

NEW BOOKS

edited by F. W. Quackenbush

PRACTICAL HINTS ON ABSORPTION SPECTROMETRY, 200-800 μ , J. R. Edisbury, Plenum Press, New York, N.Y., 1967, 266 + vii pages.

In the introduction to his text, the author says "It is directed at the intelligent School-Leaver" (equivalent to the American Dropout?) "and also the Occasional Spectroscopist." With this introduction, the title of the book becomes completely nonunderstandable. The word "hint" is defined, usually, by the synonyms "cue," "clue," "inkling," "glimmer," or "allusion," all implying a brief bit of information. "Practical" conveys the concept of more or less immediate usefulness, amenable to the means at hand, suitable to the occasion or time. Chapters 4, 5, and 6 are all entitled "General Working Instructions." Chapter 4 deals with "Photographic Instruments." Although, as the author says "No one who has enjoyed the convenience of a modern photoelectric instrument would willingly go back to the old spectrograph for quantitative absorption spectrophotometry—" his 17-page chapter is a continuous description of instruments which are not to be used again. I enjoyed the chapter. It is informative, well-written, in an easily readable, enjoyable style. Probably, too, I share with the author a nostalgic memory of the days when we worked to produce a single spectrum with these instruments. But "hint" or "practical" it is not.

Chapter 5 discusses "Visual Instruments," introduced with the words "At first sight, there is little obvious need nowadays ever to use a visual instrument for absorption spectrometry," followed by a 6-page continuous description of subjective techniques—again neither "hints" nor "practical." Even the material in the 38-page Chapter 6 on "Photoelectric Spectrometers" cannot be described as "hints," and, although the instruments described are practical, a more practical approach for the "School Leaver" or the "Occasional Spectroscopist" would be to confine himself to the brochures of the manufacturer of the specific instrument to which he has been assigned. Again a 38-page dissertation can't, by the usual connotation of the word, be called a "hint."

The first chapter "First Principles," is more a definition of "Spectra" and an explanation of "Color" than any recitation of principles. The author reveals the easy and often witty style which characterizes the entire volume, without ever detracting from the context. Our "School Leaver," if he could completely grasp the significance of the author's last two sentences in this chapter, in reference to spectrophotometers, "Each type has its appropriate applications. Each can be misused to give misleading yet reproducible results," will have advanced from his neophyte status to a stage which alas, is too often never completely attained even by professional experienced spectroscopists.

Chapter 2 "Definitions" is a disappointment. The author takes no stand regarding endorsement of any of the attempts to standardize definitions, terms, and symbols. Rather all possible choices are given, for example, for the amount of radiation absorbed, absorbance, optical density, or extinction, abbreviated E, or A, or a, or OD. I would prefer that my "School Leaver" not see this chapter and follow only the uniform system as advocated by the American Society for Testing & Materials and adopted by our Laboratory.

Chapters 7, 8, and 9 discuss respectively light sources, all types, photo-detectors, all varieties, and absorption cells or cuvettes, all styles, shapes, and sizes. Again we cannot agree that these 46 pages will ever prove to be helpful "hints" to the neophyte coming into the spectroscopic laboratory from school, nor to the Occasional

Spectroscopist. Again practicality gives way to nostalgia. For example, in Chapter 7, the under-water spark is discussed despite the admitted fact that it "is remotely likely to be revived for general use." Neither this nor the following chapter on photo-detectors adds much to what can be readily obtained from any manufacturer's brochures, and by remaining nonselective, describing all types, will probably be more confusing than helpful to the neophyte or to the part-time spectroscopist.

Chapter 10 deals with solvents, their purification and recovery, the effect of solvents on absorption spectra. No practical specific directions are given to aid the neophyte. Such specific instructions would have to be furnished by the supervisor, presumably a qualified spectroscopist who would not be particularly helped by the general discussion in this chapter.

