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. Rohrlich discusses pair production and bremstrahlung 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 H. P. NOYES
LIVERMORE, CALIFORNIA

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 LEO BREWER
BERKELEY, CALIFORNIA

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,