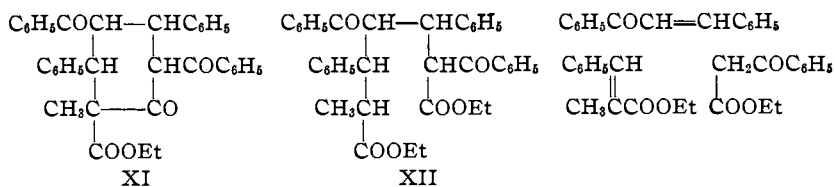


With methylmalonic ester only addition products of the type IX and X can be formed



The ester XI upon treatment with sodium ethoxide in ether solution readily undergoes fission to give benzoyl-acetic and  $\alpha$ -methylcinnamic esters and benzalacetophenone, which is in agreement with the results of Dieckmann on the decomposition of open chain and cyclic keto-esters.

Since under the conditions of Holden and Lapworth's experiment, the hexacyclic compound XI could be formed, it is probably the intermediate in the series of reactions which produce  $\alpha$ -methylcinnamic and benzoyl-acetic esters. Consequently the obtaining of the latter products cannot be considered as support for their view of the mechanism of this addition reaction.

Corresponding reactions involving one molecule of methylmalonic ester and two molecules of crotonic ester cannot explain the production of  $\alpha,\beta$ -dimethyl- $\gamma$ -carbethoxyglutaric ester in the addition of sodium enol methylmalonic and crotonic esters.

CONVERSE MEMORIAL LABORATORY  
HARVARD UNIVERSITY  
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ARTHUR MICHAEL  
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## NEW BOOKS

André Job. *Formes Chimiques de Transition. Oeuvres recueillies par J. Perrin et G. Urbain.* (Chemical Forms of Transition. Collected Works by J. Perrin and G. Urbain.) Hermann et Cie, 6 Rue de la Sorbonne, Paris, France, 1931. xvii + 340 pp. Portrait. Price, fr. 95.

This impressive memorial volume contains a collection of the more important works of André Job. In the first section are the memoirs dealing with problems in theoretical chemistry, and in particular with the mechanism of chemical reaction; in the second section are the memoirs describing experimental investigations. A thoughtful and moving Discourse by Jean Perrin and a Notice on the Life and Works of André Job by Georges Urbain serve as an appropriate introduction.

As is pointed out in the Preface, Job in his diction and style conforms to the French tradition of elegance and brevity. Like the masters of our science whom he admired, Job strove to retain only those results which

counted and those ideas which illuminated. His motto was not "ever more facts" but "ever more light."

In these days when not only our Science but also our Journals are threatened with asphyxiation by the constantly rising tide of uncorrelated facts, should we not give earnest consideration to the mode of presentation so well exemplified by André Job's works?

ARTHUR B. LAMB

**Text-book of Quantitative Analysis.** By WILLIAM THOMAS HALL, Associate Professor of Analytical Chemistry at the Massachusetts Institute of Technology. John Wiley and Sons, Inc., 440 Fourth Ave., New York, 1930. vii + 279 pp. 15.5 × 23.5 cm. Price, \$2.50.

Teachers who like the methods given in Treadwell-Hall will welcome this text designed for a year's course by Professor Hall. Placing volumetric analysis first will appeal to most people for the reason cited by the author in his preface: ". . . students accomplish more work, and get more out of the course when this (placing volumetric analysis first) is done." Several of the sections should be amplified in later editions, *e. g.*; the factors governing the choice of indicators (p. 41), co-precipitation phenomena, calculation of the equivalents in oxidation reduction reactions. For a beginning text, it would seem preferable to compel the students to calculate equivalent weights, rather than to give them a table (p. 65). The reason given for not heating sodium bicarbonate above 300° (p. 48) seems inadequate. Sodium carbonate does *not* begin to decompose at 300°; instead, it merely becomes hygroscopic, which leads to low results.

LOUIS WALDBAUER

**A Comprehensive Treatise on Inorganic and Theoretical Chemistry.** By J. W. MELLOR, D.Sc., F.R.S. Vol. XI. Tellurium, Chromium, Molybdenum, Tungsten. Longmans, Green and Co., 55 Fifth Ave., New York, 1931. xii + 909 pp. 221 figs. 16.5 × 25 cm. Price, \$20.00.

