

5 γ and may also function merely as a precursor of this quinone, and possibly further of a compound of the actual vitamin K type. Even β -methyl-naphthalene gives some response at 1000 γ . To see if indications could be obtained of still more extensive biological transformations, we investigated 3-methyl-1-tetralone and 2-methyl-1-tetralone as possible precursors of the active methyl-naphthols. Since the completion of our work, the synthesis of the former compound has been reported by Bachmann and Struve.² Both tetralones are highly active and comparable in potency with the corresponding dehydrogenation products. In view of our previous observation that hexahydro-vitamin K₁ shows evidence of only slight activity at 1000 γ , it would appear that dehydrogenation occurs less readily when four hydrogens must be removed than when the ring contains a double bond (5,8-dihydrate, enolized tetralones).

The antihemorrhagic ethers and esters of methyl-naphthohydroquinone may also function not as such but by virtue of a biological conversion to the quinone. While Ansbacher, Fernholz and Dolliver³ consider this interpretation unlikely as applied to the dimethyl ether because of its probable resistance to hydrolysis, we may note that a second possible route is by direct oxidation. Thus the dimethyl ether can be oxidized smoothly to the quinone with chromic acid at 60°. With esters the oxidative route is clearly open⁴ in addi-

(2) Bachmann and Struve, *THIS JOURNAL*, **62**, 1618 (1940).

(3) Ansbacher, Fernholz and Dolliver, *ibid.*, **62**, 155 (1940).

(4) Doisy, *et al.*, *J. Biol. Chem.*, **131**, 363 (1939).

tion to hydrolysis, and slight differences in activity may be occasioned by the absorbability factor. That hydrolysis probably plays an important part seems indicated by the observation that the highly hindered dimesityl derivative of methyl-naphthohydroquinone (m. p. 204–205°, found: C, 80.11; H, 6.70) is only about 1/200 as active as the corresponding dibenzoate.

Fernholz, MacPhillamy and Ansbacher⁵ have recently cited certain apparent discrepancies between their assay results and ours. In our opinion these comments lack validity because they take no account of the possible variations arising from the use of different time periods in the assay procedures.⁶ We must emphasize the opening statement in the first of our Communications and point out that, in making preliminary and partial reports of some of our data, we wish to reserve for mature consideration at the completion of our studies all decisions as to exact relative potencies as well as final correlation and comparison of assay data.

(5) Fernholz, MacPhillamy and Ansbacher, *THIS JOURNAL*, **62**, 1619 (1940).

(6) Ansbacher, Fernholz and MacPhillamy, *Proc. Soc. Exptl. Biol. Med.*, **42**, 655 (1939).

RESEARCH LABORATORIES, MERCK & Co.
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W. L. SAMPSON

RECEIVED JUNE 20, 1940

NEW BOOKS

Physical Organic Chemistry. By LOUIS P. HAMMETT, Columbia University. McGraw-Hill Book Co., Inc., 330 West 42d St., New York, N. Y., 1940. x + 404 pp. 14.5 × 21 cm. Price, \$4.00.

Courses in physical organic chemistry are now offered in an increasing number of chemistry departments. Of the very few books in the field, this one is the first which can be unqualifiedly recommended as a text for a course dealing with the mechanisms of organic reactions. As a physical chemist whose researches on rates, equilibria, and mechanisms of reactions in solution have been of basic importance to theoretical organic chemistry, Professor Hammett is uniquely qualified to write this book. In the

preface he credits his original interest in organic chemistry to "three great teachers, E. P. Kohler, H. Staudinger, and J. M. Nelson." How actively that interest has been maintained is shown by the fact that most of the material of this compact book has come into existence since the author last sat under his organic teachers.

Two chapters on structural theory serve as an introduction to the concepts which are important in the later treatment. There is a brief non-technical review of the experimental basis of the wave-mechanical treatment of valence and of the idea of resonance. This will be welcome to those organic chemists who, through no fault of their own, have come to regard this line of thought as a revealed

religion. There is early emphasis on the many ionic equilibria involving organic compounds which are detected by suitable choice of a non-aqueous solvent. In the next two chapters general principles of equilibrium and reaction rate are derived and applied to typical cases. Eight chapters now consider the evidence regarding the equilibria, rates and mechanisms of various displacement reactions, reactions involving the carbonyl group, acids and bases, atoms and radicals, and oxidation and reduction. Chapter 7 carries the theory of the effect of structure on reactivity as far as seems quantitatively valid at present and includes numerous data showing the nature of the problems still to be solved.

