been published as a separate book. In accordance with its title, "Silicone Polymers," most of the chapter's 130 pages are devoted to polysiloxanes with only a few pages covering polysilazanes, polysilalkylenes and arylenes, polysilanes and polymetallosiloxanes. The latter four systems are discussed in more detail in Chapters 6 and 7.

Chapter 6 (R. K. Ingham and H. Gilman), in addition to polymers based on silicon–silicon and silicon–carbon chains, also reviews polymers containing germanium, tin and lead in their backbones. Most of the research covered by this chapter is quite recent and the authors have succeeded in presenting an excellent up-to-date summary of the large amount of work which has been published.

Chapter 7 by D. C. Bradley is primarily concerned with linear polymers containing metal–oxygen bonds. After a discussion of metal alkoxides—mostly oligomers—the polymeric products formed by their hydrolysis are reviewed as well as polymetallosiloxanes and polysiloxymetalloxanes.

This reviewer will not comment on Chapter 8 ("Coordination Polymers," by B. P. Block) since he had the opportunity to discuss the manuscript with its author. For those interested it should be pointed out that two groups of polymers are discussed—natural and synthetic coördination polymers, the former referring to materials that are included even though their polymeric structure is probably limited to the crystalline state. Since a very broad definition of the term coördination polymer has been used, the review is not limited to chelate polymers.

A brief chapter on electron-deficient polymers by A. J. Leffler which includes metal alkyls, boron and aluminum hydrides and carboranes, concludes the book. Many of the compounds mentioned are of interest as building blocks for high polymers. Success in this field since the book appeared points out the importance of understanding the basic chemistry of such systems.

As far as typographical errors are concerned the book contains no more than the usual number of misprints. Thus the formula for phenylsilsesquioxane on p. 12 is given as $C_6H_5SiO_{2/3}$ and the arrows are incorrect at the bottom of page 356—to mention two of the errors which the reader will not find too disturbing.

More attention to details on the part of the editors could have made the book shorter and probably clearer without impairing the large amount of well documented information. For example, the editors apparently made no effort to have the authors adhere to a uniform nomenclature. Quite often there are confusing inconsistencies, even within the same chapter. Thus in Chapter 7 the R_3SiO- group is referred to as silyl oxide (p. 411), silyloxy (p.433), siloxy (p. 434) and finally siloxano (p. 433). Furthermore, the terms "polyorganosiloxanometalloxanes" and "polyorganometalloxanosiloxanes" are introduced to describe two types of polymers. Yet the author himself uses the more common names for these polymers, as illustrated by the statement on p. 437 under the heading "Polyorganometalloxanosiloxanes": ". .In recent years Andrianov and co-workers developed other methods for preparing polyorganometallosiloxanes." The same polymers are named polysiloxanemetalloxanes in Chapter 5 (p. 288). All this may not seem important—but the reviewer feels that the book could have provided systematizing leadership instead of adding confusion by introducing new terminology which it does not even use consistently.

Because of the substantial price difference "Inorganic Polymers" will have competition from another recent book on the same subject ("Developments in Inorganic Polymer Chemistry," edited by M. F. Lappert and G. J. Leigh, Elsevier, 1962 ($10.00)) for a place in the chemist's personal library.

PENNSALT CHEMICALS CORPORATION
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The Chemistry of Rhenium. By K. B. LEBEDEV, Candidate of Technical Sciences, translated by L. RONSON in collaboration with A. A. WOOLF, Ph.D. Butterworth and Co. (Publishers) Ltd., London, 88 Kingsway, W. C. 2. 1962. x + 105 pp. 14.5 × 22 cm. Price, $7.50.

The chapter headings, Production and Application, Rhenium Sources, Extraction of Rhenium, and Preparation of Metallic Rhenium, are more indicative of the contents of this book than is its title. Brief chapters on the properties, compounds and analytical chemistry of rhenium are incomplete and contain some rather loose statements and errors. The status of rhenium amalgams and carbides is not clear from the text. The citation of rhenium tetroxide complete with vapor pressure curve will jar most readers, as will the use of contemporary (1932) heptoxide data from the same source. Much of the excellent work of Boyd, W. T. Smith, Cobble, and others in this country appears to be unknown to the author. Presumably, the Russian and foreign literature through 1959 has been utilized. But, in spite of the title, the book does not intend to replace those of Druce or of Tribalat; *i.e.*, it is not concerned with the "pure"chemistry of rhenium.

Parenthetically, neither is this work as complete or as authoritative as is the recent compilation edited by Gonser with respect to alloys, applications and some aspects of metallurgy. The book does, however, give a relatively complete summary of Russian practice in attempting the extraction and economical isolation of rhenium from a great variety of materials. This is the primary purpose of the book, and the extractive procedures are adequately described and often novel to those in this country. While of some interest to metallurgists, the work is not complete regarding the metallurgy of rhenium.

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Ions in Hydrocarbons. By ANDREW GEMANT, Research Associate, The Grace Hospital, Detroit, Michigan. Interscience Division, John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1962. viii × 261 pp. 16 × 23.5 cm. Price, $12.50.

