In view of the authors' distinguished studies of the hydration of ions and of the isopiestic vapor pressure method, it is not surprising to find these topics treated most capably. However, it is difficult to find any section of the book that does not reveal the same high standard of clarity, competence and attention to detail. The descriptions of experimental techniques are perhaps occasionally somewhat less adequate than the theoretical parts. The discussion of the hydrogen–silver chloride cell (p. 198), for example, applies only to very dilute solutions and to a phenomenon that cannot occur when the electrodes are properly separated. The processes given for concentration cells involving a transfer of water as well as electrolyte (pp. 194–195) would seem to apply only if the water participates in the reaction at Electrode A; when this electrode is in position B the processes are reversed. Among the many excellent features of the book are the discussions of standard states, medium effects and activity coefficients in mixed solvents, non-electrolyte effects in the theory of chemical potentials, incomplete dissociation of salts and properties of electrolyte mixtures. The style is remarkably uniform throughout the book; variations in the spelling of the word "stoichiometric," however, betray the dual authorship. There is a rather brief but adequate subject index. It is to be hoped that an author index will be added in a later edition.

Robinson and Stokes have produced one of those rare volumes that not only summarizes and systematizes but shows clearly the path to further progress. Their book will be useful to scientists in many fields and indispensable to investigators concerned with the behavior of ionic solutions.

NATIONAL BUREAU OF STANDARDS
WASHINGTON 25, D. C. ROGER G. BATES

Nuclear Science Series. Report Number 17. Biochemical Aspects of Basic Mechanisms in Radiobiology. By HARVEY M. PATT, Editor. National Academy of Science–National Research Council, Washington, D. C. 1954. ix + 158 pp. 17.5 × 24.5 cm. Price, $1.50.

This book was prepared from the transcript of a conference sponsored by the National Academy of Sciences and the National Research Council. It was held in Highland Park, Illinois, on May 13–15, 1954. Questions and comments by the 25 participants in the conference are so frequent and extensive that the five principal speakers serve largely as leaders of discussion and targets for comments rather than to present formally organized papers. The published book preserves most of this informal aspect of the conference.

Ernest C. Pollard presented data on the effects of ionizing radiation, on enzymes, viruses and other large molecules in the dry state, so that indirect effects by way of activated solvent molecules were largely eliminated. E. S. G. Barron discussed radiation effects on these biologically important molecules in dilute solution so that this indirect effect was large. Frederick G. Sherman, Kenneth P. DuBois and Charles E. Carter discussed from different points of view inferences concerning the biochemical nature of primary cellular damage that can be drawn from data on the effects of radiation on more complicated biochemical systems including living organisms. Radiation damage is most evident by interference with cell division and suggests primary damage to the hereditary apparatus of the cell. Therefore the present knowledge of the structure of nucleoproteins and the possible sites of radiation damage to them is reviewed in considerable detail.

This book is in no sense a text on any phase of radiation chemistry or biology. It does, however, give a useful review of the varied points of view of some of the leading research groups studying radiation effects on biological systems, and can be read with interest and profit by individuals wishing to orient themselves in this field. Radiation chemistry, radiation genetics, and the systemic effects of radiation on higher organisms are considered only to the extent that they can throw light upon what may be called the primary biochemical lesion.

In the preface the editor asks that, because of the preliminary nature of much of the material, the data presented should not be referred to without the author's permission. This reviewer hopes this request does not set a precedent for future publications. A book as widely advertised for sale as this one represents in all senses publication of data; and material so uncertain or confidential that an author desires to forbid further consideration of it ought to have been removed from the manuscript before this publication.

UNIVERSITY OF ROCHESTER
SCHOOL OF MEDICINE AND DENTISTRY
ROCHESTER, N. Y. WILLIAM F. BALE

Technique of Organic Chemistry. Volume VII. Organic Solvents. Physical Properties and Methods of Purification. On the basis of the First Edition by ARNOLD WEISSBERGER and ERIC S. PROSKAUER. Completely Revised Second Edition by JOHN A. RIDDICK and EMORY E. TOOPS, JR., Commercial Solvents Corporation, Terre Haute, Indiana. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1955. vii + 552 pp. 16 × 23 cm. Price, $8.50.

This book is a revised and expanded edition of the original which was published in 1935. The objective is the same —to present reliable physical data, criteria of purity and methods of purification for a wide variety of organic solvents for use as a guide in the selection of a solvent for a particular purpose.

The new volume includes 254 organic liquids compared to 157 in the first edition. Of these, 48 are hydrocarbons of various types, 189 have one type of characteristic atom or group (*e.g.*, chlorine, hydroxyl, etc.), and 17 have more than one type of atom or group (*e.g.*, alcohol–ethers, chlorinated amines, etc.). For most of the solvents, 27 physical properties are tabulated, and these data are documented by 2100 literature references.