The book as a whole is characterized by the maturity and discrimination with which it is assembled. The viewpoint is systematic rather than historical. Little attention is given to discarded ideas, however widely believed or recently upset. The thorough consistency of the viewpoint and responsibility of the author for the interpretations presented combine to make this an excellent text for students who have some knowledge of elementary physical and elementary organic chemistry.

The author writes like a physical chemist in that the discussions are quantitative and are developed algebraically whenever this contributes to sharpness of definition. He writes like an organic chemist in that no general statement is found very far from its supporting evidence. Frequent use of the words: "These facts are consistent with the following mechanism," is typical of the vigorous and undogmatic tone of the book. Points of difficulty with otherwise attractive theories are not ignored. Indeed, one cannot read through the book without following the author in the discovery of fundamental problems urgently needing to be attacked experimentally. This excellent book should therefore appeal to a large group, and is sure to be influential in spreading the knowledge of these important recent contributions to organic chemistry.

P. D. BARTLETT

A System of Chemical Analysis (Qualitative and Semi-Quantitative) for the Common Elements. By ERNEST H. SWIFT, Ph.D., Associate Professor of Analytical Chemistry, California Institute of Technology. Prentice-Hall, Inc., 70 Fifth Avenue, New York, N. Y., 1939. xxi + 589 pp. 32 figs. 16 × 23.5 cm. Price, \$4.25.

Centered between the tetrahedral textbook points of (1) short qualitative, (2) qualitative reference, (3) semi-micro, and (4) chemical microscopy, it is indeed a pleasure to come upon a volume such as this, designed to introduce students to the theory and practice of the elements, proving their presence and estimating their relative amounts with a fair degree of precision. Proceeding on the practical philosophy that detecting alone is only a third of the story, Professor Swift has interwoven with an improved qualitative analysis scheme a wealth of theoretical, experimental and critical background as well as, for every constituent, a simple and workable quantitative estimation adapted to apply to the solution or precipitate obtained in the actual qualitative analysis process.

The book opens with a 150-page Part I containing theory and experimental directions for the quantitative processes

used later: the balance and weighing process, calibration of weights, volumetric units, preparation and use of standard solutions (silver, thiocyanate, permanganate, iodine, thiosulfate, dichromate, acids and bases), gravimetric analysis, precipitation processes and purity of precipitates, their filtration, washing, drying and weighing, and typical manipulations. The presentation is necessarily brief and matter-of-fact, with adequate literature references.

Part II (256 pages) presents the system of basic analysis: theoretical discussion, possible procedures, critical and comparative comments, tabular outlines, and systematic preferred procedures, the notes, continuity and cross referencing being systematized by means of a numbering plan similar to that in the well-known Noyes texts. Sampling is treated at some length, followed by preliminary and orienting tests, and the preparation of the analytical solution, planned and executed along fairly conventional lines. The group system is essentially the usual one with some variations: the acid hydrogen sulfide group divided with sodium disulfide reagent ((Ag, Pb, Bi, Cu, Cd) + (Hg, As, Sb, Sn)), the basic hydrogen sulfide group together being treated with hydrochloric acid and ether to remove iron and then with bicarbonate, oxalate and sulfide to subdivide it ((Al, Cr, Mn) + (Co, Ni, Zn)), the alkaline earth group as carbonates (Ba, Sr, Ca, Mg), and the alkalis (K, Na, NH₄). Many of the separations and confirmations are routine, but some are not, such as distilling out arsenic trichloride, reduction and precipitation of mercurous chloride with phosphorous acid, the ether separation of ferric chloride, the hydrogen chloride precipitation of nickelous chloride in ether. Some optional and short methods are included, and the quantitative estimation for each ion detected.

The system of analysis for the acidic constituents is given in Part III (96 pp.). The method of analysis starts with the preparation of the solution, preliminary orienting tests to show oxidizing, reducing, silver type, or barium type anions, and then employs a systematic group scheme: acid distillation, cadmium, silver in strong acid, silver with a reducing agent, silver in weak acid, barium in acid, calcium in basic solution, and separate tests for acetate, perchlorate, borate, nitrite and nitrate. The style of text treatment is analogous to that for the cations, with the appropriate quantitative estimations.

