

but happens to be represented in the Dow collection. It is important to keep in mind that the "Mass Spectral Correlations" are meant to be a source of suggestions rather than a foolproof guide to the interpretation of mass spectra in general.

The number of peaks listed at higher mass decreases rapidly and above mass 200 the selection becomes meager (with the exception of hydrocarbons and halogenated substances), another consequence of restricting the data mainly to the spectra of the Dow collection (only few spectra of larger molecules had been published prior to 1959). The usefulness of the book will, therefore, decrease as a molecule becomes more complex, and it will not provide many clues in the case of substances with two or more different functional groups and molecular weight above 250, except, perhaps the recognition of an acetyl or benzoyl group because of the presence of an intense peak at m/e 43 or 105, respectively.

The approach on which this book is based is an interesting experiment and its success "in the field" as a guide for the beginner will indicate whether its usefulness can be extended to more complex molecules by addition of more data (in a future edition), particularly in the higher mass range. The very moderate price of the booklet will assure its wide distribution, a prerequisite for such an experiment.

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Thin Film Chromatography. By E. VERNON TRUTER, Ph.D., B.Sc., A.R.C.S., D.I.C., Lecturer in Textile Chemistry, University of Leeds, England. Interscience Publishers, John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. 205 pp. 14 × 22 cm. Price, \$7.00

This presentation is for those who are new to the field. Details are given for the preparation of the plates, development, and location of the spots. The author points out the advantages of the method as well as indicating those places where caution is needed.

The book is divided into three sections. In the first section the basic principles and methods are described in detail explaining the various factors that can affect the results. The second section is devoted to special techniques and developments that may be useful where the normal development fails to give separations. Thin-layer ionophoresis and partition chromatography are also described as well as quantitative methods which are yet few in number in this field. Part III delves into groups of specific types of compounds with the author presenting brief literature reviews of some of the work that has been done in thin-layer chromatography on the following: amines, amino acids, drugs and alkaloids, indole derivatives and metabolites, insecticides, lipids, nucleotides and related compounds, phenols, steroids, carbohydrates and glucosides, vitamins, organometallics, inorganic ions, and other miscellaneous compounds.

It is an introduction to a rapidly expanding technique and would be useful to those who wish to try the method in their work.

THE COCA-COLA COMPANY
LINDEN, NEW JERSEY

J. G. KIRCHNER

Diffusion and Membrane Technology. By SIDNEY B. TUWINER, Professional Engineer and Consultant, Technical Director, Markite Development Corporation. Sections by LAWRENCE P. MILLER, Boyce Thompson Institute, and W. E. BROWN, Dow Chemical Company. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1963. 421 pp. 16 × 23.5 cm. Price, \$12.00.

Dr. Sidney B. Tuwiner must be a very practical man. Certainly his book follows this philosophy with membranes of commercial importance receiving most attention. Furthermore, its timeliness is attested to by the growing technical importance of membranes for fuel cells, water purification, biological separation and detection, and many other diverse applications.

Essentially, this book is limited to nonporous organic membranes, where porous is defined as that condition which permits hydrodynamic flow under a pressure gradient. A very strong point is made that diffusion through nonporous membranes "is fundamentally no different from diffusion in liquids," and several early chapters are devoted to this subject. The chapter on "Thermodynamics of Membranes" allows the author to introduce ion-selective transport, osmosis, and the Donnan membrane equilibrium, and with this background he can then proceed to report on the properties of natural and synthetic membranes. Covered in detail are experimental results on brackish water clean-up and use of dialysis in electrolytic copper refining, an area of particular interest to Dr. Tuwiner.

Two chapters which illustrate the author at his best are the ones on "Cellulose Membranes" and "Synthetic Resin Mem-

branes." On the other hand, it is unfortunate that Dr. Tuwiner has chosen to cover "Permeation of Membranes by Gases and Vapors" (co-authored with W. E. Brown) and "Natural Membranes" (written by Lawrence P. Miller), for both sections combined make up little more than 10% of the book. Their presence here should not discourage authors from treating these areas more extensively.

