
 BOOK REVIEWS

Lectures in Theoretical Physics. Volume I. Lectures Delivered at the Summer Institute for Theoretical Physics, University of Colorado, Boulder, 1958. Edited by Professor WESLEY E. BRITTIN and LITA G. DUNHAM, Department of Physics, University of Colorado. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1959. vii + 414 pp. 16 × 23.5 cm. Price, \$6.00.

The lectures presented in this volume were given at the Summer Institute for Theoretical Physics of the University of Colorado in 1958. A diversity of topics is covered, and the level aimed at is that of the advanced graduate student who is not a specialist in the subject. As a consequence, the lectures are both more detailed in treatment and less systematic in coverage than in more formal review articles. They are admirably suited for the audience to which they were addressed and can be strongly recommended to students. Moreover, the authors are some of our leading theorists and have selected topics close to their own research. They have brought to the undertaking not only special knowledge but also enthusiasm and desire to convey ideas effectively. Hence, almost any physicist can profit from the reading of many of these lectures.

F. Rohrich discusses pair production and bremsstrahlung in the field of an atom. The emphasis here is on those points where comparison with experiment is possible, which theoretical calculations of these effects are most reliable, and where the existing calculations are still inadequate. R. H. Good presents a unified treatment of non-interacting particles of zero rest mass which differs somewhat from the conventional approach. Berthold Stech gives a useful introduction to both the strong and the weak interactions of the strange particles. R. Kubo goes into the theory of irreversible processes from the microscopic (*i.e.*, statistical-mechanical) rather than quasi-thermodynamical point of view. G. Watagin discusses the interaction of particles at very high energy and how these events may be interpreted in terms of a non-local field theory. R. D. Peierls investigates the fundamental problem of nuclear structure (*i.e.*, how the shell model can be related to the basic nucleon-nucleon interaction), the relationship between nuclear reactions and the optical model, and the collective degrees of freedom of the nucleus. R. Glauber for the first time gives a unified treatment of the approach to high energy collision processes which he has developed over several years.

LAWRENCE RADIATION LABORATORY
UNIVERSITY OF CALIFORNIA
LIVERMORE, CALIFORNIA

H. P. NOYES

Physicochemical Measurements at High Temperatures. Edited by J. O'M. BOCKRIS, D.Sc., Ph.D., D.I.C., F.R.I.C., J. L. WHITE, Ph.D., D.I.C., and J. D. MACKENZIE, Ph.D., D.I.C., A.R.I.C. Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1959. viii + 394 pp. 16.5 × 25.5 cm. Price, \$13.50.

This book serves a valuable purpose in bringing together descriptions of experimental techniques of physico-chemical measurements at high temperatures. The book consists of 15 chapters written by 19 authors altogether, all of whom have made important contributions to the field of high temperature chemistry. More than a third of the main part of the book is devoted to three important chapters entitled "Temperature Measurement," "Means of Attaining and Controlling Temperature" and "The Stability of Refractory Materials." In order to obtain significant high temperature measurements one must have means of attaining the desired temperature and ensuring that the temperature is uniform within the region of interest and constant with time. One must be able to measure the temperature accurately and one must have suitable container materials for the substances under study. These chapters not only deal in considerable detail with the methods of achieving these objectives, but they also present quite comprehensive bibliographies which allow the reader to pursue in even more

detail any point of particular interest. The chapter on attaining and controlling temperature is particularly useful in that the practical details presented are not easily found in the literature and these details are often crucial for the success of an experiment.

The remaining chapters deal with various physico-chemical measurements that can be carried out in high temperature systems. The most extensive chapter is that entitled "Chemical Equilibria" which reviews in considerable detail the general principles of carrying out high temperature chemical equilibria measurements as well as a review of typical experimental techniques. Other chapters deal with electro-chemical measurements, vapor pressure, calorimetry, and viscosity measurements at high temperatures. A number of shorter chapters deal with such topics as "Techniques of Phase Equilibria Studies, Liquid Densitometry, Surface Tension, Raman and Absorption Spectroscopy, Ultrasonic Velocity and Diffusivity Measurements." In addition, several valuable Appendices have been provided which list properties of materials and other useful data of value for high temperature studies.

Although most of the chapters have been written independently, there is remarkably little repetition and the editors have managed to bring considerable unity into this book. There is no other book available which brings together so much information of practical value for design of high temperature experiments. This book will be indispensable for any laboratory doing work above 500°.

