in the absence of solvents,[2] spectroscopic evidence,[3] and data relating to the anodic oxidation of aluminum in liquid ammonia and other solvents.[4] Thermochemical considerations[5] also indicate that these oxidation states should exhibit appreciable stability even in the form of the crystalline halides.

We wish to make a preliminary report on what we believe to be conclusive evidence for the existence of these oxidation states in solution, based upon potentiometric titrations of liquid ammonia solutions of aluminum(III) iodide with liquid ammonia solutions of potassium using the equipment and procedures described previously.[6]

In a typical experiment, 8.31×10^{-4} g. eq. wt. of pure aluminum(III) iodide dissolved in *ca.* 45 ml. of anhydrous liquid ammonia was titrated with 8.56×10^{-2} *M* potassium solution. The titration curve shows two quite distinct end-points which correspond to the addition of 3.25 and 6.60 ml. of the potassium solution; the calculated volumes required for reduction of Al^{+3} to Al^{+2} and Al^{+1} are 3.24 and 6.49 ml., respectively.

Following the end-point corresponding to completion of reduction to Al^{+2}, a trace of white crystalline solid appears, the potential decreases gradually, then increases until the end-point corresponding to Al^{+1} is reached. A similar trend is observed following reduction to Al^{+1}. In view of the known chemistry of Al^{+3} in liquid ammonia,[7,8] it seems reasonable to attribute this behavior in both instances to the occurrence of slow ammonolytic reactions resulting in the separation of ammonobasic salts. Finally, when a slight excess of potassium over that required for reduction to Al^0 is added, the potential increases *ca.* 1200 mv. and this is coincident with the appearance of a permanent blue coloration which is too intense to be attributable to an ammonia solution of aluminum.[8]

These and related experiments will be described in more detail in a later communication. We are presently extending this method to the study of the intermediate oxidation state problem with other Group III elements, and those of both the lanthanide and actinide series.

DEPARTMENT OF CHEMISTRY
THE UNIVERSITY OF TEXAS
AUSTIN, TEXAS

GEORGE W. WATT
JAMES L. HALL
GREGORY R. CHOPPIN

RECEIVED OCTOBER 19, 1951

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[2] G. Grube, A. Schneider, U. Esch and M. Flad, *Z. anorg. Chem.*, **260**, 120 (1949).

[3] L. M. Foster, A. S. Russell and C. N. Cochran, THIS JOURNAL, **72**, 2580 (1950).

[4] For review and primary references see: J. Kleinberg, "Unfamiliar Oxidation States and Their Stabilization," University of Kansas Press, Lawrence, Kan., 1950, p. 16; *cf.* Kleinberg, *et al.*, THIS JOURNAL, in press.

[5] F. Irmann, *Helv. Chim. Acta*, **33**, 1449 (1950).

[6] G. W. Watt and J. B. Otto, Jr., *J. Electrochem. Soc.*, **98**, 1 (1951).

[7] E. C. Franklin, THIS JOURNAL, **37**, 847 (1915).

[8] A. D. McElroy, J. Kleinberg and A. W. Davidson, *ibid.*, **72**, 5178 (1950).

BOOK REVIEWS

Méthodes Modernes d'Analyse Quantitative Minérale. By GASTON CHARLOT, Professeur, and DENISE BÉZIER, Sous-chef de travaux, l'École de Physique et de Chimie Industrielle. Masson et Cie., Éditeurs, 120 Boulevard Saint-Germain, Paris VI^e, France, 1949. vii + 685 pp. Illustrated. 16 × 23.5 cm. Price, 2000 fr.

The title indicates the volume to deal with mineral analysis, but it is considerably more than merely this. It comprises two sections, on General Considerations (25 chapters, 285 pages) and on Analysis of the Principal Elements (54 short chapters, 368 pages). The first section presents well-written and readable discussion of volumetric analysis, acidimetry, oxidimetry, oxidation and reduction materials, acidimetry and *p*H change on oxidation-reduction titrations, titration with complexes, precipitation titration, nonaqueous acidimetry, extraction methods, gravimetric apparatus and techniques, physical analytical methods, colorimetry, absorption and emission spectroscopy, potentiometric titration, electroanalysis, polarography, conductimetry, miscellaneous methods, organic reagents, properties of precipitates, separations, analysis for traces, semi-micro and micro analysis, dissolving of materials, removal of organic matter during analysis, and gas analysis. This section alone is a good coverage of general quantitative analysis in up-to-date fashion.