Tellurium, chromium, molybdenum and tungsten form numerous, multifarious and complicated compounds which stubbornly resist any attempts at simple presentation. They are, speaking anthropomorphically, heterodox and recalcitrant. Nevertheless, the present volume attacks them manfully and with a large measure of success, exhibiting the same clarity and brevity of statement that characterized the earlier volumes of this important encyclopedia of inorganic and theoretical chemistry.

It should be pointed out, however, that even in this exhaustive treatise it has been possible to give only brief summaries of such important classes of substances as the chromium ammines, the tungsten bronzes and the complex acids of molybdenum and tungsten.

ARTHUR B. LAMB

**The Nature of a Gas.** By LEONARD B. LOEB, Professor of Physics, University of California. John Wiley and Sons, Inc., 440 Fourth Ave., New York, 1931. x + 153 pp. 11 figs. 15.5 × 23.5 cm. Price, \$2.50.

This volume is the first of a series of monographs to be published under the auspices of the Committee on Electrical Insulation of the Division of Engineering and Industrial Research, National Research Council. The reason for this book is that gases are utilized as insulators. It is therefore of importance for student and engineer to understand the structure and electrical properties of gases. Professor Loeb discusses the electron, the proton and their arrangement in atoms and molecules, the structure of molecular spectra, the kinetic theory of gases (in simplified form), ionization phenomena such as critical potentials, single and multiple ionization and their probabilities, and various methods of ionizing gases, in a brief but particularly crisp and lucid manner. A few typographical errors were noted. The work should find many readers in all fields of science and engineering who desire a simple and straightforward account of the fascinating structure and behavior of a gas.

BERNARD LEWIS

**The Structure of Crystals.** By RALPH W. G. WYCKOFF. Second edition. American Chemical Society Monograph. The Chemical Catalog Co., Inc., 419 Fourth Ave., New York, 1931. 497 pp. Illustrated. 15.5 × 23.5 cm. Price, \$7.50.

The second edition of this monograph, while similar to the first in its treatment of the subject, has been completely revised. An introductory chapter is followed by a discussion of the symmetry of crystals, the properties of x-rays and their interaction with crystals, and descriptions of methods and apparatus used in crystal analysis. The procedures followed in the determination of crystal structures from x-ray diffraction data are outlined.

The results of crystal analysis are summarized in Part II. The limitation of space necessitated an extremely condensed treatment of the crystal structures of the elements, and of inorganic and organic compounds. The structures are illustrated by projections upon some faces and by spatial arrays of shaded spheres. The results of many incomplete structure determinations and of studies of alloy systems could not be presented. The complete bibliography at the end of the book, however, includes references to such works.

The treatment of the subject is far more lucid than that of the first edition. The discussion of the fundamentally important topic of the interaction of x-rays and crystals, however, is still quite inadequate. The apparatus described while satisfactory is inferior to that used in many European and some American laboratories. The results of crystal structure determinations could scarcely have been presented in a more satisfactorily condensed form. The research worker, however, will find that

this second part in no manner replaces the "Strukturbericht," of P. P. Ewald and C. Hermann ("Structure Review, appearing in the *Zeitschrift für Kristallographie*"). For him the bibliography at the end of the book is its most noteworthy feature.

STERLING B. HENDRICKS

**Lunge and Keane's Technical Methods of Chemical Analysis.** Edited by CHARLES A. KEANE, D.Sc., Ph.D., Formerly Principal of the Sir John Cass Technical Institute, London, and P. C. L. THORNE, M.A., M.Sc., Ph.D., Chief Lecturer in Chemistry, Woolwich Polytechnic. Vol. III. Second edition. D. Van Nostrand Co., 250 Fourth Ave., New York, 1931. xx + 678 pp. Illustrated. 16.5 × 25 cm. Price \$18.00.

This third volume of the revised edition of this compendious quantitative analysis is divided into eleven sections with the following subject headings: Clays, Ceramic Products and Refractories—Chemical Examination; Clays, Ceramic Products and Refractories—Physical Examination; Glass; Calcareous Cements; Drinking Water and Water Supplies; Feed Water for Boilers; Sewage and Effluents; Fertilizers; Feeding Stuffs; Soils; Air. Twelve British chemists are listed as contributors, and, in general, they are men prominent in the particular field discussed. The book is written primarily for use in laboratories where British specifications and apparatus are employed, although in several sections references are made to American standards and specifications, and less frequently to those of Germany and France.