Starting with Chapter 11, the author enters into a detailed discussion of a series of subjects of importance to any group using absorption spectroscopy for analytical purposes. These chapters include: "Preventative Maintenance"; 12 "Stray Light"; 13 "Differential and Additive Absorption Spectrometry"; 14 "Atomic Absorption: A Brief Note"; 15 "Links With Sanity" (concerned mostly with wavelength and photometric scale calibration); 16 "Collaborative Tests," and 17 "The Quest for Accuracy and Precision." These seven chapters take 86 pages, each is therefore rather brief. The style is very scholarly, yet quite enjoyable, but as a thesis, not a series of helpful "hints." If the "School Leaver" or "Occasional Spectroscopist" is to gain much from these chapters, a supervisor will have to document, probably tabulate the specific instructions hidden in the continuous text. For practical purposes, instructions from the chapter on Preventative Maintenance could probably be better obtained from the manufacturers' brochures; and from the chapters on detection and correction of Stray Light, and Wavelength and Photometric Calibration from standard detailed procedures for these purposes available from Committee Reports of collaborative studies to attain standardization. Chapter 14 could be preferably omitted from the text. Except for this very brief excursion (less than two full pages) into atomic spectroscopy, the text deals exclusively with molecular spectroscopy. Addition of the word "Molecular" to the title would have prevented any requirement for this chapter, which by itself is of no value and properly belongs in a text dealing with emission methods, including optical emission (spectrochemical analysis) x-ray fluorescence and gamma ray spectroscopy with neutron activation.

The final two chapters of the text are entitled "The Control Charts as A Prophylactic in Absorption Spectrometry, or A Child's Guide to Statistical Analysis" and "Presentation of Results," the latter presenting the well-known, but always startling wide variety in which absorption data can be presented.

The text is recommended for general spare-time reading. Most analytical spectroscopists, including neophytes and part-time spectroscopists will enjoy it. The material is readily understandable; it is written in a very enjoyable style, and a leisurely reading, as recommended, will undoubtedly profit most any reader. However, as a practical laboratory tool to run to when problems arise, as an encyclopedia of helpful hints, it cannot be recommended.

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GRUNDLAGEN DER SYNTHESEN VON ZWISCHENPRODUKTEN UND FARBSTOFFEN (Principles of the Syntheses of Intermediates and Dyestuffs), by N. N. Woroshzow. German edition: translated by N. Stscherbina; edited and supplemented by E. Baumann and F. Bahr (Akademie-Verlag, Berlin, 1966; 1059 pp; DM 135.-).

This treatise on aromatic intermediates and dyestuffs coordinates the reactions of aromatic compounds in three major groups; their substitution, the conversion of the substituents and the reactions involving changes of the carbon structure. Altogether 15 chapters present topics such as sulfonation, nitration, exchange of amino groups, diazotization and sequential reactions, condensations and rearrangements.

Orientation in each chapter is facilitated by subheadings in a well chosen organization which conforms in all chapters. The topics begin with general considerations, proceed to practice in carrying out the reactions, and include theory and specific important compounds. Many chapters end with outlines of analytical procedures applicable to the type of compounds. These procedures appear surprisingly traditional to the reviewer.

An abundance of literature references follows each chapter. The numerous patents are given by number with reference either to Chem. Zentralblatt or Chem. Abstracts. FIAT, BIOS, CIOS and similar collections which may not be common in the average industrial library, are quoted. Many of the industrially important reactions carry considerable history and the book with about 10,000 references can truly claim the character of an encyclopedia. This is most welcome and admirably comprehensive. Literature references of the original Russian edition proceed to about 1960 and are supplemented in the German edition to reach 1963 without changes in the text. They are quoted with title, but often only with reference to Chem. Zentralblatt. An elaborate and covering subject index of 65 pages concludes the book.

The detailed discussion and the multitude of references, particularly to earlier literature, is doubtlessly very useful for the laboratory working in this field. The production is on good paper, in excellent print with many formulae and reaction schemes in very good reproduction.