A new chapter defines the various physical properties and shows the temperature dependence of important properties such as vapor pressure, viscosity, surface tension, etc.

A particularly valuable innovation are index tables in which the solvents are arranged in the order of increasing boiling point, freezing point, dielectric constant and dipole moment. A similar table based on refractive index would be helpful.

Following the tabulated data are chapters on criteria of purity, methods of drying, general methods of purification and specific methods for approximately 230 of the solvents. Included also is a brief mention of hazards, toxicology and flammability. Although the discussion of criteria of purity is brief, it critically evaluates such methods as chemical tests, freezing curves, melting points, etc.

Correct chemical names are used in the text, but the index includes both common and commercial names as synonyms; *e.g.*, 1,2,3-propanetriol, glycerine, glycerol.

A comparison with the recently published "Technology of Solvents and Plasticizers," Arthur K. Doolittle, may be pertinent. This review is primarily concerned with the *use* of solvents and plasticizers. Therefore there is little overlapping of subject matter with "Organic Solvents."

Typography, format and binding are good. This is a most useful reference book for the chemist, chemical engineer and physicist.

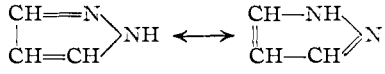
WESTERN RESERVE UNIVERSITY
CLEVELAND 6, OHIO OLIVER GRUMMITT

Introduction to Theoretical Organic Chemistry. By P. H. HERMANS, Ph.D., Utrecht (The Netherlands). Edited and revised by R. E. REEVES, Ph.D., Research Consultant in Chemistry, Tulane University, and Chemist, Bureau of Agricultural and Industrial Chemistry, U. S. Department of Agriculture, New Orleans, La. (U. S. A.). Elsevier Publishing Company, 2330 Holcombe Blvd., Houston 25, Texas. 1954. xii + 507 pp. 16 × 23 cm. Price, $9.75.

While this work is rather interesting to read, it is difficult to see wherein it will be of great use to any large group of readers. Since the expressed purpose of the author was the production of a text to supplement the recognized deficiencies in the treatment of theoretical organic chemistry in most elementary texts, it is not surprising that there is little which will be new or technically stimulating to the expert in the field. It is more disappointing to find that the book can be recommended only with severe reservations for study by beginners. It is quite possible that an interested neophyte might wax enthusiastic after a first reading of the book since a pleasingly large variety of subjects is

discussed. This enthusiasm no doubt would wane rapidly as the student gained maturity and came to realize that most of the subjects are accorded only a very shallow treatment. Since this is also true of almost any useful elementary text, there would be no harm done if it were not for the danger that some fundamental misconceptions will have taken permanent root in our student's mind.

The book fairly bristles with curious inconsistencies which perhaps teach a sobering lesson. It seems that the author has thought carefully about many recent developments in the areas of structural theory and reaction mechanisms. As a consequence, his statements of principle often are made with care and precision. Unfortunately, the reduction to practice is not carried out with similar care. As a consequence, statements occur in the discussion of specific problems which seem to be in direct conflict with the author's best understanding of basic principles. We are presented with an example of the deadly influence which one's early impressions exert on his intellectual functions. As an example of this conflict between ingrained reflex and mature thought, one turns naturally to Chapter V which bears the title, "The Bonding of Atoms to Form Molecules." In section 15, the terms *resonance* and *mesomerism* are discussed with considerable insight. The singularity of molecular structure and the useful artifice of writing down resonance structures are discussed very nicely and a clean-cut distinction is drawn between the *phenomenon* of tautomerism and the resonance *method* for the description of molecules. However, in the very next section this clarity of presentation is lost. For example, in the discussion of the structure of urea, the reader will surely be guided by his own predisposition if he finds a basis for distinction between resonance and prototropic tautomerism in the author's discussion. Deference is paid to the distinction at the end of the discussion, but it is probably too late to protect the sanctity of the intellect of our neophyte and even then the issue is clouded by the author's concern about the non-isolability of both tautomers. Similarly, on page 102, it is unequivocally stated that pyrazole "—can be symbolized as a resonance hybrid thus



No substantial improvement in tone is found in the later chapters which deal with reaction mechanisms. The best sections are those in which the author states he has made "special use" of Hammett's "Physical Organic Chemistry" and such material has not been improved by the transfer from the earlier book. In general, various suggestions concerning mechanisms are presented in a rather uncritical manner and the reader is given no reliable means of distinguishing between classic studies and the most casual suggestions of other authors. In some instances, the presentation of conclusions is not even faithful to the original works. It is doubtful that Roberts and his co-workers will be pleased to find themselves credited on p. 257 with the suggestion that the ethyl cation has a bridged structure since it was their conclusion that their work rigorously disallowed this possibility.