An Appendix (56 pp.) includes a Suggested Course of Instruction, a long Questions and Problems section, useful Tables, Reagents and Chemicals lists, and a student desk Equipment list.

The author's literary style is clear, uninvolved, and the treatment at all times smooth, logical and as complete as permitted by the limits of a year course. Much supporting experimental evidence is given or referred to, a considerable amount of it (partially unpublished) having been obtained by the author's own students and the Noyes-Bray group. The author optimistically places a shovel against the tide by reversing the usual definitions of molar and molal (would that others might follow and right the illogical nuisance), and has permitted a few undesirable style usages: (1) superfluous punctuation on centered lines, (2) subscript (g), (l), (s) to indicate phase states rather than the more usual full-sized letters, (3) the capital E⁻ for the electron, (4) use of n. for normal instead of the

customary *N*, and (5) the dropping of periods after certain abbreviations and not after others (why use *g* for grain, *mg* for milligram, *ml* for milliliter, and yet *p.* for page, *n.* for normal, *P.* for Procedure, *min.* for minute, etc.?). These, however, are picayune faults to cite in a fine book, designed for a really solid undergraduate course in analytical chemistry, requiring good previous preparation, and ample laboratory time. The student who finished the course creditably would have a comprehensive knowledge of and training in the handling of compounds and reagents to serve him well as a balancing background for impending doses of thermodynamics, kinetics, organic chemistry and natural products.

ALLEN D. BLISS

Advanced Readings in Chemical and Technical German.

Selected and Edited by JOHN THEODORE FOTOS, Professor of Modern Languages, and R. NORRIS SHREVE, Professor of Chemical Engineering, Purdue University. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1940. xliii + 304 pp. 14 × 21 cm. Price, \$2.50.

This book contains a selection of texts illustrative of the kind of German which a chemist must master, copiously annotated with comments on idiomatic constructions. The vocabulary indicates the importance of the words by giving the number of times each word occurs in the combined texts. An introduction contains a full discussion of the characteristic difficulties of the language. The book seems admirably adapted to the needs of students of chemistry and chemical engineering who wish to acquire a practical command of written scientific German.

A. S. COOLIDGE

Introductory College Chemistry. By NEIL E. GORDON, Professor of Chemistry, Central College, and WILLIAM E. TROUT, JR., Professor of Chemistry, Mary Baldwin College. Second edition. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1940. xliii + 753 pp. 159 figs. 15.5 × 23.5 cm. Price, \$3.50.

This book is designed primarily for the beginning student, and is at one and the same time a text and an experimental guide. Part I deals with the usual fundamentals and the non-metals. Part II relates the metals both to the periodic and to the analytical groupings, making it possible for the instructor to introduce as much qualitative analysis as he desires.

The authors point out in their introduction "that method must not interfere with learning, and, by means of varied approaches a full course in chemistry has been supplied . . . the aim has been to have the student learn chemistry . . . through his own efforts . . . on the principle that no one gets into condition for athletic competition by watching others, . . ." Opinions will vary on the success of the authors but this book merits the attention of thoughtful teachers who are seeking better methods of presentation. It is hard to see how students could use this text as a "cookbook" in the laboratory and one must commend the authors on their success in making an experi-

mental approach to a study which too often is a pedantic recitation of theory, law and fact. Another strong point in this book is a good choice of reference materials for the beginner, most of which are taken from the *Journal of Chemical Education*.

The reviewer is left with the feeling that the student who uses the book will view the Arrhenius and the Debye-Hückel theories as contenders for supremacy rather than as supplementary contributions to an ever-growing understanding of ionization. Some will feel that the insertion of experimental directions in the body of the text will break the continuity of thought, making the book of less value for study purposes; others will maintain that this is the best way for the beginner to acquire the scientific attitude. Whatever one's views, an examination of the book will likely produce the desire to see the authors in action with a class of neophytes.

CHARLES R. CONARD

Periodica Chimica. (Chemical Periodicals.) *Verzeichnis der im Chemischen Zentralblatt referierten Zeitschriften mit den entsprechenden genormten Titelabkürzungen sowie Angaben über den Besitz in Bibliotheken Grossdeutschlands.* (Index of the Periodicals Abstracted by *Chemisches Zentralblatt* with their Standard Abbreviations and their Locations in the Libraries of Greater Germany.) Edited by DR. MAXIMILIAN PFLÜCKE. Verlag Chemie G. m. b. H., Berlin W 35, Germany, 1939. vi + 208 pp. 16 × 24 cm. Price, RM. 11.25.