Of the 659 pages of the text, 382 are devoted to clay products, glass, and cements. These sections are more complete than in any other treatise of the same nature in English, and should be of value to workers in this field. The remaining sections of the book, especially those on water and sewage, while presenting interesting general information, are concerned with analytical methods, so thoroughly covered by publications of various government laboratories and national associations in America that they cannot be of great value to analytical chemists in this country.

In general, the descriptions of analytical methods are not encumbered with an appreciable number of alternative methods, and few suggestions are offered for the detection and removal or avoidance of the effect of the unusual and unexpected materials frequently found in industrial mixtures. From the standpoint of the average analyst, this is probably a virtue, but those in charge of a control laboratory may be required to look for more detailed guidance. The directions for carrying out the various determinations are clearly written, and the general appearance of the book, with large type and good quality paper, is excellent. It is remarkably free from typographical errors.

As previously indicated, several sections in the book describe analytical

procedures, now considered to be inadequate in this country, and many chemists may feel that the procedures outlined are not only inadequate but that directions for carrying out essential determinations have been omitted. For example, in the sections on water and sewage, no mention is made of methods of determining bio-chemical oxygen demand,  $P_H$  by potentiometric instruments, and little mention is made of the widely used color standard comparison methods of the American laboratory.

However, the volume is more than a compilation of analytical methods. The various industrial products, for which analytical methods are presented, are discussed as to source, properties, and effect on the finished product. The book should, therefore, be of value because of this general information which gives the analyst more adequate knowledge of the relation of his work to the industry as a whole.

C. R. HOOVER

**Physical Chemistry. An Elementary Text, Primarily for Biological and Pre-medical Students.** By LOUIS J. GILLESPIE, Ph.D., Professor of Physicochemical Research, Massachusetts Institute of Technology. McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York, 1931. ix + 287 pp. 43 figs. 14.5 × 21 cm. Price, \$2.75.

This text-book is planned for students of biology. Special attention is paid to such subjects as surface tension, vapor pressure, the properties of solutions and to applications of the law of mass action. "An attempt has been made to prepare the reader intelligently to consult standard authorities, to bridge the gap between the teaching of elementary principles and the thought and practice of specialists, and, in general, to give him such aid of this sort as is possible without interfering with the presentation of general principles."

The author has made a valuable contribution to instruction in biology. He has successfully avoided those abstruse statements with which physical chemists delight to bewilder biologists and yet has presented in adequate fashion the principles of physical chemistry most often used by students and research workers in the biological sciences. To them, particularly, this book is recommended.

D. B. DILL

**Photochemistry.** By D. W. G. STYLE, Ph.D. With a Preface by A. J. Allmand, M.C., D.Sc., F.R.S., Professor of Chemistry in the University of London, King's College. E. P. Dutton and Company, Inc., 286-302 Fourth Avenue, New York, 1931. vii + 96 pp. 9 figs. 11 × 17.5 cm. Price \$1.10.

This excellent little book affords an approach to photochemistry "for the chemist who has not hitherto interested himself in the subject." There are five chapters, all entertainingly and clearly written. The large mass of factual material in the field is omitted and the author has chosen merely a few typical examples to be discussed in detail.

In the introductory Chapter a hasty survey is given of light absorption, reaction kinetics and line and band spectra. For the latter use is made of the Bohr atom and of the ideas of Franck, no mention being made of the newer forms of quantum mechanics. For the purposes of the book this omission is not serious, since the use of energy levels rather than their exact interpretation is of primary importance.

The Primary Light Process, Chain Reactions, the Dependence of the Quantum Yield on Temperature and Wave-length and Experimental Methods are taken up in the four succeeding chapters. The point of view is distinctly that of the chemist and not of the physicist and the author has, in some cases, discussed reaction mechanisms which are open to question. He has, however, been exceedingly candid in pointing out doubtful matters and the reader may feel assured that scientific accuracy has not been sacrificed to brevity.

