defined and extensively used, but the essential reason for its introduction is nowhere clearly stated, or could not be found by this reviewer. An orderly treatment of thermodynamic principles might well have formed the first chapter, since an extensive discussion of fugacity is given in the present first chapter.

This text may prove stimulating to small classes of special students under the direction of experienced instructors. In the case of large, heterogeneous classes, as are usually found today it will be of considerably less value.

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The electronic theory of acids and bases. W. F. Luder and Saverio Zuffanti. New York: John Wiley; London: Chapman & Hall, 1946. Pp. ix + 165. (Illustrated.) $3.00.

This little book, dedicated to G. N. Lewis and read in manuscript form by him before his death, has as its principal thesis the propagation of Lewis' electronic theory of acids and bases. In reading the book one has the feeling that here are two ardent disciples of Lewis who are attempting enthusiastically to spread the true gospel. The 13 chapters are entitled: "Historical Background," "Atomic Orbitals and Valence," "The Electronic Theory of Acids and Bases," "Electrophilic and Electrodotic Reagents," "Acidic and Basic Radicals," "Neutralization," "Titration With Indicators," "Displacement," "Catalysis," "Acid Catalysis," "Base Catalysis," "Alkoxides as Catalysts," and "Conclusion."

By way of illustrating the points they wish to make, the authors have collected together and organized in a readable fashion a large amount of interesting and instructive data. Every chemist could benefit by reading this book because of its many suggestive and provocative postulates and theories. However, unless one reads critically, he may conclude that the electronic theory of acids and bases constitutes the whole and complete story of the phenomena considered. To test the accuracy of the theories and data presented, the reviewer made a detailed study of the authors' description of one base-catalyzed reaction, the aldol condensation of acetaldehyde (p. 138) (this being picked more or less at random from the large number in the book). Here we are told that the catalysts used are bases such as acetates, carbonates, pyridine, and amines, and the reference given is to a paper by the noted Oxford physical chemist, R. P. Bell. In that paper, however, Bell states specifically that the aldol condensation of acetaldehyde is catalyzed only by the hydroxide ion, and that acetate ions cannot catalyze the reaction by themselves but only to the extent that hydroxide ions are produced by hydrolysis. Luder and Zuffanti give no hint that any other mechanism of aldol condensation is possible, yet at least one other slightly different mechanism which fits all the facts can be imagined. Nor do they indicate that at low hydroxide-ion concentration the simple mechanism is no longer valid.

One is struck by the practically complete lack of quantitative data, graphs, and equations. No rate equations, for example, are given, despite the fact that nearly one-third of the book is devoted to the subject of catalysis. Nevertheless, read critically and with mental reservations, the book has much to contribute to the chemical thought of the day.

MALCOLM DOLE

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Analytic geometry and calculus. John F. Randolph and Mark Kac. New York: Macmillan, 1946. Pp. ix + 642. (Illustrated.) $4.75.

The authors of this text write in a vigorous, clear, and simple manner, dropping many unnecessary terms, yet pointing out many pertinent facts which are often neglected.

Although the material in the calculus is essentially traditional, the authors break new trails in handling many details. Maclaurin is not mentioned in connection with Taylor's theorem. The inverse trigonometric functions are defined as one-valued (with no reference to principal values). The sections on analytic geometry are reduced to a minimum, but are carefully and effectively handled. The device of leaving some difficult details to more extensive works and of putting much more in small print leaves a consecutive course in large print devoted chiefly to technique and to clarification of the essentials. A more than usual emphasis is placed upon discontinuities and limited domains. Many of the proofs are particularly gratifying in their rigor and simplicity. Duhamel and all his works are ignored. Gauss's rules for approximation are developed, but no section discusses significant figures or Newton's method. The figures are in most cases excellent.

The only serious criticism of items that have been included concerns the authors' random use of "f" (in isolation). This sometimes refers to the whole correspondence, sometimes to the value assumed by the dependent variable. The omissions are not easily condoned. In clearing out the rubbish, the authors have retained subnormals and subtangents, yet nothing is said concerning hyperbolic functions, simple harmonic motion, the catenary, convergence of series, angular velocity and acceleration, orthogonal curves, vectors, or such engineering notions as deflection of a beam or modulus of a spring.

Despite the many unexpectedly good features of this text, the course remains pretty thin in applied content. For most physicists and engineers, one might demand a more nourishing fare.

ALBERT A. BENNETT

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Organic reactions. (Vol. III.) Roger Adams. (Ed.-in-Chief.) New York: John Wiley; London: Chapman & Hall, 1946. Pp. viii + 460. (Illustrated.) $5.00.

This volume carries out the plan of the first two volumes of the series, also edited by Roger Adams with the collaboration of Werner E. Bachmann, Louis F. Fieser, John R. Johnson, and H. R. Snyder. It comprises critical discussion of 9 classes of organic reactions. As stated in the preface to the series, "The subjects are presented from the preparative viewpoint, and particular attention is given to limitations, interfering influences, effects of structure, and the selection of experimental techniques. Each chapter includes several detailed procedures illustrating the significant modifications of the method. . . . When all known examples of the reaction are not mentioned in the text, tables are given to list compounds which have been prepared by or subjected to the reaction."