This list of approximately 3000 scientific, technical and trade journals covered by *Chemisches Zentralblatt* and compiled by the editor of that excellent abstract journal, with the coöperation of Fräulein Alice Hawelek, gives titles, title abbreviations, symbols (like cable addresses, as *PrCambr.* for *Proceedings of the Cambridge Philosophical Society*), publishers' addresses and a key to library files.

Chemists familiar with the List of Periodicals Abstracted by *Chemical Abstracts* will recognize the value of library location data in such a compilation. Key numbers are given for 318 libraries scattered throughout Greater Germany.

The journal-name abbreviations, standard for Germany, closely resemble those approved by the International Union of Chemistry a number of years ago and commonly used in the United States.

Russian, Ukrainian, Serbo-Croatian and Bulgarian journals are segregated in a separate list (there are 242 of these) and arranged according to their names as spelled in the Cyrillic alphabet. Both transliterated and translated titles follow the Cyrillic titles, and cross references from the translated titles are included in the main list of periodicals.

The title of this compilation is slightly misleading, for most of the periodicals listed are not, strictly speaking, chemical publications. However, all of them contain, from time to time at least, papers of some chemical interest suitably reported in a chemical abstract journal.

Compilations like this, particularly for the region covered by the library key, serve a most useful purpose in bridging the gap between abstracts and complete, original papers. The modern development of photoprinting and, more re-

cently, of microfilm copying has markedly extended the usefulness of such keys.

E. J. CRANE

Proceedings of the Seventh Summer Conference on Spectroscopy and its Applications. Held at the Massachusetts Institute of Technology, Cambridge, Massachusetts, July 17-19, 1939. The Technology Press, Massachusetts Institute of Technology: John Wiley and Sons, Inc., New York, N. Y., 1940. viii + 154 pp. 7 figs. Price, \$2.75.

The vitality and helpfulness of these conferences were again attested last July by an attendance of two hundred and fifty, and now by the high quality of the reports contained in the present volume.

As on previous occasions, the object of each contributor is to refine, or to extend the applicability of, some procedure of spectrographic or spectrochemical analysis, to supplant gravimetric or volumetric methods.

Significant, in the former category, are titles such as the following: "The influence of extraneous elements upon the intensity ratio of line pairs used in quantitative analysis"; "Problems of light excitation in spark sources"; "Fundamental features of the photographic process and their special manifestation in quantitative spectrochemical methods." This last paper shows the complicated nature of the errors which are likely to beset the unwary and the ill-informed.

Applications to biology and medicine are stressed through consideration of tobacco mosaic virus, male hormones, hemoglobin and urinary porphyrins.

The editor does not fail to point out that it is better to attend the conference and hear the papers discussed than to read the Proceedings some months later.

GEORGE S. FORBES

The Mathematical Theory of Non-Uniform Gases. By SYDNEY CHAPMAN, M.A., D.Sc., F.R.S., Professor of Mathematics, Imperial College of Science and Technology, London, and T. G. COWLING, M.A., D.Phil., Lecturer in Mathematics, The University, Manchester, Cambridge: at the University Press; New York: The Macmillan Company, 60 Fifth Ave., New York, N. Y., 1939. xxiii + 404 pp. 13 figs. 18 × 26 cm. Price, \$7.50.

This book is essentially devoted to the single task of carrying out and applying the solution of Boltzmann's equation by the methods of Enskog. The "method of collisions" is the only one used, and the subject matter is also quite distinct from that of statistical mechanics, the emphasis being entirely on non-equilibrium states. The usual problems concerned with the equation of state are pushed so far into the background that van der Waals equation does not appear until the sixteenth of the eighteen chapters.

Topics related to the central theme are covered very completely. The earlier chapters include a general description of the nature and assumptions of kinetic theory, with definitions of the properties of a gas in terms of the

concepts of the theory; a careful derivation of Boltzmann's equation, the H-theorem, and the Maxwellian velocity distribution; and an account of the elementary theory of the mean-free-path phenomena. The solution of the equations is then presented, and the results are compared with experimental data. In the last chapters there are applications to dense gases, degenerate gases, and gases of electrified particles, with the inclusion not only of the thermoelectric effect, but also of the Hall and Ettingshausen effects. Only in the discussion of the consequences of quantum theory is rather less claim made to detailed completeness. The chapter in question nevertheless covers the essential points of the wave-mechanical concept of collision probability, its calculation in terms of the phase-shifts, the introduction of quantum statistics into the *Stoszahlansatz*, and the Fermi-Dirac and Bose-Einstein distribution formulas.