Included in the book is a 30-page appendix giving diffusion data for various organic and aqueous systems, plus cation-transfer numbers and activity coefficients for a wide variety of electrolytes. This is in addition to an equally copious amount of data compiled from the literature and included with the text.

The book is not written to hold the disinterested reader, and frequently contains terms and units which should be explained to the uninitiated. However, for those seriously interested in ion-membrane technology, this book will be a valuable reference.

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Molecular Vib-Rotors. The Theory and Interpretation of High Resolution Infrared Spectra. By HARRY C. ALLEN, JR., National Bureau of Standards, Washington, D. C., and PAUL C. CROSS, Mellon Institute, Pittsburgh, Pennsylvania. John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. 324 pp. 18.5 × 26.5 cm. Price, \$13.50.

This monograph gives an introduction to the theory and interpretation of high resolution infrared spectra of polyatomic molecules. At the outset, it should be emphasized that the authors have performed a commendable task in providing an excellent resumé of some of the basic theories required for the interpretation of vibration-rotation spectra observed in the infrared. Their attempt, in bringing together the diverse notations and presenting the derivations with as much completeness as possible, will be extremely helpful to the beginners in this field. Furthermore, they have summarized very clearly their experiences in interpreting infrared spectra, especially those pertaining to the asymmetric-rotor bands.

It is, indeed, true that the study of molecular spectra is one of the most effective means of obtaining information pertaining to the structures of polyatomic molecules. Especially, the observations obtained in infrared enable us to evaluate the structural parameters of polyatomic molecules with a very high degree of precision. Therefore, the sections devoted by the authors for elucidating the methods of determining the molecular parameters from infrared data are entirely pertinent.

Since the termination of the Second World War, there have been phenomenal advances made in the attainment of high resolving power in the near infrared region of the electromagnetic spectrum, particularly because of the availability of highly sensitive photoconductive detectors. These instrumental advances made it necessary to devise adequate techniques for determining the spectral positions of the rotational lines observed in vibration-rotation bands, with as high precision as possible. During the past decade, high resolution combined with precision of measurements enabled the observation, in infrared, of numerous interesting aspects relating to the effect of perturbations in polyatomic molecules. So far as this study of perturbations is concerned, it is unlikely that the data obtained in any other spectral region can provide the unique type of information available from observations of infrared spectra. This monograph is somewhat deficient in pointing to the importance of recently published results on these perturbations, particularly those relating to some of the linear and symmetric top molecules. The bibliography furnished by the authors and the topics included by them are very selective and are not intended to be complete. As a result, a good segment of theoretical work developed for the interpretation of certain aspects of infrared spectra was omitted. For instance, the extensive research work pursued at the University of Paris and published in various scientific journals is related to such theoretical studies and does not form part of this monograph. Also, the recent work pertaining to resonances in the pyramidal-type molecules was omitted; it seems that these results are just as relevant to the subject as the other aspects dealt with by the authors on the analysis of symmetric-rotor spectra. Apparently, the authors considered such investigations to be esoteric extensions of the theory with somewhat ponderous notations in them. To this reviewer, it appears that this is just the reason why it would have been extremely helpful to have available a good summary of these specialized studies since much of future work will undoubtedly relate to them. Although a research investigator can benefit immensely from the vast information summarized by the authors, provision of at least a complete list of references to what the authors considered as "specialized investigations" could have proved invaluable.

The authors have rightly alluded to the studies of the pure rotational spectra observed in the microwave region, and in-

icated how such studies complement the information obtained from infrared vibration-rotation bands. However, in order to provide a balanced outlook to students on the importance of the studies of vibration-rotation bands of polyatomic molecules, it would not at all have been irrelevant to focus the attention of the readers to the enormous amount of vital information obtained, during recent years, on the basis of studies of high resolution Raman spectroscopy of polyatomic molecules.