DEPARTMENT OF CHEMISTRY AND
LAWRENCE RADIATION LABORATORY
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

LEO BREWER

High-Resolution Nuclear Magnetic Resonance. By J. A. POPLE, National Physical Laboratory, Teddington, England, W. G. SCHNEIDER and H. J. BERNSTEIN, National Research Council, Ottawa, Canada. McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 36, N. Y. 1959. xii + 501 pp. 15.5 × 23.5 cm. Price, \$13.50.

This is the first book devoted solely to a comprehensive coverage of high resolution n.m.r., principles and chemical applications. Because of this, as well as the large extent to which the authors have succeeded in their goal, the rapidly increasing number of chemists engaged in such studies will find the book indispensable in spite of its high cost.

Several books have been published during the past few years from various points of view on various aspects of nuclear magnetic resonance. Of these, the present one is particularly timely. It covers those aspects of n.m.r. which have the widest interest. Moreover, it appears when at least the general principles are sufficiently well explored that the book will become obsolete much less rapidly than if it had been published two or three years ago.

The book itself is divided nearly equally into two parts, principles and applications. The point of view is that of the physical chemist, and familiarity with quantum mechanics is assumed. Because of this, some may prefer the enthusiastic and descriptive introduction to organic applications provided by John Roberts' colorful short book, "Nuclear Magnetic Resonance." However, once one has passed the indoctrination stage and wishes substance as well as flavor, it can be found in the Pople, Schneider and Bernstein book.

The first part of the latter contains the following chapters: Introduction, Properties of Molecules in a Magnetic Field, Theory of the NMR Method, Experimental Methods, General Features of NMR Spectra, Analysis of NMR Spectra, Theory of Chemical Shifts, Theory of Nuclear Spin-Spin Interactions, Spin-Lattice Relaxation, and Time-dependent Factors Influencing Signal Shape. Of these, not all impress me equally well. I believe that the chapter on Properties of Molecules in a Magnetic Field is especially good; it provides a general review of molecular magnetism which is very helpful in understanding some of the nuclear phenomena. The chapters on the theory of chemical shifts,

electron coupling of nuclear spins, time dependent factors, and the analysis of spectra are of high quality, and the last certainly should prove to be of enduring value. However, because of the greater detail provided, I prefer the treatment of n.m.r. methods and relaxation phenomena given by E. R. Andrew in his earlier book on the physical and solid state aspects of n.m.r.

The second part of the book, on applications, is already out of date because of the large amount of such work being done and the length of time required to publish the book and to write this review. Nonetheless, the book contains an excellent bibliography as well as useful discussions of the factors and principles important in each type of application. The high resolution spectra of protons and of other nuclear species (B, C, N, O, F, Si, P, Sn, Co) are reviewed, followed by chapters on internal rotation, molecular conformation, hydrogen bonding, solvent effects, keto-enol tautomerism, aqueous electrolytes, and quantitative analysis. The relative depths of coverage in these chapters and to some extent their quality as well, reflect the research interests of the authors. Thus, emphasis rests upon proton spectra, internal rotation, molecular conformation, and hydrogen bonding.

As is normal, one can find things about which to quibble. For example, I don't feel that Fig. 3-1 and the discussion associated with it are very clear. Moreover, the authors engage in the noble but dangerous practice of assigning credit for "firsts." In this they suffer the disadvantage of having entered the n.m.r. field some ten years after its inception, so that in spite of obvious care, they've missed some of the fine print in the early literature. One such instance is that Knight not only first observed resonance shifts in metals but also in different chemical compounds. But these matters are minor, few in number, and detract little or nothing from the value of the book. What is remarkable is that the authors started n.m.r. research only four or five years ago and since then have not only made major research contributions to the field but also have written a basic book which will be authoritative for some years to come.