No doubt only those most seriously interested in research in this particular field will care to peruse all the details of the calculations presented in this book. It appears that the task should present no unusual difficulty, once an hour's tribute has been paid to the mastery of the unconventional vector and tensor notations expounded in the first chapter. The notation for the quantities of the theory itself is decidedly more bulky than that used by Enskog in his dissertation. For most readers, however, the fact that the definitions and interrelations of the quantities are clearly and explicitly stated will no doubt be a more than compensating advantage. An excellent feature is the list of symbols in alphabetical order with the number of the page on which each is introduced.

Besides its usefulness as a definitive statement of lengthy calculations, the book should be valuable as a collection of information about existing theoretical formulas for the coefficients of viscosity, heat conductivity, diffusion, and thermal diffusion, and their comparison with available experimental information. This material is very conveniently presented in the twelfth, thirteenth, and fourteenth chapters. Each of these chapters begins with a compilation of formulas, so that it is unnecessary to look for them scattered among the calculations. A special index is provided which lists all the gases and gas mixtures for which numerical data are quoted.

W. H. FURRY

The Ultracentrifuge. By THE SVEDBERG and KAI O. PEDERSEN. Oxford University Press, 114 Fifth Avenue, New York, N. Y., 1940. x + 478 pp. 154 figs. 16.5 × 24.5 cm. Price, \$12.50.

The German edition of this important monograph has already been carefully reviewed in *THIS JOURNAL* (62, 1315 (1940)). The very valuable comments there made apply equally well to this English edition. The ultracentrifuge is proving so powerful an instrument of research in varied fields that an authoritative presentation of its construction and use is timely.

The English edition is splendidly printed and has many excellent photographs and detailed mechanical drawings of the instrument and its accessories.

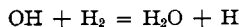
GRINNELL JONES

The Kinetics of Chemical Change. By C. N. HINSHLWOOD, M.A., Sc.D., F.R.S., Dr. Lee's Professor of Chemistry in the University of Oxford. Oxford University Press, 114 Fifth Avenue, New York, N. Y., 1940. vi + 274 pp. 35 figs. 16.5 × 24.5 cm. Price, \$4.50.

The present volume is essentially a fourth edition of the author's well-known treatise "Kinetics of Chemical Change in Gaseous Systems," previous editions of which appeared in 1926, 1929 and 1933. In spite of the changed title, the scope is almost the same, only very brief discussions of reactions in condensed phases having been added.

The book opens with the familiar introduction reviewing the kinetic theory of gases, still with the old approximate collision formulas. This is followed by a totally new chapter on statistical mechanics, partition functions and chemical equilibria. The treatment satisfactorily combines clarity and a reasonable degree of rigor, but will surely bewilder any reader who really needed the approximations of the preceding chapter. The chief reason for such a chapter is its application to the transition state approach to the problem of reaction rates, as developed by Eyring, which is briefly discussed two hundred pages later. In the reviewer's opinion, this discussion over-emphasizes the uncertainties of the method. The statement that there is "an elasticity of many powers of 10" in the total vibration partition function of the complex due to uncertainties in frequencies could scarcely be justified by writing down believable alternative frequency assignments. However much the quantitative exactness of the method may be doubted, it seems impossible to dispute, for example, its major triumph in the field of trimolecular reactions.

The subject of chain reactions has steadily grown in importance with each new edition. Any really adequate treatment even of those chain reactions that lead to explosion limits now requires a large volume. It is characteristic of this field that one deals with models rather than mechanisms. This is frequently recognized by using X and Y for chain carriers. It is regrettable that for the hydrogen-oxygen reaction, where Lewis and von Elbe have established with what looks like finality the true mechanism, this mechanism is given with no supporting discussion and no references to literature where this could be found. The mechanism actually printed omits by an unfortunate mechanical error the all-important branching step



Non-branching chains now play a leading role in the discussion of organic pyrolytic reactions. The treatment of chain mechanisms follows rather closely the path pioneered by F. O. Rice. Major emphasis is laid on chain-inhibition by nitric oxide as a means of studying the non-chain reaction, and of demonstrating the existence of true unimolecular reactions leading directly to stable molecules. This has the result that the chain reaction is regarded as a nuisance to be overcome more than as a phenomenon to be studied. From a research stand-point, such an attitude is unfortunate, since the non-chain reaction, to the extent that it exists, is well understood. The chains, on the other hand, are clearly real, but do not seem to be in accord with Rice mechanisms in simple cases. It is perhaps just as well, however, not to worry the average reader with this problem.

