chemistry of Ireland.

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Foreword

This 'Review on Analytical Chemistry' is designed to provide a comprehensive survey of the topics selected by the Scientific Committee of Euroanalysis III and presented by a panel of distinguished analysts. It has also been designed to reflect current research trends in analytical chemistry and as such it is hoped it will appeal to the reader.

The Third European Conference on Analytical Chemistry, called 'Euroanalysis III', was held in Dublin in August 1978 and was organized by the host society, the Institute of Chemistry of Ireland, on behalf of the Working Party on Analytical Chemistry of the European Federation of Chemical Societies (FECS). It is my great pleasure to thank all those who have collaborated in making this venture possible, above all Professor Dr D. A. Brown, the President of the Institute of Chemistry of Ireland and President of the Conference. The Scientific Programme Committee, headed by D. M. Carroll, tried to ensure that in the selection of topics as much as possible of the current research work on pure and applied analytical chemistry as well as on educational problems and questions of standard reference material could be covered. The plenary and keynote lectures reviewed the present situation and future prospects in clinical, pharmaceutical and environmental analysis as well as the role of analytical chemistry in earth sciences and the analysis of solid surfaces. The rapid development of modern analytical techniques like ESR, ESCA, HPLC and analysis in flowing systems were demonstrated. The programme of this well-organized and stimulating conference was rounded off by discussion of the need for standard reference materials and new thinking on the aims and techniques for the teaching of analytical chemistry.

H. MALISSA

Chairman of the Working Party on Analytical Chemistry, FECS

Preface

This book contains a collection of the texts of the plenary and keynote lectures presented at the Euroanalysis III Conference on Analytical Chemistry held in Dublin in August 1978. The topics covered are wide-ranging, spanning the extremes of analytical techniques. In addition, there is a blend of pure and applied topics.

It has been the policy of the FECS Working Party on Analytical Chemistry that Euroanalysis conferences should be broad spectrum in content and the Praesidium and Scientific Committee were determined to adhere to this principle. Both specialized and general conferences have their particular roles to play in the development of analytical chemistry. The former obviously allows for in-depth treatment of individual topics while the latter affords an opportunity to workers in one field to evaluate the efforts of their colleagues in another. All analytical chemists have or should have a common objective; the development of analytical procedures appropriate to the needs of our society and a conference such as Euroanalysis III with its broad coverage of techniques and applications is a logical place for examining whether or not this objective is being achieved.

The conference did treat two topics (of concern to all analytical chemists) in a special way. Special sessions were held on (Standard) Reference Materials and Education in Analytical Chemistry. The plenary and keynote lectures associated with the former are contained in this volume; those dealing with the latter are published elsewhere together with the contributed papers on the subject (special issue of *Z. Anal. Chem.* (in print)).

Though a conference such as Euroanalysis III is successful because of the collective efforts of many people, limitations of space permit acknowledgement of the contribution of only a selected number. I wish, however, to

thank the Institute for Industrial Research and Standards, and in particular Dr R. J. Nichol and Mr G. P. Sweeney who are members of its senior management, for the invaluable assistance given over the period leading to the conference. I am especially grateful to Professor Duncan Burns who was at all times willing to lend a hand. His assistance with the editing of this volume was particularly appreciated. Paddy O'Reilly, the Conference Officer, carried all responsibility for the practical organization of Euroanalysis III. Those with experience of such matters will know what a formidable amount of work and pressure this entails. He was, however, fortunate in having Mr M. Taylor as his assistant. A special word of thanks is due to those charming ladies who were responsible for the secretarial work: Renee Brown, Pat Seery, Susan Mungovan, Geralyn McGrath, and Lily Costello. The assistance and encouragement given by the president of the conference, Professor D. A. Brown, was very much appreciated and in this respect I would like to thank Dr R. A. Letters who was President of the Institute of Chemistry of Ireland in the early days of planning the conference. Thanks are also due to the staff of University College Dublin (the conference venue) for their co-operation. Acknowledgements would be incomplete if the name of Dr D. MacDaeid, Secretary of the Institute of Chemistry of Ireland, were not included.

Finally, to members of all committees and the Praesidium, and in particular its chairman, Professor Hans Malissa, I extend a sincere thanks for the hard work which they did to ensure the overall success of Euroanalysis III.

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Irish Contributions to European Analytical Chemistry†

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SUMMARY

The role and histories of the scientific societies and institutions influential in the development of Irish science and technology are outlined.

Biographical details and the work of the Irish chemists, R. Boyle, R. Kirwan and J. Emerson Reynolds are summarized. All three made significant contributions to analytical chemistry, both in the national and the European contexts.

INTRODUCTION

It is necessary to attempt to state what defines an 'Irish analytical chemist' and, for reasons of space, select for discussion only three from the many so defined [1, 2].

Irish could mean Irish by birth or by lineage which causes problems of apparent multinationality as many chemists of Irish parentage, for various reasons, worked abroad for all or part of their careers. The Irish origin of one of the most famous, Robert Boyle, is, for example, often overlooked [3]. Irish could also quite reasonably refer to work carried out in Ireland. Both classes were included by Desmond O'Raghallaigh [4] and by Partington [5]. O'Raghallaigh cites 60 Irish chemists of note, many of whom made contributions to analytical chemistry. Herein the Irish analytical chemists have been selected on the basis of their contributions,

† This paper was presented at the opening ceremony of the conference held on the premises of the Royal Dublin Society on 21 August 1978.

interest as people, connections with Europe and with the various institutions of importance to chemistry in Ireland.

SOCIETIES AND INSTITUTIONS

Two societies, namely the Royal Dublin Society and the Royal Irish Academy, have been influential in the development of Irish science and technology.

The Dublin Philosophical Society was the forerunner and inspiration of the Royal Dublin Society and is to be regarded as Ireland's first scientific institution [6–8]. It was founded in 1684 by William Molyneux [7] and had as President Sir William Petty [9] who was a link with the Royal Society of London. Petty and Boyle were founder members of the Royal Society, the first President of which was William, Viscount Brouncker [10, 11], of the Irish peerage, who was born at Castle Lyons in Leinster. The hostilities during this period interrupted activities and the Dublin Philosophical Society finally ceased to function in 1708.

The Royal Dublin Society was founded in 1731 and incorporated in 1749 [12–16]. From 1815 till 1922 the headquarters of the Society was Leinster House (in Kildare Street), now the seat of the Irish Parliament; it is now at Ballsbridge adjoining the Showground. For a long time the Royal Dublin Society maintained laboratories and was active in scientific as well as agricultural research, but of late it has been more concerned with agriculture and related areas. However, it has recently appointed a full-time Science Officer and acquired Thomas Prior House as a base for scientific activities.

The Society has the distinction of founding the first modern chair of chemistry which was held by William Higgins from 1796–1825 [17]. Earlier chemistry chairs were associated with medicine or pharmacy. It has, in my view, the even greater distinction of founding the first chair of analytical chemistry in these islands in 1871, held by J. Emerson Reynolds until 1875.

The societies' scientific work dates from 1792 when, through the influence of Richard Kirwan, the Dublin Society purchased the Leskean collection of minerals. One of its important present-day functions is the help it gives to the smaller scientific societies such as the Institute of Chemistry of Ireland by the provision of headquarters and secretarial assistance. Hence by virtue of its historical association with analytical chemistry, it was most