NOYES CHEMICAL LABORATORY
UNIVERSITY OF ILLINOIS
URBANA, ILLINOIS

H. S. GUTOWSKY

BOOKS RECEIVED

May 10, 1960—June 10, 1960

- ROBERT AMMON AND WILHELM DIRSCHERL, Edited by. "Fermente. Hormone. Vitamine. Und die Beziehungen Dieser Wirkstoffe Zueinander." Dritte Erweiterte Auflage in Drei Bänden. Band II. "Hormone." Georg Thieme Verlag, Herdweg 63, Stuttgart, Germany. 1960. 897 pp. Ganzleinen, DM.148.—(\$35.25); Subskriptionspreis, DM. 125.80 (\$29.95).
- K. W. BENTLEY. "The Chemistry of Natural Products." Volume IV. "The Natural Pigments." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. 306 pp. \$5.00.
- PAUL D. BOYER, HENRY LARDY AND KARL MYRBÄCK, Edited by. "The Enzymes." Second Edition, Completely Revised. Volume 2. "Purine and Pyrimidine Nucleotides and Phosphagens. Prosthetic Groups and Cofactors (Part A)." Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. 479 pp. \$16.00.
- RICHARD H. BUBE. "Photoconductivity of Solids." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1960. 461 pp. \$14.75.
- S. P. DATTA AND J. H. OTTAWAY. "Aids to Biochemistry." Fifth Edition. The Williams and Wilkins Company, Baltimore 2, Maryland. 1960. 266 pp. \$3.75.
- S. DOCKX, O. P. "Archives de l'Institut International des Sciences Théoriques." Fascicule 10. "Théorie Fondamentale du Système Periodique des Éléments." Office International de Librairie, 30 Avenue Marnix, Bruxelles 5, Belgium. 1959. 183 pp. BF 300, 00.
- H. J. EMELÉUS AND J. S. ANDERSON. "Modern Aspects of Inorganic Chemistry." D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1960. 611 pp. \$7.75.
- PAUL H. EMMETT, Edited by. "Catalysis." Volume VII "Oxidation, Hydration, Dehydration and Cracking Catalysts." Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1960. 378 pp. \$13.50.
- LOUIS F. FIESER AND MARY FIESER. "Style Guide for Chemists." Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1960. 116 pp. \$2.95.
- MARCEL FLORKIN AND HOWARD S. MASON, Edited by. "Comparative Biochemistry. A Comprehensive Treatise." Volume II. "Free Energy and Biological Function." Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. 685 pp. \$18.00 (Subscription price); \$20.00 (Nonsubscription price).
- FRANK GAYNOR. "Aerospace Dictionary." Philosophical Library, Inc., 15 East 40th Street, New York 16, N. Y. 1960. 260 pp. \$6.00.
- W. HAYES AND R. C. CLOWES, Edited by. "Microbial Genetics. Tenth Symposium of the Society for General Microbiology, held at the Royal Institution, London, April, 1960." Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1960. 300 pp. \$7.50.
- ERICH HEFTMANN AND ERICH MOSETTIG. "Biochemistry of Steroids." Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1960. 231 pp. \$5.75 (college); \$6.90 (trade).
- ALAN M. JACOBS, DONALD E. KLINE AND FORREST J. REMICK. "Basic Principles of Nuclear Science and Reactors." D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1960. 262 pp. \$6.50.
- E. LEDERER. "Chromatographie en Chimie Organique et Biologique." Volume II. "Applications en Chimie Biologique." Masson et Cie., 120, Boulevard Saint-Germain, Paris 6, France. 1960. 876 pp. Broché, 130,00 NF; cartonné toile, 140,00 NF.
- R. H. F. MANSKE, Edited by. "The Alkaloids: Chemistry and Physiology." Volume VII. Supplement to Volumes II, III, IV and V. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. 559 pp. \$17.00.
- WILLIAM J. PANGONIS AND WILFRIED HELLER. "Angular Scattering Functions for Spherical Particles." Wayne State University Press, Detroit 2, Michigan. 1960. 222 pp. \$6.50.
- E. H. ERICH PIETSCH, Edited by. "Gmelins Handbuch der Anorganischen Chemie." Achte Völlig Neu Bearbeitete Auflage. "Barium." Ergänzungsband. System-Nummer 30. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim-Bergstr., Germany. 1960. 469 pp. \$84.50 (in wrappers); \$85.50 (cloth bound).
- E. H. ERICH PIETSCH, Edited by. "Gmelins Handbuch der Anorganischen Chemie." Achte Völlig Neu Bearbeitete Auflage. "Strontium." Ergänzungsband. System-Nummer 29. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim/Bergstr., Germany. 1960. 306 pp. \$46.50 (in wrappers); \$47.50 (cloth bound).
- ARNOLD WEISSBERGER, Editor. "Technique of Organic Chemistry." Volume I. Part II. "Physical Methods of Organic Chemistry." Third Completely Revised and Augmented Edition. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. 1797 pp. \$24.50.