The reviewer takes pleasure in recommending this book to those who may wish a brief survey of photochemistry as well as to many photochemists who may need to popularize their subject from time to time in conversation or in lecture. Indeed even the hardened addict is certain to find stimulating points of view on many topics.

W. ALBERT NOYES, JR.

**The Principles of Organic Chemistry.** By JAMES F. NORRIS, Professor of Organic Chemistry, Massachusetts Institute of Technology. Third edition. The McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York, 1931. xii + 595 pp. 14.5 × 21 cm. Price, \$3.00.

Though this volume ably maintains the Norris text in its proud position in the regard of organic chemists, enthusiasts for "electronics" will be disappointed by its conservative position. The new chapter on proteins strengthens the presentation of this important subject. The book is made unusually interesting by the accurate and specific information about industrial processes.

While actual reagents are, as a rule, indicated in the equations, there is still room for improvement in this matter: "O" or "H" not being very helpful to the inquiring student. Particularly where mechanisms of reactions are given, there is an opportunity for improvement in subsequent revisions of the text. In the discussion of the Perkin and the Beckmann reactions, and in the addition to  $\alpha,\beta$ -unsaturated acids this is apparent. The statement that ketones do not polymerize is included, and the stereoisomers of saccharic acid are said to be 16, whereas but 10 are possible. Also mention is made of disodium malonic ester though plenty of experimental evidence indicates that no such compound exists. It is unfortunate that one of the few errors of spelling involves the omission of the "h" in Winther's name.

However, these discrepancies, by contrast, but serve to emphasize the general excellence of this very teachable text.

G. ALBERT HILL

**Grenzflächenvorgänge in der unbelebten und belebten Natur.** (**Boundary Surface Reactions in Inanimate and Living Nature.**) By Prof. Dr. DAVID REICHINSTEIN. Verlag Johann Ambrosius Barth, Salomonstrasse 18B, Leipzig, Germany, 1930. xiv + 434 pp. 69 figs. 15.5 × 23.5 cm. Price, unbound, RM. 34.50; bound, RM. 36.50.

The content of this book covers such an immense field of science that the reviewer must content himself with making a report as to the fundamental idea jointly underlying the various chapters. This idea may be designated as the principle of substitution or replacement and may be characterized as follows.

When a reaction takes place at a phase boundary between a solid and a liquid such as adsorption, a rule may be stated as a substitute for what is known as the mass action law in a homogeneous system. The author takes the interfacial layer as a phase, this word being used as it is usually used in thermodynamics. Let the nature of the absorbing surface and the adjacent solvent be given and let a variable amount of another substance be dissolved in the solvent and partially adsorbed at the interface to the establishment of an equilibrium. In order to calculate the state of equilibrium by a principle resembling the mass action law the author propounds the following hypothesis.

The interfacial phase may be thought of as containing the molecules of the adsorbing solid and the molecules of the other substances concerned in a definite concentration. The sum of the concentrations of all these substances concerned must be taken as a constant so that by increasing the concentration of the substance to be adsorbed the concentration of the adsorbent is diminished. This idea, of course, cannot be taken literally because, from a molecular point of view, there is no sense in speaking of a concentration of the adsorbent in the interfacial phase. The whole idea is rather like an analogy.

A great part of the book is dedicated to the justification of the use of analogies in natural sciences and of the philosophy of "as though" especially with reference to Ernst Mach's philosophy. This principle is applied to processes of adsorption, catalysis, enzymes, immunology, medical problems, electrolysis, galvanic polarization, electron emission and others. The reviewer does not feel himself competent in all these various fields. In those fields in which he dares utter a criticism he feels that this principle solves the problem only in a formal way and disregards too much our well-established mental pictures about molecules and concentrations. To be sure, modern physics is inclined to abandon any mental picture or mechanistic

interpretation for intra-atomic processes such as electron orbits. But there was no need as yet to give up our mechanistic point of view when dealing with systems in which the molecule can be taken as the ultimate elementary mass unit. One is, however, on reading this remarkable book, so impressed by the display of the author's very comprehensive erudition and originality and by the strict treatment of the subject in other respects, that one feels judgment of the merits of the book may be left to the future. Albert Einstein accompanies this book with a preface. The following remark of his seems entirely to the point: "The hypothesis of a variable concentration of the solid participant of the reaction is very paradox from the standpoint of any molecular theory. Yet, however the decision finally may turn out, in any case this book may have an inspiring effect by its settings of the problems."