The author has attempted coverage of a tremendous field in a short treatise. His efforts have resulted in a pleasant, readable introduction to the subject. The book contains sections covering (1) correlation with other fields; (2) hydrogen ions; (3) ions in amine–aliphatic acid solutions; (4) ions from oxidation of *ortho*-substituted aromatics; (5) ions from ozonolysis of aromatics; (6) metal–complex ions; (7) electron transfer ions and (8) radiolytic ions. Unfortunately each section treats its subject matter in so superficial a manner as to leave much to be desired in a reference book. If one looks upon this book as an introduction to the subject of ions in hydrocarbons, it fulfills its purpose and can be recommended on this basis. However, a second thought might be necessary before an expenditure of $12.50 is considered.

MELPAR, INC. M. J. ALLEN
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Elements of Chemical Thermodynamics. By LEONARD K. NASH, Department of Chemistry, Harvard University. Addison–Wesley Publishing Company, Inc., Reading, Mass., 1962. ix + 118 pp. 15 × 22.5 cm. Price, $1.75.

This book is one in a series on Principles of Chemistry, designed to be used as a supplement to an introductory text on general chemistry. Prepared for the beginning college student, the topics covered are: an introduction on heat and work; the first principle of thermodynamics, including enthalpy, thermochemistry, heat capacity, ideal gases; the second principle of thermodynamics, including the Carnot cycle and entropy; consequences of the thermodynamic principles, including free energy and equilibrium, colligative properties, equilibrium constant, galvanic cell, and the temperature dependence of the equilibrium constant. Three appendices give, respectively, some operations of the calculus, problems, and some thermodynamic data at 25°. The author carefully states the topics which are omitted from this text. This book represents a good step in the direction of bringing chemical thermodynamics as such to the student in the first course in college chemistry. The author has the material under actual trial for the second year with students at his university, and reports good success. Lecturers in general chemistry will wish to examine this book carefully to determine whether it will fit into their respective courses.

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Electronics for Scientists. Principles and Experiments for Those Who Use Instruments. By H. V. MALMSTADT, University of Illinois, and C. G. ENKE, Princeton University, with the assistance of E. C. TOREN, JR., Duke University. W. A. Benjamin, Inc., 2465 Broadway, New York 25, N. Y. 1962. xi + 619 pp. 16 × 23.5 cm. Price, $10.75.

This book is written to be of practical service to a wide variety of scientists covering the range from biologists and medical researcher through to chemists, physicists and engineers. This is a very ambitious undertaking and it is with some skepticism that this reviewer undertook to evaluate the success with which the objective was reached. There are many books and pamphlets on the subject of electronics which give simple pictures of how various electronic devices work. However, to say that these are of practical value is another matter.

An experimental scientist should be expected to produce data as good as his instrumentation permits and his experiment justifies. Thus practical for him often means the sophisticated

use of complex equipment. It is not enough to have general ideas of principles of operation. One must know about machine capabilities, machine-introduced artifacts and machine limitations if one is to make proper use of these devices.

This book and its accompanying laboratory course comes as close to meeting these objectives as could be hoped for in a single volume. The topics selected have been suggested with judgment and are presented in a succinct fashion without loss of clarity. This book is the result of a lot of hard work and will require a lot of hard work upon the part of the uninitiated to read. However, the non-electronics scientist can sit down with paper, pencil and book in hand and get a good course in practical electronics.

This first chapter presents an excellent discussion of basic electrical measurements and instruments of common type. As is true in general, no attempt is made to be encyclopedic, but the examples are well chosen and the problems and limitations of making measurements clearly discussed. Other chapters in the first section of the book deal with such traditional material as power supplies, amplifiers and circuits, oscillators, etc. It is rather surprising how much material is presented in a logical, clear, and condensed fashion, with important practical considerations outlined. Certainly in cases such as the discussion of the transitors no person not already well informed is going to appreciate the physics of their operation. However, he should understand much about their design and operation given the characteristics supplied.

The last half of the book covers servo systems, operational amplifiers for measurement and control and switching timing and digital computing systems. This material covers a wide range of possible applications not ordinarily found in an electronics text. Again the context is very well presented and well illustrated. Circuit diagrams are used profusely and are exceptionally well drawn with a minimum of confusion. Undoubtedly they will present an initial source of difficulty, but their consistent use will certainly help the non-electronically experienced reader with his practical problems.

The book closes with certain supplements on basic d.c. and a.c. theory etc. that will serve to widen its applicability.

An additional supplement concerns the experiments and equipment needed to perform them. As the authors suggest, the desired state of competence undoubtedly can only be achieved by undertaking the experimental course outlined. This laboratory is made practically possible for all by means of a laboratory kit marketed by the Heath Company and specially designed to accompany the text.

In conclusion this is a well written book with a great deal of valuable information presented concisely in one volume at a level appropriate for a scientist working in areas other than electronics but with electronics needs.