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COMMERCIAL METHODS OF ANALYSIS, by Foster Dee Snell and Frank M. Biffen, (Chemical Publishing Company, Inc., New York, N.Y., 753 p., 1964, \$12.00).

This book, in the field of analytical chemistry, contains 39 chapters and an index. It is sturdily bound, well printed and illustrated, all lending to its projected usage as a general reference on the analysis of many commercial products and materials.

This is the second edition of this title, the original of which was published in 1944. The book is comparable to some texts which have found wide usage in classrooms of Industrial Chemistry, as suggested by opening chapters on "Tools of the Analyst" and General Procedures." Few changes are made in the second edition. Most instrumental methods developed in the last 20 years, such as gas chromatography and infrared analysis, etc., are not included.

The book should be in the libraries of independent laboratories as a general reference; also chemical analysts in whatever position, who may be interested in the analysis of the many commercial products on the market today, and the many raw materials going into those products. It should also be valuable as a school text.

Many special methods have been included to save time and labor. Some simplification of standard methods have been made where it is possible and practical to deviate. This is of particular value to the analyst ordinarily subject to multitudinous investigative procedures.

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INSTRUMENTATION IN THE CHEMICAL AND PETROLEUM INDUSTRIES—Vol. 3, edited by J. T. Ward. (Instrument Society of America) 187 Pages, 1967, Price \$12.00.

This book consists of a collection of 22 papers taken from the Seventh National Chemical & Petroleum Instrumentation Symposium sponsored by the Instrument Society of America in 1966. Its $8\frac{1}{2}'' \times 11''$ size with photo-reproduced typewritten format makes for easy reading in the armchair. But your reviewer found it to be a trifle awkward on a city bus where the cover might rest in the lap of the mini-skirted young thing in the next seat.

The papers are grouped into five subject categories: analog computer process control, distillation control, instrument maintenance, analytical instruments, and intrinsic safety in electrical instruments and equipment. As with any symposium, the quality of the papers is highly variable. And their value to the reader will depend on his particular needs, experience and viewpoint. On the whole, this annual publication presents an overview of current activity in the process instrument field from the point of view of the user and the manufacturer of such equipment.

Papers generated by users largely describe specific application problems which they have encountered. These may be of academic interest to some readers as a matter of general knowledge. Some of the papers contributed by manufacturers seem to be tainted with commercialism, but most are scrupulous on this point.

The group of papers on instrument maintenance are the result of a "workshop" type of session. As such they are primarily a colloquy between the speaker and the audience dealing mainly with the philosophy of maintenance and calibration.

A paper titled "Control of Columns with Side Stream Draw-Off," by W. L. Luyben of duPont Company is of particular interest in that it serves as a useful reference and guide for side-stream control applications.

Two papers are apt to be of particular interest to readers of the Journal. Both of these describe proprietary equipment. One presents a method of "Fluids Blending by Special Purpose Analog Computer," and the other describes a device for the "Analysis of Particulate Contaminants." Another paper which may interest the Oil Chemist is titled "Trends in Electrochemical Instrumentation in the Chemical and Petroleum Industry." This is a review type of paper describing the latest in electrochemical analysis electrodes for both plant and laboratory.

The section on intrinsic safety is worthy of comment in that it presents a rather complete dissertation on the present state of the art. The first paper reviews the history and background considerations of intrinsically-safe systems. The second covers the application of intrinsically-safe circuits, the testing of such circuits, and a discussion of the mathematical probabilities of failure. A third paper covers the methods of circuit design and fault analysis techniques.

Another paper in this section on explosion prevention is titled "Area Classification and Available Equipment for Hazardous Areas." It is a comprehensive digest of the applicable codes and practices of the United States and various foreign countries, including the U.S.S.R., Great Britain and West Germany. This is a worthwhile reference to material which is not readily available elsewhere. The differences in philosophy and practices of the various countries will be of interest to those concerned with safety and fire prevention.

