

obvious. There is also lacking a discussion of the variety of organelles (ribosomes, mitochondria, etc.) in which distinct types of biochemical reactions take place in the living cell. How much is known about the extent to which the architecture of these organelles has varied in the course of biological evolution?

Despite this criticism, the charm for the biologist of Professor Baldwin's book cannot be denied. It is still a worthwhile *entrée* to comparative biochemistry, if for no other reason than its emphasis on the biological importance of phenomena studied at the molecular level. All too often, both in research and in teaching, biochemistry becomes an end in itself, with the result that the biological problems originally stimulating biochemical analysis are forgotten. One cannot accuse Professor Baldwin of such oversight of the biologically significant. Indeed, much of what is contained in this book often passes as physiology (the regulation of osmotic pressure, the conservation of water, digestion), and the morphological aspects of adaptation (pigmentation, type of eggs produced, food-gathering mechanisms) have the prominent position they should in a book on comparative biochemistry. The theme running through this book is evolution and adaptation to different ecological niches. The conclusion finally reached is that "... there exists a common, fundamental chemical ground-plan of composition and metabolism to which all animals, and very probably other living organisms also, conform, and that, superimposed on these foundations, there are numerous secondary, specific and adaptational variations, some of addition and others of omission." This is a lesson worthy of deep consideration by the beginning student of biochemistry.

Arnold W. Ravin

Department of Biology, University of Rochester  
Rochester, New York

**Theorie und Praxis der Gravimetrischen Analyse. Band II. Bestimmung der Metalle.** By LÁSZLÓ ERDEY, Professor an der Technischen Universität Budapest, Mitglied der Ungarischen Akademie der Wissenschaften. Akadémiai Kiadó, Alkotmány U. 21, Budapest V, Hungary. 1964. 802 pp. 18 × 24 cm. Price, \$18.00.

The literature of analytical chemistry is a well-tilled field. In fact, some of its areas are beginning to show signs of overcultivation. Gravimetric analysis is not one of these, however. In some quarters, resort to precipitation processes is looked upon as something reprehensible, especially if the precipitate is finally weighed. Be that as it may, we have here, in the second volume of the German translation of Professor Erdey's three-volume treatise on the theory and practice of gravimetric analysis, a good account of such methods for the determination of the metallic elements. Adequately detailed directions are given for important procedures, and separation methods are included. A commendable feature is the inclusion of many thermoanalytical curves and tables showing the accuracy and precision of determinations, both from work in the author's laboratory.

If any fault is to be found, it is that some omissions of determination methods, or modifications of value, occur. More extensive bibliographies dealing with the determination of each metal would be helpful. Perhaps a full treatment of separations cannot reasonably be asked for—the field is too large. In a work of this size, errors are bound to be made, but not many were noticed (p. 396, the solubility of dimethylglyoxime in water at 25° is 63 mg. per 100 ml., not 0.4 mg.).

The last volume in the series will cover the anions.

E. B. Sandell

School of Chemistry, University of Minnesota  
Minneapolis, Minnesota

**Gas Analysis by Gas Chromatography.** By P. G. JEFFERY, Principal Scientific Officer, and P. J. KIPPING, Senior Experimental Officer, Warren Spring Laboratory, D.S.I.R. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1964. xi + 216 pp. 15 × 22 cm. Price, \$10.00.

This book is Volume 17 of the International Series of Monographs on Analytical Chemistry, edited by R. Belcher and L. Gordon. The analyses considered are those performed by the gas, mining, petroleum, iron and steel, and related industries. There is only one reference to gas analysis of a biological sample. Therefore this book will be of little interest to those in the biochemical and medical fields.

The introductory chapter and, indeed, all theoretical material is so briefly treated that the book cannot be compared to other books on gas chromatography which may be used as texts. The sections on sample transfer systems, detectors, and gas sampling should prove useful to gas analysts.

Although there are a number of recent references in this volume, certain significant recent developments are not included. For example, the section on detectors might have included some information on the recent advances in micro thermal conductivity cells, and in microcoulometric methods of detection. The tables listing separating columns and retention times for various gases provide a handy source of useful data.

The price of this volume is rather high for a brief book printed on inexpensive paper. Almost all of the information presented, with the exception of the unpublished references of the authors and their associates, is available in other more comprehensive volumes such as those written by Purnell, Littlewood, Dal Nogare and Juvet, and Keulemans. However, the practicing analyst in the industries cited above may wish to have a copy for use in the laboratory.

R. D. Schwartz

Shell Development Company  
Houston 1, Texas

**Porphyryns and Metalloporphyryns. Their General, Physical and Coordination Chemistry, and Laboratory Methods.** By J. E. FALK, Division of Plant Industry, Commonwealth Scientific and Industrial Research Organization, Canberra, A.C.T. (Australia). American Elsevier Publishing Co., Inc., 52 Vanderbilt Ave., New York 17, N. Y. 1964. xii + 266 pp. 17 × 24.5 cm. Price, \$13.50.