The work of Coehn and Jung showing the necessity for water in the hydrogen-chlorine reaction, which Hinshelwood still accepts, has been generally considered discredited by the publications of Allmand and Craggs, Rodebush and Klingelhoefer, Rollefson and Potts, and Bodenstein and Bernreuther in 1932-1933.

The author index has been omitted "lest [it] be regarded as a minor temple of fame in which representation has been granted or withheld with too arbitrary a hand." Hinshelwood has been studying reaction kinetics for twenty-one years, and has personally contributed such a great share of our present knowledge that no one would have denied his right to bestow arbitrary accolades.

LOUIS S. KASSEL

Mineral Metabolism. By ALFRED T. SHOHL, M.D., Research Associate in Pediatrics, Harvard University. (American Chemical Society Monograph.) Reinhold Publishing Corporation, 330 West 42d St., New York, N. Y., 1939. x + 384 pp. 13 figs. 15.5 × 23.5 cm. Price, \$5.00.

This monograph will be cordially welcomed by workers in the chemistry of nutrition. It is valuable both as a summary of present knowledge and as a stimulus to further research. Dr. Shohl divides his treatment of mineral metabolism into fourteen chapters: Introduction; Mineral Composition of the Body; Secretions and Excretions; Internal Secretions; Total Base, Chloride, Ammonium and Bicarbonate; Calcium and Magnesium; Phosphorus; Sulfur; Iron¹; Iodine¹; Traces; Water Metabolism; Anion-Cation Relationships; Mineral Intakes, Balances and Requirements. Each chapter closes with a bibliography, and the volume is indexed for authors and subjects separately.

The book contains a vast collection of material, very thoroughly documented. That it should be coordinated and unified with equal completeness would be too much to expect when the field is so wide, so complex, and so rapidly changing. The general style is such as to invite frequent consultation of the supporting references. That the latter are set in extremely small type is therefore a real misfortune; but one for which the author is not responsible. To him all workers in the field are greatly indebted for a volume which will facilitate the further advancement of this important branch of science. Rather than merely to add subdivisions to the above outline of the contents of this very comprehensive book, what here follows will deal chiefly with the two topics on which, perhaps, the largest numbers of readers will hope for new light: the significance of the anion-cation relationships more familiarly spoken of as acid-base balance; and the levels of mineral-element intakes and composition of the body as affecting its nutritional well-being.

Anion-cation relationships have evidently occupied much of Dr. Shohl's thought. The consideration of them not only constitutes one of the longest chapters of the book but also interuses the text at several points in other chapters. Yet there is evident hesitation to draw conclusions as to the significance of these relationships.

(1) By F. C. Bing.

Shohl is entirely clear and unqualified in the statement that the base-forming elements must predominate in the material stored in normal growth. "The retention of more positive than negative mineral equivalents occurs throughout the growth period. . . each fat-free kilogram of body contains about 84 to 94 meq. excess of positive minerals; therefore this increase must be directly proportional to the weight increase. A baby grows 8 kilograms the first year. . . and hence adds 570 meq. per year of excess positive minerals, or 1.6 meq. per day." But once the body is full-grown the necessity for any such relationship of intake becomes doubtful. Thus Shohl writes: "The exact optimum value is impossible to define, but the best opinion favors slight alkalinity." "There is no doubt that the adult in health can subsist upon diets that vary greatly in acid- or alkaline-ash value. Meat eaters and lacto-vegetarians both survive to recommend their type of diet. . . Do we live longer healthier lives because of the acid- or alkaline-ash value of the diet? Do we have more gout or kidney disease because of ingestion of excess negative minerals, or more arteriosclerosis and stone because of excess positive minerals? The problem can be solved only by statistical analysis of data on large numbers of cases." Which seems to be not so much a counsel of perfection as of despair, in view of the improbability of finding large numbers of cases in which the acid- or alkaline-ash value of the diet has been the sole significant variable throughout a lifetime, or even in which all influential factors can be sufficiently "unscrambled" by regression equations to permit of valid conclusions.

