

THE SCIENCE OF SURFACE COATINGS, by H. W. Chatfield (D. Van Nostrand Co., Inc., Princeton, N.J., 594 pp., 1962, \$22.50). Dr. Chatfield has undertaken the editorship of this book in the hope that he might hasten the trend in the surface coating industry from being technology-based to becoming science-based. His chances of some success in this effort seem quite good.

The 19 chapters of the book each have been written by one or more authors who are experts in their fields. This approach has both the advantage of greater authority for the individual pieces of a very broad and complex field and the disadvantage of introducing large variations in style and coverage. Since the book will be useful primarily for reference to specific chapters, these variations are not particularly troublesome, but more attention by the editor could have improved this situation. Several of the chapters are well documented; others afford little or no help to the reader who might wish to go beyond the content contained in this book.

The extent of coverage of the subject matter is excellent. Individual chapters treat such subjects as principles of film formation, film properties and defects, surface preparation, application techniques, corrosion and its prevention, emulsions and surface active agents. Still other chapters deal with extenders, solvents and plasticizers. Two chapters are devoted to pigments, both organic and inorganic, while the chemistry and chemical engineering of drying oils and resins are discussed in three chapters. Chapters on optical properties and on rheological characteristics remind the reader of the importance of physics in the science of surface coatings.

This book should be useful to most of those who are active in the field of surface coatings. It is doubtful that even the "experts" will be so well-versed in all aspects that they will be unable to find useful information in some of the chapters. It also may be of some interest to those whose work brings them to the periphery of this area as a way of relating their work to this important field. In such a group one might include those who are interested in fats and oils, plastics, corrosion inhibitors and emulsifiers.

The printing is of good quality. Unfortunately, the same cannot be said for the binding. The spine of the reviewer's copy was badly broken upon receipt, with considerable consequent separation of the signatures. If this copy is typical, the book will not take the wear of repeated use as a reference without being rebound early in its lifetime.

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ADVANCES IN PHYSICAL CHEMISTRY, Vol. I, Edited by S. G. Cohen, A. Streitwieser, Jr. and R. W. Taft (Interscience Publishers, 1963, \$15.00; 411 pp.). Thus a new series of authoritative reviews begins in a rapidly expanding field. It is devoted to the application of the basic theories and methods of physical chemistry to the broad areas of knowledge of organic reactions and organic structural theory. The editors solicit the personal views of the authors.

The contents of this first volume include chapters on Ionization Potentials in Organic Chemistry by A. Streitwieser, Jr., of the University of California; Nucleophilic Aromatic Substitution Reactions, S. D. Ross of Sprague Electric Co.; Ionization and Dissociation Equilibria in Solution in Liquid Sulfur Dioxide, N. N. Lichtin of Boston University; Secondary Isotope Effects, E. A. Halevi of the Israel Institute of Technology; and Quantitative Comparison of Weak Organic Bases, E. M. Arnett of the University of Pittsburgh.

Printing and format are excellent. Errors are infrequent. The series has made a good start. It is directed at those who wish to keep up on current theoretical developments in specific physical organic topics.

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NEW BOOKS

ELECTRONS IN ATOMS, G. F. Lothian (Butterworths, 196 pp., 1963, \$6.95).

This little book provides a survey of "old-fashioned" atomic physics. It begins by reviewing briefly the development of the concepts of the electronic structure of the atom, including optical and X-ray spectra of atoms. Following a thorough survey of the Bohr theory of the atom, the author presents a simplified discussion of wave mechanics with an outline of the hydrogen atom problem. Then comes a chapter introducing the concept of electronic and nuclear spin and a short chapter on many electron atoms, emphasizing their spectra with a chapter on the Zeeman effect. The final chapter gives a history of the hydrogen atom's fine structure, including a discussion of the Lamb shift. The overall emphasis is on the experimental aspects, especially those which appeal to physicists.

This book is written for undergraduate physics students. Because of this, there is little emphasis on chemical applications. For example, the discussion of the *Aufbau Prinzip* and the periodic table is minimal, as is that on atomic term symbols. It seems to me that the author does not always define clearly the concepts as they are introduced, so that I believe it would be difficult to use this book as a first introduction to this subject. On the other hand, the treatment is almost too superficial to supplement other texts on the same subject. Most undergraduate courses in atomic physics would want to include material on the nucleus, while most physical chemistry courses would want more emphasis on chemical applications. The strength of this book lies in its strong emphasis on the experimental aspects of atomic physics. I believe it would be of some use to those chemists who wish a review of atomic physics as preparation for reading the more detailed treatment in Herzberg, *Atomic Spectra and Atomic Structure*, for example. It also may find some use as a supplement to a modern physical chemistry text.

