

fiber is parallel to the fiber axis.<sup>1</sup> The chains are probably extended linearly, rather than possessing the helical configuration of the "V" modification, but they must be folded, less extended than in the "B" modification, as indi-

cated by the difference in the fiber spacings.

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## NEW BOOKS

**Organic Syntheses.** Collective Volume 2. A Revised Edition of Annual Volumes X-XIX. Edited by A. H. BLATT, Secretary to the Board, Queens College, Flushing, New York. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1943. ix + 654 pp. 15.5 × 23.5 cm. Price, \$6.50.

The material in the annual Volumes 10 through 19 is here collected, edited, revised to date, and indexed in the same manner as in Collective Volume I which embraces the first nine annual volumes. This great contribution to the serviceability of "Organic Syntheses" has been made with all the care and accuracy of editing and printing which are generally associated with this series. Eleven new sets of directions are included as alternates to those previously given, and the literature is surveyed through the 1941 volume of *Chemical Abstracts* for reports of methods of preparation. The only obvious ways in which the usefulness of future collective volumes might be further increased are by making at least the general index cumulative for the entire series and, if the times permit, shortening the present interval of four years between the publication of the material in its annual and collected forms. The latter purpose might be promoted by substituting a collective volume entirely for Volume 29.

PAUL D. BARTLETT

**Micromeritics, the Technology of Fine Particles.** By J. M. DALLAVALLE. Pitman Publishing Corp., New York, N. Y., 1943. 376 pp. 100 figs. 15 × 25 cm., Price, \$8.50.

Micromeritics, a new term in the vocabulary of the scientist and engineer, means, according to the author, the science of small particles.

In the introduction the author defines the size of the particles as those ranging from  $10^{-1}$  to  $10^6$  microns. In other words, the text is for the most part limited to a discussion of particles ranging from the upper limits of the colloidal range to fairly large ones. The systems, therefore, are identical with those which O. Chwala termed cloudy systems or mechanical turbidities. That a better understanding of the properties of such systems, as well as a more comprehensive knowledge of the methods available for their study, is becoming of increasing importance, not only to the chemical engineer, but to the soil physicist, to geology, hydrology, etc., induced the author to write this text. For this alone he deserves lasting credit.

The book is divided into eighteen chapters which deal with the dynamics of small particles, their shape and size distribution, methods of particle size measurements, sifting and grading, packing characteristics, electrical, optical, sonic and chemical properties, thermodynamics, flow of fluids through packings, infiltration and moisture relationships, capillarity, determination of particle surface, a discussion of muds and slurries, the transport of particles, the theory of fine grinding, the separation from air, and finally a chapter on atmospheric and industrial dusts.

The book is clearly written, and the mathematics necessary for complete understanding as well as application of

the subject matter are well balanced and precise. The incorporation of specific problems at the end of every chapter materially increases the value of the book, which fills out of the remaining gaps in our scientific and technological literature. It therefore should be of real value to anyone—student, teacher and men in industry alike—who is faced with problems in which systems containing small particles are involved. Besides being an excellent textbook, it should serve admirably as a reference book, particularly in view of the selected bibliography and a list of useful constants and conversion factors appended to the main text.

The print as well as the many illustrations are excellent. In the chapter on methods of particle size measurements no reference could be found to the valuable contributions of A. Casagrande, as well as those of Norton and Speil.

In the discussion of light scattering the contributions of Pililblad would have deserved mentioning.

In the chapter dealing with fine grinding reference to the work of men like von Weimarn, Stein and Utzino would have contributed to completeness.

Entirely omitted in the discussion of ball mill operations is the well-known phenomenon of mechanical coagulation, a factor which may not be overlooked even with particles larger than colloidal.

Although the author purposely omits the discussion of colloidal systems, the influence of surface properties of matter particularly during disintegration or combination may no longer be entirely overlooked.

These statements, however, do in no way reduce the interest this book should have and are offered merely as suggestions for future developments in micromeritics.

If any unfavorable criticism of the book could be made at all it would be the price, which may seriously hamper the distribution it deserves.

E. A. HAUSER

**A Textbook of Elementary Quantitative Analysis.** By CARL J. ENGELDER. Third edition. John Wiley and Sons, Inc., New York, N. Y., 1943. viii + 283 pp. 14 figs. Price, \$2.75.

