Book Reviews

Physical Chemistry. Walter J. Moore. New York: Prentice-Hall, 1950. 592 pp. $5.00.

The first six chapters of this text, "designed for students in the sciences and in engineering" and possibly "useful to chemists in industry who desire a review of the subject," are devoted to a classical formulation of the fundamentals of thermodynamic theory and its application to gases, chemical equilibria, phase transformations, phase equilibria, and solutions. Included in the treatment are such topics as the proof of the lever rule, the calculation of the entropy of mixing of ideal gases, and the effect of hydrostatic pressure on vapor pressure. This is followed by individual chapters on the kinetic theory of gases, on atomistics, on nuclear physics, and on the ideas of wave mechanics. Then a chapter treats theoretical methods (e.g., the valence-bond and the molecular orbital approach) of interpreting molecular structure as well as some experimental tools providing elucidation of the constitution of molecules. A short chapter considers the Boltzmann distribution, the evaluation of partition functions and the calculation of thermodynamic quantities of chemical interest. The next two chapters deal with the results of the application of x-ray diffraction methods to crystals and liquids and a brief, qualitative discussion of modern theory of condensed phases. The final three chapters treat electrochemistry, surface chemistry, and chemical kinetics with a presentation of modern reaction rate theory.

The scope of the treatment is generally intermediate between that of the usual elementary physical chemistry text and the specialized treatise of use to the theoretical chemist. Excellence of organization, illustration, and typography are evident. A generally lucid and precise manner of presentation employed by the author enlivens the reading. Interest is further heightened by injections of paragraphs of historical significance. Occasional footnotes bear reference to research papers and sources of specific information. Chapter lists of references to treatises, monographs, and other books, as well as to informative or review articles, may encourage the student to further independent study. A generous number of stimulating problems is provided.

To present a comprehensive and varied physicochemical "smörgåsbord" in a single, conveniently sized volume requires some concessions. To provide space for emphasis of structural chemistry, the author severely minimized the discussion of topics such as ionic equilibria, titration curves, determinations of molecular weights, fractionation, and thermochemistry. Continuity and development of theoretical considerations with mathematical exactness were achieved at some sacrifice of the presentation of the experimental aspects of the subject. The treatment of electron diffraction of gases includes the derivation and some applications of the Wierl equation; there is a 13-page discussion of x-ray diffraction of crystals, including even Fourier syntheses—yet the reviewer could find no mention of the application of neutron diffraction to structural problems. For details of mathematical apparatus, the reader is referred to standard texts.

The success of the book as an elementary text can perhaps best be judged by student response. Although considerably more material than can be presented or digested in a two-semester, elementary course is provided, judicious selection will provide a basis for a nourishing menu. The volume should prove of especially great utility to chemists and graduate students who desire a concisely yet clearly presented review of modern physical chemistry.

EDGAR F. WESTRUM, JR.

Department of Chemistry
University of Michigan

Principles and Practice of Spectrochemical Analysis. Norman H. Nachtrieb. New York: McGraw-Hill, 1950. 324 pp. $4.50.

The first part of this book is a very skillful condensation of the background information in the varied domains of physics, chemistry, and common sense which are of interest to chemists performing or learning quantitative (and qualitative) emission spectrographic analysis. Professor Nachtrieb has included, in 70 pages of lean and carefully considered prose, all the main features of refraction and diffraction, applicable to spectrographs, as well as many interesting details. The effects of varying parameters are usually described in words and diagrams, although these are supplemented by basic formulas.

In a few cases, a more detailed mathematical derivation is given. Thus, the section on concave gratings not only gives a fairly rigorous derivation of the Rowland circle, but also includes the mathematical justification for spacing grating rulings equally along a chord of the trace of a concave grating in the horizontal plane. The latter is a rare item in textbooks. The chapters on the "Photographic Process" and "Evaluation of Photometric Data" are clear and uncluttered, and mention several advances in these fields which, although some are ten or more years old, have for the most part been greeted by a conspiracy of silence in recent texts in English. This is particularly true of the Seidel (Sampson-Baker) function, which gives an emulsion calibration curve that is linear over most of the measureable transmittance range.

One or two ambiguities in the discussion of the effects of intermittency and reciprocity failure might have been avoided if the connections between density, intensity, exposure time, and the Schwarzschild coefficient p had been presented in some form such as the Ahrens-Eggert three-dimensional model. Certain paragraphs in this discussion might leave the reader with the impression that intensity-

scale calibration curves made with spectral lines of different intensities are parallel only when reciprocity failure is absent (i.e., $p=1$), whereas this parallelism requires only that p be constant over the exposure range covered. This is, in fact, implicit in some of the author's statements.