Since the author has contributed important work to the field of free radical chemistry, it is disappointing to find that the discussion of radical mechanisms propagates many of the usual errors and generally presents the field as it stood some ten or fifteen years ago.

It is the considered opinion of this reviewer that Hermans has not succeeded in properly *introducing* theoretical organic chemistry and that the acute need for a text which will do so remains unabated.

DEPARTMENT OF CHEMISTRY
IOWA STATE COLLEGE GEORGE S. HAMMOND
AMES, IOWA

Biochemistry of the Aminosugars. By P. W. KENT, M.A., B.Sc., Ph.D., D. Phil., F.R.I.C. and M. W. WHITEHOUSE, B.A., B.Sc., A.R.I.C., Department of Biochemistry, University of Oxford. Academic Press Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1955. ix + 311 pp. 14.5 × 22 cm. Price, $6.80.

Thirty years have elapsed since the publication of P. A. Levene's monograph on hexosamines and mucoproteins. During this period, the field of amino sugars has increased tremendously and the publication of Biochemistry of the Aminosugars by Kent and Whitehouse fills a very urgent need.

While Levene's treatise was mostly a discussion of the chemistry of aminosugars, of chondroitin sulfuric acid and some considerations on mucoprotein and glycoprotein, with more than a quarter of the literature being Levene's own publications, Kent and Whitehouse report the work of more than a thousand scientists. Subjects as varied as the interaction of influenza viruses with cells, the bacterial polysaccharides or the synthesis of aminosugars are discussed. The book is divided into two parts, one devoted to the aminosugars in the biological environment, the second to the chemistry of the aminosugars. In the first part, the distribution of the mucosubstances in tissues and in fluids, the enzymic degradation of the aminosugar-containing substances, the properties and distribution of aminopolysaccharides are discussed. This part points out the enormous development of the field of aminosugars in recent years. These sugars are found in various high molecular substances like hyaluronic acid, chondroitin sulfuric acid, heparin, chitin, blood group substances, serum mucoproteins, bacterial polysaccharides or in small molecular compounds, antibiotics, products of metabolism, etc. We are to be grateful to the authors for the vast amount of time and effort spent on the survey of so many large fields.

The second part is devoted to the chemistry of the aminosugars and their various derivatives. As compared with the chemistry of other biologically important monosaccharides, like glucose, it is rather limited and much progress is expected in the future, especially in the realm of synthesis. The authors have given an excellent review of the progress up to date. The book is very easy to read and clearly written, with an excellent classification.

The development of science in the last few decades presents a real problem of communication and has given birth to a series of specialized reviews, like the various "Advances," where a specialist can discuss at length the particular phase of a problem. Unfortunately, however, many a year elapses, usually, before the neighboring fields are covered. It is the function of a treatise to fill the gap and to establish the correlation between those various phases of a problem. This requires a very critical mind and, at the same time, a vast knowledge, theoretical and practical, of the work discussed. The reviewer doubts that these ends were achieved in the review of so vast a field as the one selected by Kent and Whitehouse. What was still possible thirty years ago in a relatively small field for Levene is not possible any more today. However many good points there may be in this compilation, there are too many defects for the reviewer not to feel compelled to mention them.

Some original work is not mentioned, as for instance the preparation of a crystalline salt of chondroitin sulfate by Einbinder and Schubert (p. 74), or the isolation of aminosugar-containing mucosubstances from serum by Winzler and by Schmid (p. 125). No critical evaluation of various modifications of a technique is given, for example, in the use of the methylation procedure in the elucidation of the structure of aminopolysaccharides (p. 62). The authors have not avoided the danger of stating as a fact what has only been advanced as a tentative explanation in an original work. For example, no clear evidence has ever been presented for the presence of 1,4-linkages in chondroitin sulfate (p. 82), no 2,4-dimethylglucuronic acid and 3,6-dimethyl-2-amino-2-deoxy-D-glucose have ever been isolated from methylated hyaluronic acid (p. 106) and this last compound has never been differentiated from its 4,6-dimethyl isomer by periodate oxidation (p. 208); it is extremely doubtful that hydrolysis of a glucuronidic linkage can occur in presence of Dowex-50 alone (p. 61). The reviewer is of the opinion that it is unfair to workers in the field to present startling statements, in disagreement with the concepts accepted at the present time, without referring to published work. The reviewer has in mind specifically the presence of glucosamine in chondroitin (p. 241) and the importance of the furanoside form in the immunological and enzymic properties of mucopolysaccharides (p. 229). The reason for publishing analytical data on various hyaluronic acids, where the purest contain 10% and the most impure contains up to 50% of impurities (p. 105) is not understandable when there exist in the literature data for much purer specimens.

Words or names are misspelled, for example halogeno (p. 194), Krunkenberg (p. 74), Chang (p. 8, ref. 5), Marbet (p.