PRACTICAL X-RAY SPECTROMETRY

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R. JENKINS

J. L. DE VRIES

SECOND EDITION

MACMILLAN EDUCATION

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PREFACE

X-ray fluorescence spectrometry is now widely accepted as a highly versatile and potentially accurate method of instrumental elemental analysis and so it is somewhat surprising that although the volume of published work dealing with the technique is high the number of textbooks dealing exclusively with its application is relatively few. Without wishing to detract from the excellence of the textbooks which are already available we have both felt for some time, that a great need exists for a book dealing with the more practical aspects of the subject. For a number of years we have been associated with the provision and arrangement of X-ray schools for the training of new X-ray spectroscopists as well as in the organisation of conferences and symposia whose aims have been to keep the more experienced workers abreast with the latest developments in instrumentation and techniques. In all of these ventures we have found a considerable dearth of reference work dealing with the reasons why an X-ray method has not succeeded as opposed to the multitude of success stories which regularly saturate the scientific press.

In this book, which is based on lecture notes from well established courses in X-ray fluorescence spectrometry, we have tried to cover all of the more usual practical difficulties experienced in the application of the method and we have endeavoured to keep the amount of purely theoretical data at a minimum. Wherever possible we have used worked examples to illustrate specific points, particularly in the sections on counting statistics and quantitative analysis. In addition to chapters dealing with the more obvious major headings such as dispersion and detection we have chosen to devote whole chapters to topics such as pulse height selection and sample preparation, lack of experience of which can make all the difference between the accuracy of a method being barely sufficient and comfortably adequate.

It is inevitable that in a rapidly expanding field such as this any published work whose time of preparation is somewhat protracted has specific deficiencies and this book is certainly no exception. The rapid expansion of the spectral range into the ultra-soft X-ray and vacuum ultra-violet region is a case in point and one in which we have had to rigorously restrict our long wavelength limit to about 15 Å. The latest work on wavelength shift and

absorption edge fine structure is also covered only sketchily and it may be as well to point out that these areas of expansion of the technique could well become of paramount interest to the analytical chemist during the course of the next few years.

Those new to X-ray fluorescence analysis should find little difficulty in keeping up to date in this field since several literature reviews appear regularly. In addition to the excellent general reviews appearing biannually in 'Analytical Chemistry', our own company has for some years now provided quite comprehensive literature reviews dealing exclusively with X-ray analysis. As we have relied heavily on both of these sources of literature we would like to express our thanks to those concerned with their preparation. As the number of references quoted in this book is rather large, we have marked with an asterisk those which we consider to be the more useful. We hope that this will help to guide the reader in his choice for further study.

Since we both started our professional careers as chemists we are particularly aware of our shortcomings in the field of pure physics and we apologise to the physicist, on whose preserves we have encroached, for stating our arguments in terms which we hope are more intelligible to the analytical chemist. We are particularly grateful to our assistants and to Mr. P. W. Hurley for their many useful comments and advice and to the large number of scientists who have passed through our laboratories for providing us with a wealth of interesting problems and fascinating studies.

R. Jenkins
J. L. de Vries

PREFACE TO THE SECOND EDITION

We are very pleased that already now, two years after the first edition, followed by a second impression in 1968, a second edition was found to be necessary.

We have taken the opportunity to revise the text thoroughly to bring it entirely up-to-date with the latest developments in this field. A new section has been introduced dealing in detail with the dead time. In the sections Quantitative Analysis, Mathematical Corrections and Pulse Height Selections major revisions have been made.

We hope that thereby the new book will be even more useful than the first one.

THE AUTHORS

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