The third revision of this textbook for a one semester course in quantitative analysis is not unlike the previous edition. It contains a selection of the simpler procedures of volumetric and gravimetric analysis and a discussion of the principles on which they are based. In addition there appears a new chapter on "Systematic Quantitative Analysis" which outlines some of the separation procedures used in rock and alloy analysis and gives a tabular summary of methods for the determination of the elements. The appendix contains pages devoted to the literature of analytical chemistry, plans and suggestions for the instructor, density tables for solutions of acids and bases, five-place logarithms, and chemical factors.

With respect to the treatment of practical matters such as directions to the student for performing the experiments, the principal criticism of the material presented is that much of it is repetitious. For example, directions for the reduction of ferric ion given on page 130 are repeated al-

most verbatim on page 131, and these are practically identical with similar directions given twice on page 119. One would judge from this that the student is not expected to remember very much of what he reads about the action of stannous chloride on ferric ion. Concerning appropriate material which has been omitted entirely, most teachers will probably find the omission of the well-known Mohr method for chloride a great surprise, and the omission of the citrate procedure for the separation and determination of magnesium a distinct loss, for this newer method is much easier to carry out than the older molybdate separation.

The theoretical parts of the book would be something of a puzzle to a student who has just finished a modern course in general chemistry. With his knowledge of electrovalence and covalence, he would be at a loss to understand the passage on page 136, which states that "in the molecule of  $H_2C_2O_4$ , the two carbon atoms have different valence charges, one atom having 4 positive charges and the other atom 3 positive and 1 negative one." Nor would the statement on page 151 that "in the molecule of  $Na_2S_2O_8$ , one sulfur atom has a valence of 6 and the other a valence of  $-2$ " be any more comprehensible. He might also wonder what has become of the idea of "proton transfer" in neutralization reactions, since it is not mentioned in the present text. It is possible that he would want to question the statement on page 7 that the equilibrium law can be "rigorously applied" to weak electrolytes in the absence of any statement regarding activity or activity coefficients.

Apart from the matters mentioned, the book is written in clear and direct language and is attractive in format. A large selection of problems accompanies each chapter and answers to half of the problems are given.

FRANK H. HURLEY

**Principles and Practice of Qualitative Analysis, with Semi-micro Laboratory Technique.** By PAUL E. SPOERRI, Ph.D., Associate Professor of Chemistry, Polytechnic Institute of Brooklyn, HAROLD WEINBERGER, Ph.D., Instructor in Chemistry, College of the City of New York, and ROBERT GINELL, M.S., Assistant in Chemistry, Polytechnic Institute of Brooklyn. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York, N. Y., 1942. x + 282 pp. Illustrated.  $15.5 \times 23.5$  cm. Price, \$2.75.

This book is an extreme example of the recent tendency in the teaching of qualitative analysis to place a great deal of emphasis on theoretical principles, and the development of specialized techniques, and to relegate factual inorganic chemistry to a very minor role. The first nine chapters, comprising 136 pages, are devoted almost exclusively to theory, and the practical aspects of qualitative analysis are condensed to seven chapters which total only 112 pages.

The theoretical part is strictly up to date and modern concepts are employed freely. In addition to the usual range of topics, certain subjects are treated in much greater detail than is usual, and several sections are more than faintly suggestive of a textbook of physical chemistry. For example, in Chapter III on The Atom and The Molecule, one finds discussions of the quantum condition for discrete electronic orbits and of the wave nature of the electron, a description of elliptical orbits, and even an illustrated "explanation" of the precession of orbital electrons. In their discussion of the gas laws in Chapter V the authors introduce and discuss the van der Waals equation of state, and a problem involving a quantitative comparison of the simple gas equation and the van der Waals equation is presented on p. 69. The detailed calculations pertinent to gaseous equilibria in Chapter VI, particularly the quantitative treatment of the relation between  $K_c$  and  $K_p$ , are about as complete as one would expect to find in an elementary physical chemistry text. The reviewer fails to appreciate the value of such detailed discussions of these topics in a course in qualitative analysis.