This excellent monograph may be characterized briefly as "poly-functional." One function intended by the author is to bring up to date the review of the porphyrin and metalloporphyrin portion of the book published by Lemberg and Legge fifteen years ago. In particular, the attempt has been made to correlate experimental observations with newly developed basic concepts in the field. A real effort has been made, however, to provide enough background material to permit the book to stand alone. This will make it valuable to organic, inorganic, and physical chemists, biologists, and medical students. Both experts and beginners in the field will find this a useful compilation of the literature.

The monograph is divided into two sections, a general and theoretical section and one on laboratory methods. The section on laboratory methods will give other laboratories the benefit of the long experience of the Australian investigators in the manipulations involved in porphyrin chemistry and will be a great time saver for investigators in the chemical and biological aspects of porphyrin studies.

The work also serves the useful purpose of providing an up-to-date insight into the theoretical and experimental advances in the field of porphyrin chemistry made in the Australian laboratories. In particular, the extensive work on the properties of porphyrin derivatives in detergent solutions is presented in several sections. It is stated (p. 117) that detergent solutions of porphyrins are essentially aqueous, yet arguments are presented and observations recorded (pp. 29, 37, 46) showing the strong contrast in the environment of the porphyrins in detergent micelles from that in truly aqueous media. While the detergent technique is one of great value, Falk's own observations raise objections which must temper interpretations of its ultimate significance.

A brief section appears (pp. 24 and 25) which mentions clinical use of porphyrins. Since this may well be used as an introduction by medical men, it is unfortunate that the author did not draw upon his extensive experience to sound a warning about the hazards involved in clinical use from undesired photosensitization of patients.

The position is taken (p. 59) that both the visible and ultraviolet bands of metalloporphyrins are shifted by a change from low-spin to high-spin bonding. Examination of the spectra shows, however, that the change in the ultraviolet is due to a change in ligandcy, not in spin-state. The figure of 300 m $\mu$  should read 30 m $\mu$ .

The section on hemoglobin (pp. 106–108) relies on the X-ray evidence from the ferric series for structural conclusions regarding the ferrous series. As more chemical and X-ray evidence has accumulated, it is apparent that this conclusion is not tenable and will have to be revised.

The value of the well-selected bibliography at the end is limited by the lack of an author index. Whatever the cause of this deficiency,

it is unfortunate that an author who spends so much time in assembling a critically selected bibliography will consent to have its utility diminished by limiting it to unidirectional use.

In spite of these minor flaws, the book will be found to be of great value to all scientists interested in the field, whether from the chemical, biological, or medical point of view or whether they are beginners or experienced in these studies.

Alsoff H. Corwin

Department of Chemistry, The Johns Hopkins University  
Baltimore, Maryland 21218

**Topics in Phosphorus Chemistry. Volume 1.** Edited by M. GRAYSON, American Cyanamid Co., Stamford, Conn., and EDWARD J. GRIFFITH, Monsanto Chemical Co., St. Louis, Mo. Interscience Publishers, John Wiley and Sons, Inc., 605 Third Ave., New York, N. Y. 1964. vii + 262 pp. 16 × 24 cm. Price, \$12.00.

This volume is the first of a new series which has been inaugurated "to provide the general scientific reader as well as the specialist in phosphorus chemistry with a series of critical evaluations and reviews of progress" in this rapidly growing division of the chemical science. No pattern of topic coverage has been established for the series and the editorial view is toward a flexible attitude.

A series, such as this one, certainly has a place in the "permanent" chemical literature today. Numerous and rapid strides of research expand the existing knowledge so rapidly that a truly comprehensive piece of writing, even in such a restricted area as phosphorus chemistry, would require at this time a volume of ponderous size, at best. Such a volume would lack a fair amount of the most recent information and, thus, would be out of date, even at the publication date, in several topics if the writer is fortunate.

The present volume contains the following chapters, in addition to the usual author and subject indexes: "Synthesis of Organophosphorus Compounds from Elemental Phosphorus," by M. M. Rauhut; "Nucleophilic Displacement Reactions on Phosphorus Halides and Esters by Grignard and Lithium Reagents," by K. D. Berlin, T. H. Austin, M. Peterson, and M. Nagabhushanam; "The Michaelis-Arbuzov and Related Reactions," by R. G. Harvey and E. R. De Sombre; "Lower Oxo Acids of Phosphorus and Their Salts," by Sh. Ohashi; and "Condensed Phosphates Containing Other Oxo Acid Anions," by Sh. Ohashi.

While the general approach of the individual authors to their chapters varies expectedly in this book, some similarities are clear. The descriptive approach predominates in all of them. This is unavoidable in the last two chapters which deal with very young material, with topics that really did not exist but a few years ago. Probably the best balance between the theoretical and the descriptive approaches is attained in the third chapter on the Arbuzov-Michaelis reaction. This is facilitated, of course, by the relative wealth of data which has appeared in the literature in this connection in the past decade. Unfortunately, this information was made use of much more sparingly by the other authors in this volume. Possibly, at the present time, this reluctance to theorize is wise; however, the time is ripe for a well-founded theoretical analysis of the behavior of phosphorus compounds and a volume such as this one could well be expected to provide a home for such a discussion.