The second part of the book deals with the analysis of the principal elements, from aluminum to zirconium, sixty-five of them, including the rare earths as one "element." For each the treatment follows the pattern of: Separations (general and special cases and treatments, footnoted and cross-referenced), Gravimetric Methods, Volumetric, Colorimetric, Electrolytic, Potentiometric, Physical, Special Cases, as these methods may variously apply. References to the original literature are plentiful and well-chosen, including post-war publications. The format and typography are good, and proof-reading errors very few. The book will be a good reference source for general inorganic and mineral analysis.

DEPARTMENT OF CHEMISTRY
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ALLEN D. BLISS

Fundamental Mechanisms of Photographic Sensitivity. Edited by J. W. MITCHELL. Academic Press Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1951. viii + 347 pp. 19.5 × 25.5 cm. Price, $9.50.

The papers which make up this book were presented at a conference held at the University of Bristol in March, 1950, and represent contributions from workers in Europe, Great Britain and the United States. As will be seen from the list of contents given at the end of this review, the scope of the conference was broader than the title of the book suggests. Some of the papers contained in the book have already appeared in scientific journals, but many have not. A few appear in the book in abridged form. No discussion of the papers is recorded, but Dr. Mitchell has written an able review of the status of the theory of sensitivity and latent image formation as it appeared to him at the conclusion of the conference.

The book will be of more interest to the research worker than to the general reader, since most of the papers aim specifically at presenting the results of the authors' research on the particular problem. A few papers are of more general scope and present an integrated picture of the present state of knowledge in the particular field. In addition to Mitchell's paper, already mentioned, B. H. Carroll and W. West present a systematic survey of optical sensitization; W. G. Lowe, J. E. Jones and H. E. Roberts review the field of chemical sensitization and present important new findings; H. Ammann-Brass discusses fundamentals in photographic emulsion manufacture based on FIAT and BIOS reports; and P. H. Fowler and D. H. Perkins write on the application of photographic emulsions to the investigation of problems in nuclear physics and cosmic rays.

Of the papers not already mentioned, the following are printed in their entirety: report on S. Petroff's photochemical investigations on KCl crystals (R. W. Pohl); coloration of alkali halide crystals by high energy radiation (H. Pick); optical and thermal activation processes in X-ray colored crystals (E. E. Schneider); optical demonstration of presence of Schottky disorder in AgBr (O. Stasiw); diffusion in AgBr crystals containing AgI (J. Teltow); effect of light on development and etching of single crystals of AgBr (C. G. Boissonnas); oriented growth of silver during electron bombardment of AgCl (D. W. Pashley); diffusion of silver and bromide ions in AgBr suspensions (T. B. Grimley); self-diffusion of silver and bromide ions in AgBr and AgCl (K. E. Zimen); properties of colloidal AgBr (A. K. Holliday and K. N. Davies); low temperature fluorescence of silver halides and photographic emulsions (G. C. Farnell and P. C. Burton); inhibition of grain growth in AgBr crystals (T. Krummenerl); inhibition and grain growth of Au sols (R. Lorenz); examination of photographic grains by the phase-contrast microscope (L. Falla); photochemistry of nitrogen triiodide (J. Eggert); correlations between photographic and photoconductive sensitivity of silver halides (W. West); chemical sensitization and latent image fading in an AgBr soln. (E. E. Loening); evolution of spectral sensitivity in Lippmann emulsions (E. Vassy and A. Vassy); interpretation of the characteristic curves of photographic materials (P. C. Burton); influence of static pressure on the sensitivity of photographic materials (H. Bäckström); dependence of solarization on wave length (H. Sauvenier); method of increasing sensitivity by tanning development (J. Rzymkowski); destruction of internal latent image (G. W. W. Stevens); preparation and sensitization of electron-sensitive nuclear track plates (L. Jenny); effects of diluting nuclear emulsion type G5 with gelatin (E. C. Dodd and C. Waller); track recognition in nuclear emulsions (R. W. Berriman); "print-out effect" produced by alpha particles (L. Winand); latent image fading in nuclear emulsions (G. Albouy and H. Faraggi); temperature development in processing nuclear emulsions (C. C. Dilworth, G. P. S. Occhialini, and L. Vermaesen); applications of *p*H buffers in developing nuclear plates (G. W. W. Stevens); experimental study of the law governing the production of developable grains as a function of the charged particle energy (M. Morand and L. van Rossum); estimation of sensitivity of nuclear track plates (A. C. Coates); determination of shrinkage factor in nuclear emulsions (F. A. Roads); shrinkage and moisture content of nuclear emulsions (J. Bogaardt and L. Vigneron).