Both early and late in his volume, Dr. Shohl gives attention to the quantitative data of the mineral-element composition and intake of the body. He shows that fairly recent analyses consistently establish a regular decrease of water-content and increase of ash-content in the developing fetus; but that data on the post-natal composition of the human body are scanty. In fact, estimates of the composition of the normal adult still rest largely upon the single case of the body analyzed by Volkmann in 1874. However, the evidence that the human body in growing up approximately doubles the *percentage* of mineral matter in the normal newborn is regarded as established.

Shohl's estimate (p. 50) of the normal calcium content of the body is: 0.67% at birth; 1.34% at six years; 1.66% at fifteen years and in the adult. He definitely registers his non-concurrence in Leitch's much higher estimate. The wide diversity of present evidence as to normal retention rates is emphasized, the author apparently giving greatest weight to Macy's averages.

The book ends with a discussion of the interrelations of calcium intake, growth, and nutritional well-being. Here the present reviewer feels that the reader might possibly be misled by part of Shohl's discussion on calcium intake and growth. In a normal development, growth and calcium retention go on together, but we do not particularly seek the former through the latter; and the rate of growth seems usually to be more largely influenced by the intake of proteins and vitamins than of mineral elements. Nor is there such a difference of view between the Cornell and Columbia investigators as this part of Dr. Shohl's text seems to imply. But while this reviewer must therefore decline, as too particularistic, "the thesis" attributed to

him on page 352, he agrees with Dr. Shohl's conclusion that the recent increased growth of children generally, though perhaps not universally, "represents an increase in well-being, and is a result of our better understanding and practice of the fundamentals of nutrition."

H. C. SHERMAN

Biochemistry of Disease. By MEYER BODANSKY, Ph.D., M.D., Director of the John Sealy Memorial Laboratory and Professor of Pathological Chemistry, University of Texas School of Medicine, and OSCAR BODANSKY, Ph.D., M.D., Lecturer in Biochemistry, Graduate Division, Brooklyn Division, Formerly Biochemist, Children's Medical Division, Bellevue Hospital, and Instructor, Department of Pediatrics, New York University College of Medicine. The Macmillan Company, 60 Fifth Avenue, New York, N. Y., 1940. viii + 684 pp. 72 figs. 16 × 24 cm. Price, \$8.00.

This book represents a desirable type of approach to the relationship of laboratory data to clinical medicine that might well be carried over into other special fields. Primarily, this consists in the presentation of pertinent biochemical data that have a direct bearing on pathogenesis, diagnosis and treatment of various diseases, arranged according to their major functional and anatomic relationships. The material is presented in 18 chapters of which the first 14 have to do with diseases and disorders of blood, lungs, heart, liver, kidney, pancreas, and the various endocrine glands. The remaining 4 chapters are devoted to the general subjects of nutrition, metabolism, neurologic and psychiatric disorders and problems related to gynecology and obstetrics. A substantial and up-to-date bibliography is found at the end of each chapter. The authors have shown judgment of the highest order in the selection of representative data, and in the avoidance of the controversial where possible. The material is well cross-indexed as to author and subject.

The book should prove of unlimited value to the practicing physician, whether engaged in general practice or confined to one of the specialties. For the medical student, it should provide a valuable supplement to the more orthodox textbooks on medicine and biochemistry.

Special mention should be made of the chapter on the biochemical aspects of neurologic and psychiatric disorders. This is a particularly useful summary of a large body of data, mainly the result of recent studies, and as yet largely confined to scientific journals that are usually overlooked by practitioners and students.

HERMAN YANNET

Vitamin D. Chemistry, Physiology, Pharmacology, Pathology, Experimental and Clinical Investigations. By C. I. REED, A.M., Ph.D., H. C. STRUCK, M.S., Ph.D., and I. E. STECK, M.S., M.D., College of Medicine, University of Illinois. The University of Chicago Press, 5750 Ellis Ave., Chicago, Illinois, 1939. xviii + 389 pp. 13 figs. 15.5 × 23.5 cm. Price, \$4.50.