In spite of these reflections, it is the contention of this reviewer that, incomplete as it may be, the material chosen by the authors has been presented in this worthy undertaking in a very logical, lucid, and useful manner. This book, will undoubtedly stimulate research work in high resolution infrared spectroscopy of polyatomic molecules.

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Treatise on Analytical Chemistry. A Comprehensive Account in Three Parts. Part II. Analytical Chemistry of the Elements. Volume 8. I. M. KOLTHOFF and PHILIP J. ELVING, Editors, with the assistance of ERNEST B. SANDELL. John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. 556 pp. 16.5 × 24.5 cm. Price, \$20.00.

This latest addition to the Treatise discusses, *in seriatum*, the analytical chemistry of "The Rare Earths" (Woyski and Harris), "Bismuth" (Fritz), "Vanadium" (Grady), "Chromium" (Hartford), and "The Platinum Metals" (Walsh and Hausman) and follows the format of preceding volumes of Part II in outlining the analytical chemistry of a block of elements in the Periodic Table. The scope is rather imposing for a book of this size, and, in the face of other more specialized volumes dealing with the extensive chemistry of each of these elements, one might reasonably question the value of condensed discussions such as those comprising Volume 8. It was evident to the reviewer in assessing this volume that, for the most part, the present treatment can afford the reader a very meaningful advantage in its critical coverage of topics presented by writers with an everyday working concern for their subject. With but a few exceptions, the editors have again succeeded in producing smooth-reading, economically written text, the more difficult because of the necessary listing in this type of book of a great number of diverse analytical procedures.

Several of the authors have chosen to commence their discussions with a very heavy historical and mineralogical introduction, but after this experience the material which follows in each chapter comprises a worthwhile offering of reliable analytical chemistry. In the space available, Woyski and Harris have done a notable job in summarizing the chemistry of the lanthanides, and their discussions of ion-exchange separations and the spectrochemistry of these elements are worth reading. Of special mention also is the well-written chapter by Walsh and Hausman dealing with the platinum group. This critical discussion is particularly valuable as it provides a nearly up-to-date summary (11 references extend the coverage into 1962) of the complex analytical chemistry of these six elements. The text is presented essentially free of misspellings and common typographical errors; on p. 115, however, there occurs a glaring misstatement of the Beer-Lambert relationship, *viz.*, " $A = kcl \log I_0/I$," which might possibly fit into the latter category. In the discussion of chromium by Winslow Hartford the wave lengths of maximum absorption for aqueous dichromate ion are cited incorrectly on p. 289 as 525 and 545 $m\mu$ (these figures are incompatible with the observed orange-yellow color of aqueous dichromate; the more nearly correct values are 258 and 350 $m\mu$ with a small absorption at 440 $m\mu$), whereas in the previous sentence the figure for chromate ion at pH 9 is given as 366 $m\mu$, and on p. 317 as 370 $m\mu$ without further qualification. On p. 291 of the same chapter the "standard potential" of the Cr^{+3}/Cr^{+2} couple is written incorrectly with a positive sign. The too frequent occurrence of small technical mishaps of this sort can be mildly disturbing and work to increase the reader's suspicion of other tabulated data.

The number of literature references found at the end of each chapter varies from 107 for bismuth to 399 for the platinum group metals, but apart from this, a sampling of several chapters showed a fairly wide variation in the coverage of recently reported work. Of the references cited in the chapters on vanadium, chromium, and the platinum metals, for example, 0.06, 5, and 31%, respectively, referred to work published in 1960 or later. This probably reflects to some degree the sequence in which the chapter manuscripts were received for publication as well as the multiplicity of elements included in the platinum group, but partly it serves also to point out the care to be exercised by those who may be inclined to regard these discussions as final summaries.

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January, 1964

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