

of Robins, the "Fluxions" of Maclaurin, the "Calculus" of the Bernoullis and the various contributions of Euler, Lagrange and others, was necessary to prepare the way for the period of rigorous formulation which followed. But the full story is told vividly and fearlessly by Carl Boyer, who traces the development of the basic concepts upon which the modern calculus is founded, from the earliest times to the present day. The eight chapters are filled with interesting facts welded into a continuous narrative which rivets the reader's attention almost like a romantic novel. According to the preface, the author's theme

—well described by the sub-title—has not before been satisfactorily dealt with. The book is "not a history of the calculus in all its aspects, but a suggestive outline of the development of the basic concepts"; and a very stimulating outline, too! The author almost makes the infinitesimal, Osgood's "abominable little zeroes", or "the ghosts of departed quantities", the indeterminate ratio $0/0$, etc., seem like living characters in a work of fiction.

A comprehensive bibliography is provided at the end and the complete volume is both an important and valuable addition to the literature of mathematics.

F. G. W. B.

CHEMICAL ANALYSIS

Standard Methods of Chemical Analysis

A Manual of Analytical Methods and General Reference for the Analytical Chemist and for the Advanced Student. By Dr. Wilfred W. Scott. Fifth edition, edited by Prof. N. Howell Furman in collaboration with Eminent Specialists. Vol. 1: The Elements. Pp. xxxi + 1234 + 97. Vol. 2: Special Subjects. Pp. xxi + 1301-2618 + 97. (London: The Technical Press, Ltd., 1939.) 2 vols.. 77s. 6d. net.

THE rapid growth of analytical chemistry in modern times necessitates that any textbook which hopes effectively to cover the fields of both pure and applied analysis shall assume almost encyclopædic proportions. The considerable increase in the size of this fifth edition of Scott's well-known manual is at least outward evidence that it has attempted to deal adequately with these recent advances, a conclusion which is amply confirmed by a study of the contents. The two volumes of the present edition now cover some 2,700 pages—an increase of nearly 1,000 pages over the fourth edition.

In the first volume, which deals with schemes for the analysis of the more important chemical elements, practically all the chapters have been expanded and, in many cases, re-written. In addition, there have been included, for the first time, methods of analysis for gallium, germanium, hydrogen, oxygen and rhenium. Of these, the first two are not quite as complete as they might be, there being missed from the chapter on gallium Ato's camphoric acid method, which is quite reliable, while no colorimetric procedures are given for germanium. Also, in the determination of oxygen in organic compounds, it is unfortunate that the method given, although neat, is applicable to materials containing carbon, hydrogen and oxygen only. Apart from these points, the new

chapters cover the ground adequately. The second and third parts of volume 1 are substantially the same as in the previous editions, although it is to be regretted that the tables of gravimetric factors have been omitted.

The second volume has undergone even greater changes and is now divided into two parts. Part 1 deals with sampling and applied analysis, and here all the chapters have been brought up to date, while many of them have received considerable expansion, particularly those on alloys, petroleum products, rubber and soap. The section on paper and paper-making originally found under "Miscellaneous Analyses" has been enlarged and raised to the dignity of a separate chapter.

Part 2 deals with special techniques applicable in diverse cases, and here are to be found the chapters on acidimetry and alkalimetry, gas analysis, metallography and solubility. New material which has been introduced consists of sections on the determination of *pH* by colorimetric and electrometric methods, potentiometric methods, conductometric methods, chemical microscopy, quantitative microanalysis and spectrographic analysis. All these provide excellent surveys of the various procedures, while in some of the chapters are to be found numerous references regarding the application of the methods to special problems.

The manual is commendably free from errors, although one or two have crept in as a result of rearrangement of the text; also Figs. 25, 243 and 267 do not correspond with the legends beneath them. There has been a typographical change which makes for easier reading, while another welcome change has been the provision of an author index. Altogether, revision has considerably enhanced the value of a work that had long established itself as a necessity to analytical chemists.