The book is attractively printed on good quality paper and is well illustrated. The binding is good.

RESEARCH LABORATORIES
EASTMAN KODAK COMPANY T. H. JAMES
ROCHESTER 4, NEW YORK

Anorganische Chemie. By DR. EGON WIBERG, Professor der anorganischen Chemie an der Universität München. Walter De Gruyter and Co., Genthiner Strasse 13, Berlin W 35, Germany, 1951. xxii + 634 pp. 18 × 24.5 cm. Price, DM 24, Ganzln.

This major revision, in German, has effectively modernized the Holleman text. It is believed that the current edition merits serious consideration for use where German is the language of instruction.

The over-all content is similar to that of the better American general chemistry texts. The treatment of the material proceeds rapidly from a very elementary level to a considerably higher plane. The chemistry of the non-metals is unusually well and completely covered. Although the actual references are not given, the inclusion of the names of the authors and dates (year) of outstanding contributions make it easy for the reader to refer to the original work.

In summary, the Holleman–Wiberg text is excellent. However, there is little material which is unique to this text.

8600TH AAU
THE PENTAGON ROY D. JOHNSON
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An Introduction to the Chemistry of the Silicones. Second Edition. By EUGENE G. ROCHOW, Associate Professor of Chemistry, Harvard University. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1951. xiv + 213 pp. 15.5 × 23.5 cm. Price, $5.00.

This edition is a thoroughly revised version of the first (THIS JOURNAL, 69, 729 (1947)), which was published in 1946 when the author was a member of the research laboratory of the General Electric Co. The revision is 50% larger. It is an improved book as the result of the addition of worthwhile chapters on the carbon–silicon bond, procedures for synthesizing representative organosilicon compounds, physical chemistry of silicones, and tables of physical properties.

Like the popular first edition, this book is not a reference work but an introduction to the organic chemistry of silicon. The simple covalent compounds (hydrides, halides, ethers, etc.) are described; this is followed by a study of monomers and of the polymeric types derived from them, namely, silicon chains, silicon–carbon chains, siloxane chains, and siloxane networks. There is a chapter on analytical methods which should be useful to researchers new to this field of chemistry, and an interesting comment (p. 2) that the official atomic weight of 28.06 as compared with the atomic weight of 28.11 computed from the proportions of the stable isotopes casts doubt on the analytical methods used in the chemical determination.

To this reviewer, the new edition illustrates the Pauling–Wheland–Remick influence on current textbook writing. Chapter 2 (which is new) discusses the chemistry of organosilicon compounds on the basis of bond energies and ionic character of the bonds which connect the silicon atom to other elements (hydrogen, chlorine, oxygen and carbon). The principles outlined in this chapter are referred to throughout the book to explain the chemistry (and physics) of organosilicon compounds. Chapter 7 (also new) extends the physical chemistry discussion to the molecular structure of the silicones in order to explain their unusual behavior. The author sums up available opinions to the effect that much of this unusual behavior is due to ionic character of the Si–O bond in the siloxane units. For example (p. 120), "flow properties of methyl silicone oils could be explained entirely in terms of low intermolecular forces," and these forces, in turn, are due to "exceedingly free motion of dimethylsiloxane units about the silicon–oxygen bond, such freedom being related in turn to the ionic character of such a bond."

It is of interest to note that the Fisher–Hirschfelder–Taylor model of a siloxane chain, used as a frontispiece in the first edition, does not appear in the second. This omission may have been due to the thinking which inspired this sentence from p. 133: "A reasonable configuration for an oriented dimethylsiloxane film may be shown on a conventional molecular model, even though the covalent basis for the framework of the model is misleading according to considerations in Chapter 7." The viewpoint is stressed that silicone or organosiloxane polymers are essentially organo-substituted silicon oxides. An organosiloxane is compared to a silicate mineral (p. 73), "with the organic groups performing much the same function as metal ions. Instead of acquiring properties associated with metallic ions, however, the organosiloxane polymer acquires some properties usually associated with hydrocarbon compounds, such as solubility in specified organic solvents and a marked water-repellent character of the surface."

The book is easy to read; each topic is discussed fully and clearly. Of the few typographical errors noted the only one of importance was omission of valence bonds from the ethylene oxide formulas on p. 11. Adherence to a system of nomenclature is also noteworthy, with but a few aberrations, such as zinc diethyl and sodium ethyl (p. 30). Furthermore, *Chemical Abstracts* editors probably prefer dichlorodimethylsilane to dimethyldichlorosilane. The author showed good judgment in dropping the Glossary that was used in the first edition.