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ULTRAVIOLET AND VISIBLE SPECTROSCOPY, Second edition by C. M. Rao, (Plenum Press, New York and Butterworths, London, 223 p., 1967, \$10.00).

This is a hard cover book very legibly printed on good quality paper. The 198 $6 \times 9\frac{3}{4}$ pages of text comprise 13 chapters, each with its own set of references, totalling nearly 800. In addition the book contains a short bibliography of spectra collections, indices and books and reviews and concludes with a comprehensive subject index.

The first 2 chapters deal with the basic concepts of ultraviolet and visible spectroscopy as related to energy levels and transitions as well as with instrumentation and experimental techniques. This is followed by four chapters in which the spectral characteristics of molecules of increasing complexity are discussed, namely simple molecules, conjugated molecules, aromatics and heterocyclics. The longest chapter of the book then presents a number of practical applications of ultraviolet and visible spectroscopy and this is followed by several chapters in which the effects of structural features of molecules on spectra and special cases are discussed such as steric effects, far ultraviolet spectroscopy, fluorescence and charge transfer spectra. A chapter on miscellaneous topics covers transition metal ions, inorganic compounds, organic pigment dyes and the effect of the physical environment (solvents, temperature, hydrogen bonding) on spectra. The text concludes with a new chapter described by the author in the preface as concerning the spectra of "molecules of biological interest." This, however, turns out to be only a few pages limited to proteins and related compounds.

All through the book great effort has been made to assign observed frequencies to particular structures and electronic vibrations and transitions, and to explain any frequency shifts and intensity changes on the same basis. The book is profusely illustrated with excellent tables and figures, either prepared by the author or selected from the literature.

The book, however, has its shortcomings. As with the first edition, the references are less up-to-date than is desirable. With a few exceptions most of the literature cited is four years behind the date of publication. Even with the bibliography at the end of the text, which could easily have been prepared up-to-date just before printing time, the most recent citations are for 1965. Also, one

of the most extensive collections of ultraviolet spectra, published by Sadtler Research Laboratories, is not even mentioned. In the first edition, references at the end of each chapter were listed numerically in the order in which they had appeared in the text. This system has been retained in the new edition but in many cases revisions have consisted simply of inserting new material in the text and in these cases, the new references have been given additional numbers so that all references are listed numerically at the end of each chapter but often they are no longer in the order in which they appear in the text. This makes it difficult to locate any particular reference in the text.

There are a few misspellings throughout the text but most important there are also a number of mistakes and errors in the writing and references.

Most disappointing is the failure of the author to use the terms and symbols absorptivity (a) and absorbance (A) recommended by the ASTM Committee E-13. Instead Dr. Rao has continued to use interchangeably the hodge-podge of terms which have accumulated in the literature during the past. This is doing a disservice to students and non-students alike and perpetuating confusion. The relationship between wave length, wave number and frequency has not been explained and in many cases terms used in equations are not adequately defined or identified; in others, some abbreviations have been used without explanation.

As would be expected of a general book on this subject, lipids are given only incidental mention. The book, however, contains much material which is useful for obtaining information on the structure and nature of lipids as well as of other compounds from their ultraviolet and visible spectra. Many persons who have the first edition of this work, however, may not find it worthwhile to purchase this more recent version.

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SOLVENT PROPERTIES OF SURFACTANT SOLUTIONS, Kozo Shinoda, editor ix + 365 pages. Marcel Dekker, Inc., 95 Madison Ave., New York, N.Y. 10016, 1967, \$18.50.

Much technical information has been discovered in the past decade, concerning the physical properties of synthetic detergents and surface active agents. It is quite a task for the researcher to seek it out in the numerous scientific journals and reference books. The "Surfactant Science Series" has assisted the chemist by collecting and correlating recent findings and reviewing the current knowledge.

