

**Annual Review of Nuclear Science. Volume 7.** JAMES G. BECKERLEY, Editor, Schlumberger Well Surveying Corporation, ROBERT HOFSTADTER, Associate Editor, Stanford University, and LEONARD I. SCHIFF, Associate Editor, Stanford University. Annual Reviews, Inc., Grant Avenue, Palo Alto, California. 1957. v + 496 pp. 16 × 23 cm. Price, \$7.00 (U.S.A.), \$7.50 (elsewhere).

Printed comment on volumes in one of the Annual Reviews series is usually over the name of an expert in the field covered by the book. The comment below is an exception, for its author claims to be not expert in any field reviewed in the volume, and approached his task looking mostly for interesting sketches of what was going on.

About one-half of the book is devoted to mesons, the collective model theories for nuclei, and high energy electron reactions; about a third is taken up with radiobiology. In the summary paragraph below are given for each review: title, author; mean number of literature references per page of text (comment of this reviewer).

Mu-Meson Physics, J. Rainwater; 3.2 (good reading; mention of references suitable for initiating the un-initiated). Radiochemical Separations by Ion Exchange, Kurt A. Kraus and Frederick Nelson; 15.8 (total coverage approach; pretty hard going after first page). Equipment for High Level Radiochemical Processes, Nelson B. Garden and Elmer Nielsen; 8.1 (gives a good notion of the problems and how they are being attacked). Cellular Radiobiology, E. L. Powers; 4.5 (best in the book; penetrating but inclusive). Biochemical Effects of Ionizing Radiation, Barbara E. Holmes; 6.6 (covers a lot of ground; author gets medal for effort to maintain critical approach). Vertebrate Radiobiology (Lethal Actions and Associated Effects), V. P. Bond and J. S. Robertson; 12.7 (total coverage approach). Vertebrate Radiobiology (The Pathology of Radiation Exposure), C. C. Lushbaugh; 10.7 (pretty fast going, but good prefatory remarks in every section). The Collective Model of Nuclei, F. Villars; 2.6 (beautiful). Nuclear and Neutron Scattering of High-Energy Electrons, Robert Hofstadter; 1.9 (another beauty). Collision of  $\leq 1$  BeV Particles (Excluding Electrons and Photons) with Nuclei, S. J. Lindenbaum; 4.8 (covers a lot of ground; medal for critical approach). The Measurement of the Nuclear Spins and Static Moments of Radioactive Isotopes, W. A. Nierenberg; 6.9 (distinguished colleague A says this is very good; distinguished colleague B had already written author for reprint). Hyperons and Heavy Mesons (Systematics and Decay), Murray Gell-Mann and Arthur H. Rosenfeld; 1.0 (strange; began to get picture after second reading).

Memo to experts; Get it if you haven't already got it; memo to others: read 'beauties' and the 'best' in library copy.

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**The Molecular Theory of Solutions.** By I. PRIGOGINE, Professor of Physical Chemistry, Universite Libre, Brussels. With the collaboration of A. BELLEMANS and V. MATHOT. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. xx + 448 pp. 15.5 × 23 cm. Price, \$13.25.

Although it has long been recognized that deviations from the non-ideality of solutions arise from differences in intermolecular forces, the quantitative connection has been elusive due to the variety of possible interactions and the usual complexities inherent in liquid state calculations. The early treatments, which ignore the detailed structure of the systems, were based on a judicious combination of the van der Waals equation and the law of corresponding states. Together with its later refinements, this approach culminated in the theory of regular solutions which provided simple expressions that accounted fairly well for some of the properties of solutions that possessed positive deviations from Raoult's law.

In recent years attempts have been made to obtain a deeper understanding of the problem by the utilization of statistical mechanical techniques which not only provide a

better picture of the liquid but also permit use of more detailed specifications for the intermolecular forces. It was shown that while for simple systems the first-order deviations could be rigorously expressed in terms of the thermodynamic functions of the solvent, this degree of approximation could not realistically account for the observations. Although the far more important second-order deviations are not amenable to exact evaluation, with help of plausible assumptions they may also be expressed in terms of pure solvent properties. The resulting lengthy expressions led to good agreement with experiments and in some cases to unexpected predictions which were subsequently verified.

This development was carried out independently by various investigators among whom Professor Prigogine was the most prominent. In this book, written in collaboration with A. Bellemans and V. Mathot, Prigogine provides a systematic presentation of the contributions in solution theory by his school. Written in his usual lucid style, the complex subject matter is treated by primary emphasis on the physical interpretation. After a thorough review of the necessary apparatus the elaboration of the theory proceeds in a logical manner. The final results are then exhaustively compared with the available measurements on simple systems. More specialized applications to globular molecules, dipolar effects, hydrogen bonding, polymer mixtures and quantum effects are covered in separate chapters. This book is highly recommended to readers interested in recent contributions to solution theory.

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**Contributi Teorici E Sperimentali di Polarografia. Volume III. A Cura del Centro di Studio per la Polarografia.** By GIOVANNI SEMERANO. Consiglio Nazionale delle Ricerche, Ufficio Pubblicazioni, Piazzale delle scienze, n. 7, Rome, Italy. 1957. 567 pp. 17 × 24 cm. Price, £4.500. (\$7.43 at current exchange rate).

The Research Center of Polarography of the Italian National Research Council is located in the Institute of Physical Chemistry of Padua University. Under the able leadership of Professor Semerano it is contributing most significantly to the documentation of the field of polarography, especially by the bibliography of polarographic literature which it publishes yearly and by the series "Theoretical and Experimental Contributions to Polarography" of which this volume is the third.

The first half of the present volume comprises a collection of twenty-four individual papers. Most of these are concerned with various aspects of polarography, both theoretical and applied. In keeping with the times several of these papers deal with applications of polarography in kinetic studies. Electroanalytical subjects other than polarography are also treated in a paper by Gierst on recent developments in chronopotentiometry, and in another by Liberti and co-workers on automatic coulometric titrations. Although most are in Italian a few of the papers are in French and German, and all have summaries in English and German.

Perhaps the most valuable part of this volume is the second half, which summarizes the polarographic characteristics of 310 organic compounds. Presumably in deference to the linguistic limitations of English speaking chemists, this part of the book is in English. A tabular page is devoted to each substance, and, as far as pertinent items are available in the literature, data are given for the type of solvent, supporting electrolyte, pH condition, half-wave potential, wave slope, diffusion current constant, product of the electrode reaction, etc. References to the pertinent journal literature also are given. The table is selective rather than comprehensive, and does not include every organic compound that has been studied polarographically. Rather it is intended to provide orienting information on classes of compounds, to show relationships between chemical structure and polarographic behavior. Certainly, anyone concerned with organic polarography will find this table very useful.

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