

ace, the increasing availability of commercial equipment to carry out measurements with positronium means that an expert knowledge of electronics is no longer a prerequisite for work in the field.)

The next two chapters of the monograph are devoted to a description of the behavior of positrons in gases and in solids and present the theoretical background for interpreting the "chemistry" of positronium in these media.

The last half of the book reviews the techniques and the often-conflicting observations of positronium chemistry in gases, organic liquids, and aqueous solutions. The many gaps in knowledge of the behavior of this species and suggestions for future work are clearly indicated.

It is refreshing to read a book so carefully edited and proofread in its printing. I am aware of only one typographical error.

This little monograph will probably be most interesting to radiation chemists, who will find many parallels to their own field in the chemistry of positronium, and to nuclear chemists. However, it should also be understandable and of interest to physicists, chemists, and biologists who want to keep abreast of challenging and potentially important new areas of research.

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Chemistry and Technology of Explosives. Volume I. By TADEUSZ URBANSKI, Department of Organic Technology, Politechnika, Warsaw. The Macmillan Co., 60 Fifth Ave., New York, N. Y. 1964. xv + 653 pp. 18 × 25 cm. \$15.00.

This volume, presumably the first of three, is devoted almost exclusively to C-nitro aromatic compounds. Aliphatic and heterocyclic nitro compounds receive briefer treatment, reflecting their lesser interest in technology. Nitric acid esters and nitramines do not appear in this volume.

The book is a masterly treatise, reflecting the author's intimate knowledge of his subject. The manufacture and chemical, physical, and physiological properties of nitro compounds of interest in the technology of explosives are given detailed treatment. The first five chapters cover the art and knowledge of aliphatic and aromatic nitration and general information on the physical and chemical properties of the nitro group. A chapter on the general properties of aromatic compounds is followed by detailed exposition of essentially everything in the available literature on the mono- and polynitro derivatives of benzene, toluene, other aromatic hydrocarbons, naphthalene, halogen derivatives of benzene, phenols, aniline, and azo- and hydrazobenzene. Chapter XIX describes mono- and polynitro aliphatic compounds and the final one, dinitro- and hexanitrosobenzene. Separate chapters are given to TNT and picric acid manufacture.

Although the author admits that these may not represent current practice, his diligence in searching out available information is illustrated by the inclusion of German and Japanese methods from BIOS, CIOS, FIAT, HEC, and PB sources.

Each chapter is followed by a bibliography covering the available literature through 1959, with a few references as late as 1962. Only a few patents are cited.

The book is surprisingly free of misprints, almost all of which are trivial. The only really deceiving one noted was the melting point of tetranitromethane: actually +14.1° but given as +3°C. The translation sets a high standard, with so few "Europeanisms" that it gives the impression of an English original. The printing, done in Poland, is excellent and the binding adequate. The book is well worth its relatively modest price and is recommended to all with interest in this interesting and actually little known area.

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Ion Exchange Separations in Analytical Chemistry. By OLOF SAMUELSON, Professor of Engineering Chemistry, Chalmers University of Technology, Goteborg, Sweden. John Wiley and Sons, Inc., 605 Third Ave., New York 16, N. Y. 1963. 474 pp. 15.5 × 23.5 cm. \$9.50.

In his "Ion Exchange Separations in Analytical Chemistry" Olof Samuelson has revised and expanded the content of his earlier book "Ion Exchangers in Analytical Chemistry." In the preface

of the earlier edition he stated, "Only the principles of chromatographic separations by means of ion exchange resins and some applications will be briefly mentioned in this monograph. It is not intended to be a complete reference book in this field, but rather a sketch of the possibilities revealed." In contrast, the later edition appears to have considered all of the important publications in the field and is a good general reference book.

The over-all organization of the book was not changed in the new edition. As in the previous version the Introduction is followed by (1) a General Part, (2) a Practical Part, and (3) Applications. However, the organization of the parts have been changed considerably with the newer edition covering considerably more material and having some new sections not found in the earlier edition but omitting detailed descriptions of specific analyses included previously. The Introduction was changed only slightly; the section on ion-exchange chromatography was lengthened to reflect its increased importance in analytical procedures.

In the General Part two new chapters, "Applications of the Plate Theory" and "Non-aqueous Solutions," were added. The first three of the other four chapters (Chapters 2-4) were reorganized to give a more logical presentation than previously and expanded to cover publications in the past decade and others before 1952 not considered in the earlier edition. Chapter 5, "Column Operation," has been changed the least. This is understandable because it describes procedures which have not changed much in the past decade. Chapter 6 on the plate theory is an important addition to the text. It should be valuable to analytical chemists for calculating the separation to be expected in solutions of low ionic concentrations.

In the Practical Part of the book a chapter has been added on "Choice of Resin." This is an expansion of a section of another chapter in the previous edition and reflects the increase in the variety of resins available. A short description of the preparation and purification of resins for analytical use is also given in this chapter.

Of the other two chapters in the Practical Part, the first (Chapter 9 in the new edition) considers "Technique of Simple Ion Exchange Separations," and the second, "Technique of Ion Exchange Chromatography." The former has been reorganized in a more logical manner and partially rewritten but contains much of the same material used previously. The latter has been almost completely rewritten and greatly expanded. It considers the effects of the important variables on the separation of similar substances. It also describes fraction collectors and a number of methods for continuously assaying the eluate. It should prove very valuable as a guide to analytical chemists in the important technique of ion-exchange chromatography.

The Applications part is the largest section of the book. In the original edition it was more than half of the text. Because of the expansion of the first two parts in the new edition, it represents a somewhat smaller portion. The material in this section has been reorganized and applications restricted to separations of inorganic and simple organic ions. Whereas in the original edition the applications were largely those of concern to industrial chemists, the recent edition considers the separations in a more academic manner. The 1952 edition had 19 chapters in this section; in the new edition the number has been reduced to 7, although the length of the text has been increased slightly.

Chapter 11 in the new edition has the same title as before, "Determination of Total Salt Concentration." However, the text has been rewritten to describe several general methods, and applications and specific examples with references are tabulated.

In Chapter 12, "Removal of Interfering Ions of Opposite Charge," the content has also been reorganized with some revisions and rearrangements of the examples.

In Chapters 13 and 14, "Inorganic Colloids and High Polymer Electrolytes" and "Isolation of Trace Constituents," there have been fewer revisions. However, again the text in the new version is more general in its orientation and gives less attention to specific examples. In the latter chapter a description of methods for concentrating radioactive elements has been added.

Chapter 15 in the 1963 edition, "Metal Separations," is entirely new. It has been organized to follow the groups of elements in the periodic table in so far as possible and methods have been given for separating groups of elements and individual members of the groups. In the past decade a large number of investigations have been performed on such separations. All of the important group and elemental separations described in the literature are well summarized in this chapter.

The Introduction summarizes the separation methods and tabu-