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THE CHEMISTRY OF NATURAL PRODUCTS 2 (Butterworths, 225 pp., 1963. \$11.00). This book contains lectures presented at the Second International Symposium on the Chemistry of Natural Products held in Prague in 1962. The symposium was jointly sponsored by IUPAC and the Czechoslovak Chemical Society. The lectures have been published previously in *Pure and Applied Chemistry*, Vol. 6, No. 4.

The contents cover a broad range of topics that reflect the research interests of the authors. They include: biogenesis and chemistry of the terpenes, Ruzicka; steroid synthesis, Torgov; medium-sized ring compounds, Prelog; synthesis of tetracycline, Woodward; mass spectrometry of natural products, Djerassi; alkaloid biogenesis, Robinson; highly-oxygenated diterpenoid alkaloids, Marion; akuammicine alkaloids, Janot; photochemical transformations, Barton; chemotaxonomy, Erdtman; and the chemistry of aphid coloring matters, Todd.

As with previous volumes of IUPAC reprints of symposia, the book's main value is as a reference copy for the specialist. However, most of the chapters contain enough background information and have a broad enough scope so that they serve as interesting introductions for the non-specialist to current developments in the chemistry of natural products. The profuseness and clarity of the structural formulas are particularly commendable.

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IONIC EQUILIBRIA IN ANALYTICAL CHEMISTRY, by Henry Freiser and Quintus Fernando (Dept. of Chemistry, University of Arizona, John Wiley & Sons, 334 pp., 1963. \$4.95) is a textbook. It is a very good textbook. It very adequately fulfills the authors' goal of providing a rigorous but complete portrayal of the how and why ionic equi-

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New Books . . .

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libria are of such great importance in understanding how chemical reactions can be made to go to completion for analytical purposes.

While designed for upper level undergraduate students, it could be introduced at virtually any college level and referred to following post graduate work. It leads to an understanding of the processes involved rather than describing the experimental operations. Whereas there is a segment of teachers which feels that nearly all of the chemistry of analyses can be taught through a rigorous qualitative analysis course, these authors appear to feel the same about a rigorous course in ionic equilibria.

They treat the very fundamental (freshman level) concepts of the mole, normality, chemical equilibria and affecting conditions followed by a more mature presentation of the concept of chemical activity and its coefficient. The remaining 90% of the book treats the equilibria of analytical chemistry starting with acid-base equilibria of mono- and polybasic (and acidic) materials, including references to Bronsted and Lewis systems (80 pp.). Precipitation, metal complex and oxidation-reduction equilibria are treated in the next eighty pages. A welcome treatment is given to the equilibria operating in liquid-liquid extraction and ion exchange systems. The last 100 pages are devoted to the actual titrations that utilize these various equilibria. Herein lies this reviewer's principal objection to the book for this separation results in severe duplication and disjointed discussions of the four main types of analytical titration systems treated: acid-base, precipitation, redox and complexometric.

Each chapter is profusely filled with stepwise mathematical development and graphic representations of the salient points. These require close attention during reading as such ideas as equilibrium constants using activity coefficients use a bold-faced K while the more common "concentration" constants are depicted with an ordinary K .

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The difference is subtle but the import undeniable. Problems (sorry, no answers) close each chapter and frequently require a grasp or prior concepts to complete. Suggested monographs are noted after each chapter for deeper delving. The appendix includes formation constants of metal complexes, acid dissociation constants (only of 34 acids and 11 nitrogen bases), solubility product constants, standard and formal single electrode potentials (IUPAC 1953 convention), and acid-base and metallochromic indicators with appropriate pK_a and $\log K_f$ values. A good index concludes the book and four-place logarithms constitute the inside back liner.

Whereas acid-base buffers are discussed, buffer capacity is not, although it may be argued that titration equilibria do not rightfully require this treatment. A "sharpness" index is presented which is quite novel. This pertains to the quality of an endpoint and is applicable to visual and potentiometric endpoints.

Aside from what this reviewer considers a serious error in organization as noted above, this book is a firm and complete treatment of a most valuable subject. The authors are to be commended and this Journal's readers would be well advised to add this surprisingly inexpensive book to their reference library. They would also be well advised to read this book as well, and refresh themselves on just what is really going on in many of their own chemical analyses.

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