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Comprehensive Biochemistry. Volume 3. Methods for the Study of Molecules. Edited by MARCEL FLORKIN, Professor of Biochemistry, University of Liege (Belgium), and ELMER H. STOTZ, Professor of Biochemistry, University of Rochester, School of Medicine and Dentistry, Rochester, N. Y. American Elsevier Publishing Company, Inc., 62 Vanderbilt Avenue, New York 17, N. Y. 1962. xiii + 324 pp. 16 × 23 cm. Price, $14.50.

This volume forms part of a comprehensive treatise of very broad scope, and can be fairly judged only in relation to the rest of this large enterprise. I have therefore examined not only this volume but also (more superficially) the other three volumes already published and the announced plans for the treatise as a whole. Volume 2 on "Organic and Physical Chemistry" has already been reviewed in this journal (85, 838 (1963)) by W. P. Jencks.

Volume 3 begins with two chapters by C. J. Bullen on crystallography and X-ray diffraction. The fundamentals are well presented, although it is somewhat surprising to find Patterson syntheses and isomorphous replacements discussed in Chapter I, while the Laue conditions and the Bragg equation are not reached until the beginning of Chapter II. The great recent achievements in the study of heme protein crystals are not discussed here—they are probably reserved for a later volume dealing with proteins—but much of the background for understanding them is laid. Chapter III on "Analysis by Emission Spectroscopy" (N.H. Nachtrieb) is brief but useful. R. A. Morton discusses "Spectrophotometry in the Ultraviolet and Visible Regions," covering much material of fundamental importance. One misses discussion of the important distinctions between $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ transitions, and there is no mention of exciton theory. There is virtually no discussion of the spectra of proteins or nucleic acids; presumably these are to be taken up in later volumes dealing with these classes of substances. The discussion of purines and pyrimidines assumes the enolic form to be predominant. However there is strong evidence from infrared spectra, not mentioned in this book, in favor of the keto structures (H. T. Miles, *Biochem. Biophys. Acta*, **22**, 247 (1956); **27**, 46 (1958); *Proc. Natl. Acad. Sci.*, **47**, 791 (1961)). Morton's chapter is, however, a valuable contribution and covers much fundamental material very well.

Chapter V on infrared spectra (L. J. Bellamy) gives an excellent presentation of the fundamental significance of vibrational spectra for compounds of biochemical interest; and Chapter VI on "Fluorescence" (A. Ehrenberg and H. Theorell) manages to present, in only twenty pages, an inevitably brief, but useful, sketch of fundamental theory and a clear picture of the use and power of fluorescence methods in biochemistry.

Chapter VII on "Electronic Paramagnetic Resonance" (S. I. Weissman) will prove hard going at the start for those who do not have some basic background in quantum theory; in any case, however, a knowledge of quantum theory must indeed become part of the essential equipment of the biochemists of the coming generation. Those who are prepared to grapple with this brief and compact chapter should learn much from it.

The following chapter on "Nuclear Magnetic Resonance" (C.D. and O. Jardetzky) has to compete with a number of other recent expositions of the subject. Having read this chapter in manuscript, at the invitation of the authors, I may be prejudiced in its favor; but I do believe it does an excellent job of introducing this vital topic to the non-specialist like myself. The same authors have given a more detailed treatment of the subject in Volume 9 of "Methods of Biochemical Analysis" (D. Glick, editor).

The final chapter on "Determination of Mass, Form and Dimensions of Large Particles in Solution" (C. Sadron and M. Daune) covers a great deal of important material in highly condensed fashion. The discussion is admirable, and Sadron is one of the great masters in this field, but this chapter can be fully appreciated only by those who have much more background in the study of macromolecules than can be obtained from this volume.

All the topics covered are of fundamental importance for biochemists today, and all of course have been presented in other recent books and reviews. It is noticeable that optical rotatory dispersion is not discussed here or elsewhere in the first four volumes, although it is now comparable in importance to the subjects treated in Volume 3. However, it could quite logically be taken up later, in the volumes devoted to proteins and nucleic acids.

Internal evidence indicates a long delay between the submission of the manuscripts and the publication of the book. Few references later than 1959 are cited, and scarcely any later than 1960. In the subject matter of almost every chapter there have been recent advances of major importance, some of which reveal quite new perspectives, and it is regrettable that a book published late in 1962 should not have included more of these developments. This is presumably not the fault of the authors, and probably not of the editors; the chief responsiblity must fall upon the publishers. The present rate of scientific advance indeed creates formidable publishing problems, which scarcely existed in a more leisurely age. Articles in a book like this must be prepared thoughtfully, with mature consideration, as these chapters are. Once the manuscript is ready and has received critical editorial review, however, it should appear in print with all possible speed.

The useful working life of most scientific books today is relatively short; if the process of publication can be speeded up by six months or even a year, which is certainly within the realm of possibility, a substantial percentage will be added to that period of useful life. Publishers must break with past habits, and explore new approaches, if they are to achieve this; in a time when science is moving with such phenomenal speed, publishers must improve their own techniques to meet the situation.

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