CHEMICAL AND RADIOLOGICAL LABORATORIES
ARMY CHEMICAL CENTER, MD. RUDOLPH MACY

Kurzes Lehrbuch der Enzymologie. By THEODOR BERSIN. Akademische Verlagsgesellschaft, Geest and Portig K.-G., (10b) Sternwartenstr. 8, Leipzig C1, Germany, 1951. viii + 274 pp. 16.5 × 24 cm. Price, bound DM 19.20.

This book was first printed in 1938. The author, who is living in St. Gall, Switzerland, now has presented its third edition. This latest form especially takes into account the progress in the field of enzymology made meanwhile in the U. S. A. In the preface the importance of certain textbooks and treatises indispensable for advanced studies is emphasized. The question was raised recently, whether it is at all possible nowadays for *one* individual to write this kind of a text, since he must have a broad command of chemistry and physical chemistry. The author attempts to prove that such an assignment can be accomplished, and with the previous two editions he has demonstrated that his interpretation met with over-all approval. The contents, organized chiefly according to a chemical viewpoint, are meant to introduce the student, the scientist working in related fields, and the technologist concerned with enzymatic processes to the modern trends and findings of enzymology. The literature is covered up to the beginning of 1950.

This book distinguished itself from similar textbooks in the field mainly on the basis of its attempt to systematize the enzymes according to their chemical properties and the mechanisms of the reactions set in move by them. This was a courageous undertaking at the time when the first edition was published and apparently has been approved. The theory of the primary valence catalysis of Langenbeck, unfortunately not fully appreciated, is chosen as a basis for the organization of the hydrolases. This theory found a useful application in the classification of the enzymes discovered since, such as the transferases and transglycosidases, the existence of which could be foreseen. The redoxases are grouped according to the chemical nature of their active agents, *i.e.*, copper, iron, pyridin and flavin enzymes. The author also presents an introduction to the meaning and theory of the redox potential. It was hardly possible to give a generally valid outline of the present status of studies in this particular field and, therefore, the author's personal views are emphasized. The third part, dealing with the role of enzymes in general metabolism, is rather problematic. It is obvious here, how little became known in this field despite extensive research. The great strides made in the biochemistry of microörganisms are not yet fully considered, and we can only hope that the author will discuss them in more detail in the next edition. This stimulating book purports to induce coöperation and discussion and is recommended to students capable of reading scientific German.

DEPT. OF ORGANIC CHEMISTRY AND ENZYMOLOGY
FORDHAM UNIVERSITY F. F. NORD
NEW YORK 58, N. Y.

Medicinal Chemistry. Volume I. C. M. SUTER, Editor-in-Chief. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y., 1951. vii + 473 pp. 16 × 23.5 cm. Price, $10.00.

This is the first volume in a series of authoritative reviews of the biological properties of medicinal substances sponsored by the Division of Medicinal Chemistry of the American Chemical Society. Chapters cover the following subjects: Antithyroid Compounds; Antispasmodics, Derivatives of Carboxylic Acids; Antibiotics from Plants; Benzoates and Substituted Benzoates as Local Anesthetics; Analgesics: (A) Aralkylamines, (B) Partial Structures Related to Morphine.

The prime purpose of the series is to provide chemists and pharmacologists with comprehensive listings of the chemicals which have been tested for a certain type of biological activity. Where such activity has been very extensively explored, the chapter is limited to a class of chemicals. By reason of the contribution of much previously unpublished information to the authors' listings, the book becomes indispensable as a reference work to those active in the fields covered and particularly so for patent attorneys.

The discussion of general methods of synthesis of compounds and of the methods for evaluation of pharmacological activity, while not in such detail that they may be used directly, are of considerable value in directing the reader to original sources and in warning of pitfalls. Attempts to correlate activity with structure are perhaps of less value. Small changes of structure can have such pronounced effects on the biological activity that little extrapolation from existing data is possible.

The printing and paper are of high quality. Remarkably few typographical errors were observed, considering the difficult text and large number of complex structural formulae reproduced. On page 459 the structures are obscure but may be deciphered from the accompanying names.

The excellent systematic order of listing substituents in tables employed in Chapter I was not followed by authors of all subsequent chapters. Fortunately, not many of the tables are of such length that orderly arrangement is of major importance. However, it is felt that the board of editors of the series would do well to establish a consistent system for guidance of authors in future volumes.