In 1929 when Hess wrote his volume on "Rickets, Osteomalacia and Tetany" he dismissed the evidence for the existence of an anti-rachitic vitamin with the state-

ment: "It would be to no purpose to discuss whether in view of its limited distribution among foods the anti-rachitic factor should or should not be dubbed a vitamin." It is therefore illuminating that only ten years later a book of the character of the one written by Drs. Reed, Struck and Steck should not only have been possible but should have been written to meet an urgent demand for information on the chemical nature, physiological action and clinical use of such a vitamin.

The authors have seen fit to divide the subject matter into 15 chapters. After disposing of the chemistry of vitamin D and methods for its assay they discuss the action of vitamin D in rickets, its general physiological action and its relation to the parathyroid glands. Some attention is devoted to its general physiology and its effect on energy metabolism. The toxic effects of vitamin D and its bearing on therapeutic use are discussed in considerable detail. Some attention is given to the relation of vitamin D to resistance to infection, to general mineral metabolism and to its effect on the blood constituents. The discussion of the possible use of vitamin D in the treatment of arthritis, hay fever, asthma, acne, psoriasis and other diseases is finally ended with the remark: "The discussion of the various applications should not be taken as an endorsement. The ultimate state of any of the uses can be determined only by open-minded approach and not by pre-determined prejudice or speculation."

A bibliography of 48 pages and a subject and author index add greatly to the value of the text.

The authors are to be congratulated for the excellent service which they have rendered not only to those who are interested in nutrition research but also to those upon whom we depend for intelligent medical practice.

HARRY STEENBOCK

BOOKS RECEIVED

May 10, 1940 to June 10, 1940

- ROGER ADAMS AND JOHN R. JOHNSON. "Elementary Laboratory Experiments in Organic Chemistry." Third edition. The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 420 pp. \$2.00.
- JOSEPH A. BABOR AND ALEXANDER LEHRMAN. "Laboratory Manual for General College Chemistry." Thomas Y. Crowell Co., 393 Fourth Avenue, New York, N. Y. 290 pp. \$1.50.
- H. B. G. CASIMIR. "Magnetism and Very Low Temperatures." Cambridge University Press, The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 95 pp. \$1.40.
- EDWARD J. CONWAY. "Micro-diffusion Analysis and Volumetric Error." D. Van Nostrand Co., Inc., 250 Fourth Avenue, New York, N. Y. 306 pp. \$6.00.
- FRITZ EPHRAIM WITH P. C. L. THORNE AND A. M. WARD, Editors. "Inorganic Chemistry." Third English edition. Nordemann Publishing Co., Inc., 215 Fourth Avenue, New York, N. Y. 911 pp. \$8.00.
- JOHN W. EVANS AND GEORGE M. DAVIES. "Elementary Crystallography." Nordemann Publishing Co., Inc., 215 Fourth Avenue, New York, N. Y. 149 pp. \$2.00.
- ERWIN B. KELSEY AND HAROLD G. DIETRICH. "Fundamentals of Semimicro Qualitative Analysis." The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 350 pp. \$2.75.
- M. G. MELLON. "Chemical Publications, Their Nature and Use." Second edition. McGraw-Hill Book Co., Inc., 330 West 42d St., New York, N. Y. 284 pp. \$2.75.
- J. R. PARTINGTON. "A College Course of Inorganic Chemistry." The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 658 pp. \$2.50.
- J. R. PARTINGTON AND KATHLEEN STRATTON. "Intermediate Chemical Calculations." The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 239 pp. \$1.65.
- LINUS PAULING. "The Nature of the Chemical Bond." Second edition. Cornell University Press, Ithaca, New York. 450 pp. \$4.50.
- A. N. SACHANEN. "Conversion of Petroleum." Reinhold Publishing Corp., 330 West 42d St., New York, N. Y. 413 pp. \$6.00.
- HENRY J. S. SAND. "Electrochemistry and Electrochemical Analysis." Volume II. "Gravimetric Electrolytic Analysis and Electrolytic Marsh Tests." Blackie and Son Limited, 50 Old Bailey, London, England. In the U. S. A.: Chemical Publishing Co., Inc., 148 Lafayette St., New York, N. Y. 149 pp. 5s. net.
- MAURICE B. VISSCHER, Editor. "Chemistry and Medicine." Papers Presented at the Fiftieth Anniversary of the Founding of the Medical School of the University of Minnesota. The University of Minnesota Press, Minneapolis, Minnesota. 295 pp. \$4.50.
- "Twelfth Report on Catalysis." The National Research Council. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 388 pp. \$5.00.