The second volume in this series has now been published. (Volume I, "Nonionic Surfactants," has been written by Dr. Martin J. Schick). Dr. Kozo Shinoda is Professor of Chemistry at Yokohama National University in Yokohama, Japan, and has many publications on physical-chemical properties of surfactants and related subjects. Under his editorship, a set of excellent articles has been prepared by leading international authorities. These are as follows:

"An outline of the Solvent Properties of Surfactant Solutions" by Eric Hutchinson, Department of Chemistry, Stanford University, Stanford, California, and Kozo Shinoda introduces the subject to the reader and defines commonly used terms as surface activity, micelle formation and solubilization.

"Solvent Properties of Nonionic Surfactants in Aqueous Solutions" by Kozo Shinoda penetrates deeper into the subject describing cloud point, critical micelle concentration and related phenomena.

"The Interactions of Polar Molecules. Micelles and Polymers in Non-Aqueous Media" by Frederick M. Fowkes, Director of Basic Research, Sprague Electric Company, North Adams, Massachusetts, reports on the properties of non-aqueous micelle formation and polar polymers. The principles of solubilization in non-aqueous media are set forth.

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"Physical Chemistry of Cleansing Action" by H. Lange, Henkel & Cie, G.m.b.H., Düsseldorf, Germany, defines cleansing as the removal of dirt or soil from objects or living beings. He then describes the mechanisms in both aqueous and dry cleaning systems.

"Pharmaceutical Applications and Physiological Aspects of Solubilization" by Lars Sjöblom, Department of Biochemistry and Pharmacy, Åbo Akademi, Åbo, Finland, examines surfactants used as antiseptics, and disinfectants and in conjunction with essential oils, alkaloidal and glycosidal drugs, fat soluble vitamins and hormonal steroids. He also comments on the toxicity of surfactants.

"Surfactants in Pesticidal Formulations" by Wade VanValkenburg, The Dow Chemical Company, Midland, Michigan, specializes on the preparation of stable emulsions via the HLB system, their properties and applications as insecticides, herbicides and fungicides.

"Emulsion Polymerization" by B. M. E. van der Hoff, Department of Chemical Engineering, University of Waterloo, Waterloo, Ontario, Canada, concludes the book with a discussion of emulsion polymerization, its initiation, particle formation, propagation and termination and the roles of diffusion.

The book is well documented with over 1000 references, has an author and subject index and is well illustrated with 42 tables, 120 figures and 3 electron microscope photographs.

The book is highly recommended to the fundamental researcher and the work in the applied field of surfactant chemistry.

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"NONIONIC SURFACTANTS," Volume 1 of Surfactant Science Series, edited by Martin J. Sebeck, published by Marcel Dekker, Inc., New York, 1085 pages, 1967.

The physical format of the book is excellent. Starting with graphs which are easy to follow, a broad subject index preceding each chapter and an extensive subject index which combine to make this book very easy to use.

It would be difficult to compare this book with other works since this is the first time all the facets of nonionic surfactant synthesis, properties and applications has been brought under one cover.

The book is divided into four main sections covering the organic, physical, analytical and biological chemistry of all classes of nonionic surfactants. The first section discusses the organic chemistry of all classes of nonionic surfactants covering their syntheses, applications and structural influence on detergency. The second section of the book deals with the physical chemistry of nonionic surfactants covering such subjects as surface films, micelle formation, solubilization, emulsification, dispersion stability, detergency, foaming and polyoxyethylene chain configuration. The third section covers the instrumental and chemical methods currently used for the separation and analysis of nonionic surfactants. The last section of the book deals with two important subjects, toxicity and biodegradation of nonionic surfactants.

Each chapter is well coordinated with the rest of the book showing a uniformity of presentation and evidence of good editing. The treatment of each subject ranges from the theoretical to the practical as shown by the complex discussion of micelle formation in Chapter 16 to the practical suggestions of cleaning formulations in many of the other chapters. Most of the contributors expertly skirted the prolific use of trade names and when they did use them they were preceded by a descriptive chemical name.

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