Some lack of economy in printing the tables was observed. For example, in Chapter I unusually large headings were necessitated by an explanation of activity listings which might have been made once rather than repeated page after page. A similar criticism applies to an extensive footnote of credits for unpublished work. Current high printing costs make authors' efforts at economy worthwhile if prices of scientific reference works are to be kept within reach of individual scientists.

AMERICAN CYANAMID CO.
NEW YORK 20, N. Y. E. H. NORTHEY

The Fischer–Tropsch and Related Syntheses. (Including a Summary of Theoretical and Applied Contact Catalysis.) By HENRY H. STORCH, NORMA GOLUMBIC and ROBERT B. ANDERSON, Office of Synthetic Liquid Fuels, Bureau of Mines, U. S. Department of Interior, Pittsburgh, Pennsylvania. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y.; Chapman and Hall, Ltd., London, 1951. xii + 610 pp. 15 × 23 cm. Price, $9.00.

This book is a valuable summary of investigations dealing with the catalytic synthesis of hydrocarbon fuels and other products from water gas. It includes not only information gathered by the teams of American and English technologists who followed the Allied advance into Germany in 1945, but also the researches of the Bureau of Mines group and of other earlier investigators. All this has been skillfully combined to give a clear picture of the state of the art today.

The first two chapters deal with general matters about the thermodynamics of the processes, and the preparation and evaluation of catalysts, the latter based largely on the work of P. H. Emmett and his collaborators. This material is followed by two long chapters (the major part of the book) on the behavior of catalysts composed of cobalt or nickel with thoria or magnesia, and kieselguhr. A considerable amount of pertinent data on structure and adsorptive properties is included. Mention is also made of alkalized iron (the first successful catalyst) and of ruthenium. Chapter 5 describes briefly the Oxo Process, by which mixtures of olefins with water gas are converted to higher aldehydes and alcohols, and the Isoparaffin Synthesis. Finally, in Chapter 6 an attempt is made to analyze the data in order to derive kinetic expressions and a reaction mechanism. This proves to be a difficult matter since much of the data are not well suited to the purpose. Considerable attention is devoted to the role of carbides and to the hypothesis of step-wise addition to the carbon chain, but in the end it is concluded that "the reaction mechanism of the Fischer–Tropsch synthesis is not clearly understood." Apparently there is still room for new ideas and a fresh experimental approach in this field.

Petroleum chemists and students of catalysis should find much to interest them in this text.

FRICK CHEMICAL LABORATORY
PRINCETON, NEW JERSEY ROBERT N. PEASE

Silicate Melt Equilibria. By WILHELM EITEL. Translated from the German by J. G. Phillips and T. G. Madgwick with the collaboration of R. B. Sosman and with revisions and additions by the author. Rutgers University Press, New Brunswick, New Jersey, 1951. x + 159 pp. 16 × 23.5 cm. Price, $5.00.

The first printing of this book, published in 1943 (Leipzig), was totally destroyed except for one copy, from which a second printing was made in 1945. The book has now been brought up to date by the author, and its usefulness has been further increased by translation into English.

The book deals with the solid–liquid phase relations, some of them highly involved, of silicate systems consisting of two to five components. The discussion is thorough and careful, and while extremely compact, it is distinguished by surprising clarity and admirable organization. It is concerned primarily with general types of behavior of importance in silicate equilibria rather than with the description of actual systems. At the same time the discussion is accompanied with a wealth of instructive and significant examples from the recent literature, adequately illustrating the great variety of possible relations, especially under the ternary systems. Unusual emphasis is placed upon the actual or non-equilibrium phenomena encountered upon cooling or heating in these systems; these are made clear in every case by direct reference to the schematic (or "ideal," to quote the book itself) behavior of the systems in true equilibrium. The practical significance of the relations, for both equilibrium and non-equilibrium conditions, is frequently pointed out, in connection with problems in geology, in petrology, in mineralogical interpretation, in the cement industry, etc.

It is difficult to say for what level of reader the book is intended. The author seems to have attempted to explain the principles behind all the types of phase diagrams discussed, explaining certain elementary things and organizing the book somewhat in the form of a textbook. In many cases, however, especially for the higher systems, the elementary principles are followed directly by the consideration of complicated situations, with little or no regard to intermediate developments which would seem to be necessary for the reader who needs the elementary parts and unnecessary only for the reader who can start at once with the actual systems and all their complications. On the other hand, while in general only principles bearing directly upon silicate melts are discussed, the section on reciprocal ternary systems has no silicate example and is out of place except in a textbook. A general orientation is achieved, however, which should serve as guide and background to the silicate chemist for whom this book will prove to be quite valuable as a systematic review and exposition.