The section on the origin of spectra is an excellent example of skill in concentrating a large field into a small space by making every sentence count. The presentation, although semiquantitative in many places, is a model of tight organization and effective use of diagrams. The section on the excitation of spectra is brief; it includes a summary of Kaiser and Wallraff's classic paper on spark discharges and the generation of disruptive discharges. The emphasis is very properly placed on the current flowing in the discharge, rather than on the circuit parameters. No specific mention is made of the Pfeilsticker-Sventitskii low-voltage triggered arc.

The "practices" section of the book contains detailed discussions of certain exposure and sample preparation techniques selected to illustrate principles, rather than to provide laboratory directions. Presparking, electrode shapes, fractional distillation, the use of standard samples, and other topics are discussed in terms of specific techniques for analyzing liquids and solids. A section on preliminary chemical separation methods for trace analysis is accompanied by much good and heartfelt advice on chemical "asepsis" derived from the author's long experience in this field.

This book would serve as an excellent basis for a course in spectrochemistry.

CYRUS FELDMAN

Oak Ridge National Laboratory

An Introduction to Nematology: Anatomy, Sect. I. Rev. ed. B. G. Chitwood and M. B. Chitwood. Washington, D. C.: B. G. Chitwood, Box 104, Catholic University, 1950. 213 pp. $10.00.

After being out of print for several years this source book on nematodes, Section I, Parts I, II, and III, is again available, in one volume. It is intended for zoologists, helminthologists, agriculturists, and research workers in any field dealing with roundworms.

A historical résumé in Chapter I reminds us of the importance of nematodes, which annually exact a 10% toll from all crops in the United States. As parasites of domestic animals they cause a yearly loss of $500,000,000.

Chapter II outlines the classification of free-living and parasitic nematodes, in which the class Nematoda is given the rank of a phylum. This arrangement, together with the subdivisions, makes the entire classification more comprehensible and available to the nonspecialist in taxonomy.

Chapters III to XII illustrate and discuss fully the details of the finer anatomy of some 439 species and 357 genera of both free-living and parasitic nematodes, from the cuticle to the ova. The same excellent text figures, 145 in all, are retained from the original printing, with slight rearrangement and changes in pagination. Each chapter is supplied with a well-chosen bibliography brought up to date. It is significant, however, that few great contributions have been made since 1941; consequently, there are no large additions to the general content of the text.

The final chapter—XIII—discusses nemic relationships, origins, and evolution and gives a tabular comparison with other groups. A page and a half of abbreviation symbols and four and a half pages of an index to illustrations complete this excellent volume on nematodes.

LYELL J. THOMAS

Department of Zoology
University of Illinois

Botany: An Evolutionary Approach. R. Darnley Gibbs. Philadelphia: Blakiston, 1950. 554 pp. $6.00.

One difficulty that a reviewer of a textbook always faces is to judge the book from the position of the students for whom it is written. Even if the reviewer is a teacher, it is hard for him to remember how much and how little beginners in a particular field may know. It is even harder to judge whether the author's presentation of the material is explicit enough for the students to obtain the concepts and facts that were intended. It seems to this reviewer that Dr. Gibbs has been very successful, on the whole, in incorporating the information and the viewpoint that he set out to give. It is his contention that the best way to lead students into botany is to start with a discussion of the simplest plants and to work gradually through an evolutionary sequence to the study of the flowering plants. As he points out in the preface, this approach is not currently popular and serves in part, at least, as a justification for putting on the market yet another introductory botany text.

Prospective users of the book will have to decide whether they agree with the author that the evolutionary approach to plant science is best for beginning students. There can be no doubt that this approach should be available for advanced students and for general readers. The modern concepts of plant evolution have not been presented frequently enough in as clear and well-developed a manner as Gibbs achieves. This reviewer believes, however, that college freshmen and sophomores may have trouble in maintaining an interest in their botany course when they fail to learn about the familiar, conspicuous seed plants until late in the book—this despite the fact that in all the earlier chapters there are references to the usefulness or the harmfulness to man of many of the "lower" plants. Gibbs argues that students are not familiar with seed plants and are not especially interested in them. He is right that they are not familiar with them, but they think they are, and this feeling of familiarity serves to make them more interested in acquiring some knowledge of them than in learning about primitive plants first. Gibbs may be able to hold the attention of his students, for any good teacher can carry students into any field he is enthusiastic about. It is the belief of this reviewer, however, that Gibbs's *Botany* may be a hard book for many teachers to use successfully with first- or second-year college students. It should be an excellent text for advanced students.

The emphasis on evolution as the basis for organizing