Unfortunately the authors have frequently neglected to explain adequately certain fundamental concepts on which their discussions rest, and the treatment in various sections is inconsistent with respect to the amount of previous knowledge which the student is assumed to possess. For example, although a rather detailed treatment of atomic structure is presented in Chapter III, no mention is made of important spectroscopic facts on which so much of the modern interpretation depends and which are certainly valuable for their own sake in qualitative analysis. In discussing the gas laws in Chapter V, the gas constant  $R$ , absolute temperature, "standard conditions," and the gram-molar volume, are used without being adequately defined. On p. 45 numerical data for the equivalent conductance of solutions of various complex cobalt compounds are presented as a proof of the structure and mode of ionization of these substances, but since the significance of such conductivity data and the method used for their determination are not explained, the force of the argument will undoubtedly elude the average student.

In the reviewer's opinion, Chapter IV. Complex Ions and Molecules, Chapter VII. Reactions with Solvents, Chapter VIII. Reactions in Solution, and Chapter IX. Oxidation-Reduction Reactions, are outstandingly good. The discussions in these chapters are thorough, well illustrated by numerous carefully chosen examples and problems, and the authors deserve particular commendation for emphasizing the important role played by water molecules in various types of ionic equilibria in aqueous solutions.

In marked contrast to the detailed discussions of theoretical principles in Part I, the treatment of factual inorganic chemistry and practical qualitative analysis in Part II is much less thorough and it leaves much to be desired. The difficulties of qualitative analysis are avoided and the subject is presented as being much simpler than it actually is. For example, coprecipitation phenomena in the hydrogen sulfide and ammonium sulfide groups are not mentioned. Organic color and precipitation reagents are mentioned frequently but usually without any discussion of their limitations and the effect of interfering ions, so that the student cannot help but obtain false notions of their specificity. It is rather a surprise to find on p. 177 the statement that arsenic "forms simple cations" and that arsenic trioxide "dissolves readily in hydrochloric acid with the formation of arsenous ion,  $As^{+++}$ ," and the similar statement on p. 180 that antimony "forms cations exhibiting valences of 3 and 5". On p. 207 a flame test is given for the confirmation of strontium after precipitation as strontium sulfate with no regard to possible interference by coprecipitated calcium. In connection with the detection of ammonium ion, on p. 210, no mention is made of the important Nessler reagent. On p. 211 no provision is made for removing excessive amounts of potassium ion before testing for sodium ion with zinc uranyl acetate, nor is any mention made of the importance of the relative volumes of the reagent and unknown solutions in this test.

The text employs semi-micro technique and it contains a number of excellent illustrations of procedural details.

JAMES J. LINGANE

**A System of Qualitative Inorganic Analysis.** By J. L. B. SMITH, Senior Lecturer in Chemistry, Rhodes University College, Grahamstown, Union of South Africa. Nasionale Pers, Beperk, Capetown, Bloemfontein, and Port Elizabeth. Second Ed., 1943. Paper. 63 pp.  $15.5 \times 23.5$  cm.

This little manual is intended strictly for laboratory use and in the author's own words it "contains practically no theory." The intended use of the manual is clearly expressed in the following quotations from the Preface. "It is the author's experience that students more readily acquire manipulative skill and certainty if they have not to disinter actual practical directions from a mass of theory. At the same time it is most desirable that students should have some appreciation of the theory of the subject, and experience has shown that this should form a part of the

lecture course in Physico-Inorganic Chemistry." Since the "lecture course in Physico-Inorganic Chemistry" probably accompanies the laboratory work in qualitative analysis, this policy may not be as radically different from current American practice as it might seem to be at first glance.

The booklet has been composed with exceptional conciseness, and indeed it contains no "text" at all in the usual sense, but is more properly described as a compilation of schematic directions for carrying out qualitative analyses. The author's succinct expository style, and his very liberal use of abbreviations for common terms, have enabled him to include a remarkable amount of factual analytical chemistry in a relatively small number of pages.