A certain number of slips, some of transcription or of translation, must be considered inevitable in such a condensed discussion covering 200 diagrams. Most of these will be mentally corrected by the careful reader. There are some faults, however, which the reviewer feels are more fundamental and may cause confusion. As a possible warning, therefore, their occurrence is noted as follows: in Figs. 67, 123, 132, 134, 149, 150, in paragraph 155, and in paragraphs 198 and 200 on the interrelations of Figs. 126, 132 and 133. Also, the expression "pseudobinary system," familiarly referring to dynamic isomerism, is here used for a certain type of section in a ternary system, related to that usually called "quasi-binary," as by Masing.

DEPARTMENT OF CHEMISTRY
NEW YORK UNIVERSITY
NEW YORK 53, N. Y.
JOHN E. RICCI

Negative Ions. By H. S. W. MASSEY, Goldsmid Professor of Mathematics, University of London (University College). Second Edition. Cambridge Monographs on Physics. Cambridge University Press (American Branch), 51 Madison Avenue, New York 10, N. Y. 1950. xiv + 136 pp. 14.5 × 22.5 cm. Price, $2.50.

The first four chapters, dealing with negative atomic ions, negative molecular ions, modes of formation of negative ions and detachment of electrons from negative ions, are essentially the same as in the earlier edition except that they have been brought up-to-date by the inclusion of more recent data. The remaining chapter, which has been largely rewritten, is a discussion of the application of the knowledge concerning negative ions to the role which they play in glow discharges and in the atmospheres of the earth (night sky emission, etc.), sun and stars. Particularly interesting is the development of the role of the negative hydrogen ion in accounting for the observed spectral distribution of solar radiation.

This small volume is highly recommended for its easily readable and not too mathematical presentation of the fundamental background of electron affinity, a concept of considerable current interest.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF ROCHESTER
ROCHESTER, NEW YORK
EDWIN O. WIIG

Dimensional Analysis and Theory of Models. By HENRY LANGHAAR, Professor of Theoretical and Applied Mechanics, University of Illinois. John Wiley and Sons, Inc.. 440 Fourth Avenue, New York 16, N. Y., 1951. xi + 166 pp. 15.5 × 23.5 cm. Price, $4.00.

The study of physical phenomena (heat transfer, fluid dynamics, elasticity, etc.) has been simplified by the application of dimensional analysis. Instead of having to consider the relationship between all the variables involved in a problem, it is necessary only to consider those between groups of the variables. These groups consist of products of powers to the original variables taken in such a way as to make the group dimensionless. Model studies for which these groups have the same numerical values as a full-scale prototype faithfully reproduce the performance of the prototype.

Professor Langhaar's book provides a systematic way of determining these groups as well as a wide variety of applications to current engineering problems. The presentation is clear and thorough. For those interested in the application of these methods to chemical systems, an additional reference is the paper by R. Edgeworth-Johnstone (*Trans. Inst. of Chem. Engrs. (London)* 17, 129 (1939)).

BROOKHAVEN NATIONAL LABORATORY
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WARREN E. WINSCHE

BOOKS RECEIVED

October 10, 1951–November 10, 1951

ALVA H. BENNETT, HAROLD OSTERBERG, HELEN JUPNIK, AND OSCAR W. RICHARDS. "Phase Microscopy Principles and Applications." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1951. 320 pp. $7.50.

THOMAS ANDERSON HENRY. "The Plant Alkaloids." The Blakiston Company, 1012 Walnut Street, Philadelphia 5, Pennsylvania. 1949. 804 pp. $14.00.

R. J. MCILROY. "The Plant Glycosides." Longmans, Green and Co., Inc., 55 Fifth Avenue, New York, N. Y. (Edward Arnold Co., London). 1951. 138 pp. $3.25.

F. F. NORD (edited by). "Advances in Enzymology and Related Subjects of Biochemistry." Volume XII. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1951. 570 pp. $9.75.

MARTIN A. PAUL. "Principles of Chemical Thermodynamics." McGraw-Hill Book Company, 330 West 42nd Street, New York 18, N. Y. 1951. 740 pp. $7.50.

JOHN C. SLATER. "Quantum Theory of Matter." McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 18, N. Y. 1951. 528 pp. $7.50.

W. J. YOUDEN. "Statistical Methods for Chemists." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1951. 126 pp. $3.00.