L. MICHAELIS

**Grundriss der modernen Arzneistoff-Synthese.** (Fundamentals of Modern Medicinal Synthesis.) By Dr. K. H. SLOTTA, Lecturer in Chemistry at the University of Breslau. Verlag von Ferdinand Enke, Stuttgart, Germany, 1931. xi + 202 pp. + 25 tables. 16 × 25 cm. Price, RM. 17.50, unbound; RM. 20, bound.

This outline of the synthesis of modern medicinals presents the subject from both chemical and pharmacological viewpoints.

The major classification of the material is pharmacological, the separate chapters being entitled: I, Narcotics; II, Sedatives and Hypnotics; III, Antipyretics; IV, Local Anesthetics; V, Sympathomimetics; VI, Excitants; and VII, Antiseptics and Chemotherapeutics. The subdivision of these major headings is generally along chemical lines. Thus, Chapter III is divided into A, Antipyrine Group, B, Phenacetine Group, C, Salicylic Acid Group and D, Atophan Group. Both author and subject indexes are provided. There are also, at the back of the book, 25 interesting and useful charts, depicting diagrammatically the synthesis of various important drugs and beginning with one on fundamental syntheses from carbon and lime, through acetylene. Structural formulas are used freely throughout the text, to make clear the various synthetic steps discussed and the constitution of the products. Type, paper and presswork are excellent.

The author has endeavored to show not only the details of the syntheses, but also to explain the pharmacological considerations underlying them. No attempt has been made to compile a work of such encyclopedic scope as Fränkel's "Die Arzneimittel-Synthese," but rather to select those medicinals of known constitution which have been introduced comparatively recently and have proved useful. The term "modern" is not interpreted as meaning only those synthetics to which a passing vogue or vigorous commercial exploitation may have given prominence, but includes such well-known compounds as ether and chloroform.



Since the book concerns medicinals in the broad sense, it takes up not only true curative agents, but also those compounds which stimulate or check the activity of various organs. Naturally, the chief aim of the synthesist is the preparation of healing drugs, but he must often content himself, at least temporarily, with those which merely cause the disappearance of the symptoms. General anesthetics are necessary for the performance of operations. In diseases of the nervous system, sleep is often one of the best healing agencies. Such indirect remedies as general anesthetics, hypnotics, etc., therefore are included. Other maladies may be alleviated by the introduction of synthetics which the body itself either ceases to generate or no longer produces in sufficient amount, as, for example, adrenaline or thyroxine.

The chapter on "antiseptics and chemotherapeutics" is devoted to a consideration of those synthetics which act either to destroy pathogenic organisms or at least to arrest their growth, and which are therefore true remedies in that they remove the cause of the disease.

The book is as nearly up to date as reasonably can be expected. The subject matter is presented clearly and compactly, with ample references to the original literature, and the reviewer is of opinion that the work will be found useful to all interested in this exceedingly important branch of Organic Chemistry.

Of course, no two chemists would agree exactly on the list of synthetics which should be presented in such an outline, and it is inevitable that there will be those who will criticize it on that score, but it seems to the reviewer that on the whole the list has been chosen wisely and with reasonable conservatism, and that the author has kept constantly in mind that the guiding star in all such investigations is the desirability of learning more about the connection between chemical constitution and physiological action.

MARSTON TAYLOR BOGERT

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## BOOKS RECEIVED

November 15, 1931-December 15, 1931

- GUIDO BARGELLINI. "Esercizi Numerici di Chimica Organica." Editrice Studium, Piazza S. Agostino 20-a, Roma, Italy. 242 pp.
- GEORGE BARGER. "Ergot and Ergotism." A Monograph Based on the Dohme Lectures Delivered in Johns Hopkins University, Baltimore. Gurney and Jackson, 33 Paternoster Row, E. C., London, England. 279 pp. 15s net.
- FRANK CLOWES AND J. BERNARD COLEMAN. "Quantitative Chemical Analysis. An Intermediate Text-book." Thirteenth edition. Revised by D. Stockdale and J. Dexter. P. Blakiston's Sons Co., Inc., 1012 Walnut Street, Philadelphia, Pa. 605 pp.