More or less classical macro procedures are employed. The general scheme starts with a preliminary examination of the unknown, which is assumed to be a solid. This is followed by systematic procedures for the detection of twenty-three of the commonest anions, and then by procedures for the detection of the usual twenty-four metallic ions. This method of approach certainly has merit, in that it trains the student in the "chemical analysis of things as they are," but on the other hand it has the disadvantage of plunging the student into some of the more difficult phases of qualitative analysis before he has had an opportunity to acquire much experience. The Group Separations in the cation scheme deviate in several respects from the usual practice. Silver, mercury (I), and lead chloride are separated as Group I, and Group II is separated by acid-hydrogen sulfide, in the usual manner. The extraction of the acidic sulfides from the hydrogen sulfide group is accomplished (with doubtful completeness!) by means of sodium hydroxide alone without hydrosulfide or polysulfide. Then iron, aluminum and chromium, are separated as the hydrous oxides with ammonia as a Group III, and zinc, manganese, cobalt, and nickel, are next precipitated as a Group IV with ammonium sulfide. Although relatively simple, this scheme is objectionable because of the pronounced tendency of the Group IV metals (particularly zinc and manganese) to coprecipitate with the hydrous oxides, and it cannot be very reliable when small amounts of the Group IV metals are present with large amounts of the iron group. Calcium, strontium, and barium, are separated with ammonium carbonate as a Group V, and magnesium is precipitated from the filtrate with ammoniacal phosphate. The alkalis are left in the last group as usual. In view of the undesirable features of some of the group separations, the statement on p. 2 that "all tests in this scheme give definite results, about which there can be absolutely no doubt, . . ." appears to be overly optimistic.

JAMES J. LINGANE

**Textbook of Organic Chemistry.** By GEORGE HOLMES RICHTER, Assistant Professor of Organic Chemistry, The Rice Institute. Second Edition. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1943. vi + 759 pp. Illustrated. 15.5 X 23.5 cm. Price \$4.00.

This is the second edition of a textbook first produced in 1938 intended for the use of students beginning the study of organic chemistry. In keeping with the present trend it contains far more material than can be assimilated in a beginning course. The author, however, has shown good judgment in the selection and arrangement of the material and probably has exercised considerable restraint in keeping the number of pages down to some seven hundred in these days of encyclopedic textbooks.

The conventional aliphatic-aromatic arrangement has been followed for the most part. The material on sugars and amino acids has been withdrawn from early chapters and collected at the end of the book with other natural products, such as the terpenes and sterols. The final chapters are concerned with heterocyclic systems including purines as well as alkaloids. A conservative view has been taken with the use of electronic formulas, which are kept in the background. The older formulas are retained for ozonides and hydrazoic acid.

The proof reading has been done carefully, while an excellent list of questions appear at the end of each chapter. The reviewer is of the opinion that the author has succeeded in producing a well-balanced textbook of considerable merit and highly recommends it.

DAVID E. WORRALL

## BOOKS RECEIVED

September 10, 1943—October 10, 1943

- CHESTER H. BIESTERFELD. "Patent Law for Chemists, Engineers and Students." John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 225 pp. \$2.75.
- W. R. BLOOR. "Biochemistry of the Fatty Acids and their Compounds, the Lipids." (A. C. S. Monograph Series.) Reinhold Publishing Corporation, 330 West 42nd Street, New York, N. Y. 387 pp. \$6.00.
- VERNON J. CLANCEY. "Chemistry and the Aeroplane." The Ronald Press Company, 15 East 26th Street, New York, N. Y. 176 pp. \$2.25.
- JOHN F. FLAGG AND WILLARD R. LINE. "Semimicro Qualitative Analysis. A Course in Applied Chemical Equilibrium." D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y. 140 pp. \$1.50.
- BRUCE E. HARTSUCH. "Elementary Qualitative Analysis." John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 274 pp. \$2.75.
- LYMAN M. KELLS. "Calculus." Prentice-Hall, Inc., 70 Fifth Avenue, New York, N. Y. 509 pp. \$3.75.
- I. M. KOLTHOFF AND E. B. SANDELL. "Textbook of Quantitative Inorganic Analysis." Revised Edition. The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 794 pp. \$4.50.
- STEPHEN MIALL. "Diccionario de Quimica." Spanish Translation and Notes by José Giral. Editorial Atlante, S.A., Altamirano 127, Mexico, D. F. 1002 pp.
- EMIL OTT, Editor. "Cellulose and Cellulose Derivatives." (High Polymer Series, Volume V.) Interscience Publishers, Inc., 215 Fourth Avenue, New York, N. Y. 1176 pp. \$15.00.
- A. EDWARD REMICK. "Electronic Interpretations of Organic Chemistry." John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 474 pp. \$4.50.
- G. ROSS ROBERTSON. "Laboratory Practice of Organic Chemistry." Revised Edition. The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 369 pp. \$2.50.
- S. JAMES SHAND. "Eruptive Rocks." Second Edition. Revised and Enlarged. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. (Thomas Murby and Co., 40 Museum Street, London). 444 pp. \$5.00.