The chapters of the volume are as follows: 1, "The Alkylation of Aromatic Compounds by the Friedel-Crafts Method," by Charles C. Price; 2, "The Willgerodt Reaction," Marvin

Carmack and M. A. Spielman; 3, "Preparation of Ketenes and Ketene Dimers," W. E. Hanford and John C. Sauer; 4, "Direct Sulfonation of Aromatic Hydrocarbons and Their Halogen Derivatives," C. M. Suter and Arthur W. Weston; 5, "Azlactones," H. E. Carter; 6, "Substitution and Addition Reactions of Thiocyanogen," John L. Wood; 7, "The Hofmann Reaction," Everett S. Wallis and John F. Lane; 8, "The Schmidt Reaction," Hans Wolff; and 9, "The Curtius Reaction," Peter A. S. Smith.

Of particular interest to the reviewer was the chapter on the Willgerodt reaction and the Kindler variation of it. This is the reaction by which a ketone is converted to an amide by the reaction of ammonium polysulfide. It is an unusual reaction in the sense that a ketone such as ethyl phenylketone is converted into β-phenylpropionamide by this procedure, and there is considerable speculation as to the mechanism.

The chapter on "Azlactones" contains a large amount of interesting material which is not commonly discussed.

The material given in the chapter on the Schmidt reaction (reaction of hydrazoic acid and carbonyl compounds in the presence of strong mineral acid) will be found useful to those interested in the synthesis of amines, amides, and their derivatives.

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Smith's college chemistry. (6th ed.) William F. Ehret. New York-London: D. Appleton-Century, 1946. Pp. xii + 677. (Illustrated.) $4.75.

This revision is written under new authorship and from a fresh viewpoint, which sets it apart from the other editions; the author deserves more credit than the title would imply.

The text content is quite comprehensive and up to date. The sequence of topics is classical and seems to be well integrated, even though several times the author appears to be grasping for a connecting link. The method of presentation and quality of material indicates, however, that this edition is intended for the better student who has already had a course in chemistry in high school.

A feature well worth mentioning is the use of boldface print for new terms, for definitions, and for general emphasis.

Such topics as atomic structure, equilibria, and ionization seem to be adequately treated. A chapter on "Energy and Chemical Change" and another on "Electromotive Chemistry and Voltaic Cells" are well placed.

In general, however, the figures and pictures are very poorly executed, as demonstrated in Figs. 7, 11, 13, and 14 (which would not be recognized as a balance arm). This fact and the lack of sufficient pictorial material to break up the large pages give the book an unfortunately dull and drab effect. This is particularly true of the early chapters, which are already quite dull because of the subject matter contained in them.

Among items that can be listed as unfortunate are the use of the phrases "throw light on" and "sealed up the mouth" (p. 7); the statement, "Two substances can come together in two different ways" (p. 8); the definition of chemical property as a chemical reaction (p. 8); the verb in the sentence "The negative radicals stem from chlorine atoms . . ." (p. 71); and the use of double dots to show ratios (p. 111). Also, the periodic table (p. 178) contains elements 93, 94, 95, and 96 in positions not justified by their chemical properties.

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Practical physiological chemistry. (12th ed.) P. B. Hawk, B. L. Oser, and W. H. Summerson. Philadelphia: Blakiston, 1947. Pp. xiv + 1323. (Illustrated.) $10.00.

The 12th edition of this work appears on the 40th anniversary of the publication of the first under the signature of the senior author. The several revisions form a running commentary on the tremendous growth of physiological chemistry in this first half of the century. Inasmuch as 10 years have elapsed since the appearance of the 11th edition, revision for the 12th is considerably greater than for most of the earlier issues. The coverage of subjects is broader than ever, including tissues, foods, enzyme action, digestion, absorption, putrefaction, excretion, respiration, metabolism, hormones, vitamins, and antibiotics. It is up to date enough to include brief mention of the synthesis of penicillin G and production of isotopes by controlled nuclear fission. The table of atomic weights includes neptunium; however, virginium and alabamine likewise are there.

As in previous editions, laboratory procedures are given in sufficient detail to be followed easily. Presumably the authors are aware that their text is frequently used as a reference work as well as a teaching text. For these reasons the sharpening of certain minor points would be desirable. For example, the first experiments on dialysis include no recommendation for testing the membranes for leaks (p. 9); and perhaps it should be emphasized (p. 516) that, even with the improved Brown procedure, uric acid cannot be added to blood and satisfactorily recovered. In spite of these very minor criticisms, this revision will be welcomed by its friends and will undoubtedly win many new ones.

The text is handsomely bound, and the printing is unusually clean.

Benton B. Westfall

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Advances in carbohydrate chemistry. (Vol. 2.) W. W. Pigman and M. L. Wolfrom. (Eds.) New York: Academic Press, 1946. Pp. xiv + 323. $6.60.

The second volume of this series is again a valuable contribution to the field of carbohydrate chemistry. In contrast to reviews published during the war years, it is, as the preface states, international in scope: four reviews are presented by English authors, one by a French author, one by Canadian reviewers, and, in addition, there are four contributions by Americans.

Melezitose and turanose are the subjects discussed by Hudson. Evidence is presented to prove the structure of both the disaccharide and the trisaccharide. A thorough discussion of the anhydro sugars, presented by Peat, includes a comprehensive table of the properties of the anhydro sugars and their derivatives which should prove very valuable. Analogues of ascorbic acid is the topic discussed by F. Smith. Various syntheses are given, and the correlation between physiological activity and structure is presented. Lespieau describes the synthesis of hexitols and pentitols, giving rather detailed