The book is nearly equally divided, space-wise, between the organic and the inorganic phosphorus compounds, so that enthusiasts in both areas would find this volume a useful literature survey up to about mid-1963. The literature coverage from mid-1940's is quite complete, but occasional misses of important points have been found. For example, in the report on the reaction of elemental phosphorus with phenols and alcohols, appearing on pages 12 and 13, the author reports some work by Soviet chemists but for some reason omits the finding that considerable amounts of triphenyl phosphate result from the reaction with phenol. Since this is a commercial product of some considerable importance, this omission would be very hazardous one to an industrial chemical reader.

The make-up of the book is good and attractive. However, in the second chapter the authors make use of heavy Arabic numerals to designate the various compounds that appear throughout the text. This notation is rather hard on the reader who has been brought up on the Roman numerals in such cases. Furthermore, the need for such numerals seems absent in a printed volume of some size, in comparison with the relatively restricted space of a journal article. More generous use of chemical names and formulas would have

added but a few lines to the total size of the chapter, but would have added very greatly to the general readability of this chapter.

More generous use of tables of reported compounds, and/or their properties, would have been a most useful addition to this book, particularly for those wishing to make a quick search for a known and recently reported substance. It is to be hoped that such tables will be more frequently employed in the future volumes.

Only a few misprints were found in this volume. One of these is glaringly evident in the second equation on page 7.

While the chapter titles are a clear indication of the contents for the first three chapters, this may not be the case for the last two. These are directed primarily to the inorganic chemistry of the indicated substances and deal with very recent and difficult areas of phosphorus chemistry. The last chapter deals with condensed "polyphosphates" in which links of silicon, sulfur, vanadium, arsenic, calcium, and barium occur.

It is to be hoped that the future volumes will preserve the fine impression given by the first volume of this infant series.

G. M. Kosolapoff

School of Chemistry, Auburn University  
Auburn, Alabama

**Introduction to Infrared and Raman Spectroscopy.** By NORMAN B. COLTHUP, American Cyanamid Company, Stamford, Conn., LAWRENCE H. DALY, State University of New York at Albany, Albany, N. Y., and STEPHEN E. WIBERLEY, Department of Chemistry, Walker Laboratory, Rensselaer Polytechnic Institute, Troy, N. Y. Academic Press, Inc., 11 Fifth Ave., New York, N. Y. 1964. xii + 511 pp. 16 × 23.5 cm. Price, \$12.00.

This book was written for the analytical or organic chemist. It aims to provide the reader with an understanding of the molecular basis of infrared and Raman spectra, so that he can make better use of vibrational spectroscopy in his own work. It starts off with three chapters on the elementary physics of molecular spectra, on instrumentation for infrared and Raman spectroscopy, and on molecular symmetry as the basis of the spectroscopic activity of molecular vibrations. This introductory material, which makes up one-third of the book, is intended to provide a background of molecular physics for Chapter 4 on "The Origin of Group Frequencies." Then follow eight chapters on the characteristic frequencies of the most common organic and inorganic functional groups, an excellent chapter, "Major Spectra-Structure Correlations by Spectral Regions," and two entitled "The Theoretical Analysis of Molecules" and "The Calculation of Thermodynamic Functions."

As a bridge covering the gap between Herzberg's formidable monograph "Infrared and Raman Spectra" and Bellamy's comprehensive treatise on the infrared spectra of large molecules, this book serves a useful purpose. For the most part it compares favorably with the half-dozen or more such books which have appeared in English in the past few years.

The best features of the book for its intended readers are contained in Chapters 4-13, summarizing functional group frequencies and their origins. Not only are group frequencies discussed in authoritative detail, but 624 infrared spectra in condensed form are presented to illustrate the appearance of the infrared bands from which these frequencies are derived. The conditions under which the various spectra were obtained are carefully stated and the spectra are well indexed both as to functional groups and as to molecular formulas.

This reviewer's chief criticism would be directed at Chapter 3, entitled (somewhat inaccurately) "Classification of Molecules." It seems of doubtful value to try to present the mathematical theory of group representations in a few pages to the organic or analytical chemist if the chief objective of the presentation is to show him how to calculate the number of molecular vibrations belonging to each symmetry species. This calculation can be explained in simple terms without explicit appeal to group theory, and generalized in the form of tables, as has been shown for example by Herzberg (*loc. cit.*, pp. 131-135). The latter approach is no less exact than the group-theoretical procedure, to which it is entirely equivalent, but with proper exposition (such as that of Herzberg, for example) it gives the beginner more insight into the form of vibrational modes.

The discussion of the physical basis of infrared and Raman selection rules in Sections 3.7 and 3.8 is also needlessly obscure because of its burial under group theoretical formulas which are taken from the literature without explanation. This discussion in particular is at odds with the claims in the Preface that "the theory presented