ANALYTICAL FLAME SPECTROSCOPY

P H I L I P S T E C H N I C A L L I B R A R Y

ANALYTICAL FLAME SPECTROSCOPY

SELECTED TOPICS

by

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FOREWORD

Analytical procedures based upon the ability of combustion flames to emit, absorb, or re-emit specific radiations originating from the chemical species under investigation are already well established and have provided valuable measuring tools in a variety of fields and a large number of applications. The scientific principles on which these procedures are based, and even some of their earlier analytical applications, have been well understood and developed for many years. It is, however, due to the works of Henrik Lundegårdh, Allan Walsh, and James Winefordner that flame emission, atomic absorption, and atomic fluorescence spectroscopy have realised their full potential as analytical techniques.

The scientific literature available to the analyst who wishes to use these spectroscopic techniques is extensive, comprising well over 5000 publications, and it provides valuable information on every aspect of the theory and application. A number of books covering both theory and practice are available.

This book covers a number of selected subjects on specific aspects of analytical flame spectroscopic techniques, and includes the fields of : Flame Emission, Atomic Absorption and Atomic Flame Fluorescence. Some of the subjects were chosen because of their general and long-term interest, for example, excitation and interference phenomena in flames; other subjects were selected because of their relative novelty, such as the use of low pressure flames, the detection and determination of nonmetals, and the determination of rare earths. Other subjects, such as the principles of electronic and optical design in their application to flame spectrophotometric purposes, were selected because it was felt that they needed a more detailed discussion. The detection and measuring sensitivity together with the accuracy and precision of analytical flame spectroscopic techniques, which is a subject of permanent interest and of fundamental value to the analyst, has been included in this collection together with a critical review of two of the widest fields of application of the technique: biochemical and agricultural applications.

The flourishing fields of atomic absorption and atomic flame fluorescence require an uninterrupted survey, while the closely related topic of hollow cathodes, which thus far has not received full attention, is discussed in detail.

The volume ends with a collection of more than 2000 references to works on flame spectroscopy, selected with special regard to analytical applications and covering the last several years.

The organization of the various topics on analytical flame spectroscopy discussed in this book presents to the reader a fairly consistent sequence of subjects. Nonetheless, every chapter constitutes in itself a well defined subject which can be read individually; consequently, a certain amount of repetition is unavoidable.

Any merit in this book must be attributed to the efforts of the individual contributors, each an authority in his field. The editorial work on the manuscripts was kept to a minimum; in this manner, the personality of each author is reflected in his chapter.

The editor hopes that the subjects selected and the scientific information contained in this volume will be helpful to the analyst.

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