

## BOOK REVIEWS

**Handbuch der Katalyse.** Edited by G.-M. SCHWAB, München. Fünfter Band: Heterogene Katalyse II, Bearbeitet von J. BLOCK, P. BROVETTO, F. H. CONSTABLE, A. G. NASINI, G. NATTA, H. NOLLER, R. RIGAMONTI, G. SAINI and G.-M. SCHWAB. Springer-Verlag, Molkerbastei 5, Wien 1, Austria, 1957. vi + 779 pp. 18 × 25 cm. Price, \$43.80; ganzeleinen, \$44.75.

G.-M. Schwab conceived the plan for the "Handbuch der Katalyse" prior to the Second World War. It was to be a truly comprehensive treatment of the subject of catalysis on adequate scale. Seven volumes were projected: 1, Allgemeines und Gaskatalyse; 2, Katalyse in Lösungen; 3, Biokatalyse; 4, Heterogene Katalyse I; 5, Heterogene Katalyse II; 6, Heterogene Katalyse III; and 7, Katalyse in der Organischen Chemie. It was planned that all volumes would be published in the course of the shortest possible period and in this the distinguished editor was almost successful in spite of great difficulties for six of the seven volumes appeared between 1940 and 1943. But the exigencies of the war finally prevented the publishing of volume 5. The "Handbuch der Katalyse" was considered so important that it was published as a reprint in this country by Edwards Brothers, Inc., Ann Arbor, Michigan, 1945. Many sets are in use in English speaking countries but both here and in Germany the lack of this key volume has been keenly felt. In preparing this volume the original 1943 manuscripts have been revised and brought up to date by the original authors in preparing the four chapters of the present volume. The publication of this volume, even after fourteen years, is therefore welcome.

Chapter 1 (140 pages) Adsorption und Allgemeines über mono- und mehrmolekulare Schichte (Adsorption and General Considerations concerning Mono- and Polymolecular Layers) by A. G. Nasini, G. Saini and P. Brovetto all of Turin. The last two decades have produced a great development in the understanding of the nature of adsorption both physical and chemisorption. This development is competently reviewed in its aspects of technique, theory and literature. The great contributions of Emmett, the mathematical development of the isotherms of Brunauer, Emmett and Teller, of Harkins and Jura, of Langmuir, of Huttig, and of others are presented and compared both as to precision, ease of use, and theoretical soundness.

Chapter 2 (19 pages), Active Centers from the Point of View of Kinetics (English) by F. H. Constable of Istanbul. Much controversy has centered around the subject of this chapter. The author as an eminently qualified protagonist, has an important point of view to present. It is to be hoped that the article will stimulate further work, particularly since modern solid state theory and techniques should make this field more fruitful.

Chapter 3 (252 pages), Kinetik der heterogene Katalyse (Kinetics of Heterogeneous Catalysis) by G.-M. Schwab, H. Noller and J. Block all of Munich. This article comprises a theoretical portion (69 pages) and an applied section (187 pages). Since even the theoretical portion is liberally illustrated with applications, this article is basically a survey of the application of reaction kinetics to numerous examples of heterogeneous catalysis. The article features an 8-page table of energies of activation for various catalyzed heterogeneous reactions. Only in isolated cases are the proposed kinetics evaluated.

Chapter 4 (332 pages), Die Mischkontakte (Composite Catalysts) by G. Natta and R. Rigamonti. From personal practical use the reviewer can recommend this chapter as a key to the unwieldy but essential published literature on the preparation and effectiveness of simple and composite catalysts. Much of the data is organized into 103 convenient tabulations. Although not exhaustive, this review contains all the major articles down to 1955. The review is particularly helpful because the catalysts are classified according to crystallographic and solid state concepts.

While the author index appears small (26 pages) for the massive bibliographic material, (more than 5,000 citations) to be found in the footnotes, there seem to be no omissions.

The 3-column format makes for condensation and easy scanning. The subject index (10 pages) in two column format seems a little inadequate for a volume of this size. Tabular entries, for example, are not indexed which means that some tables must be scanned for specific topics.

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**Heat Transfer. Volume II.** By the late MAX JAKOB, Research Professor of Mechanical Engineering, Illinois Institute of Technology, Consultant in Heat Transfer, Armour Research Foundation, Consultant in Heat Transfer, Purdue University. With the technical and editorial assistance of STOTHE PETER KEZIOS, Associate Professor of Mechanical Engineering, Illinois Institute of Technology. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, New York. 1957. xxxii + 652 pp. 15.5 × 23.5 cm. Price, \$15.00.

Volume I of this two-volume treatise was published in 1949. Dr. Jakob's untimely death in 1955 occurred before the present volume was completed. His associate, Dr. Kezios, prepared the manuscript from Dr. Jakob's notes. He has accomplished this unselfish task skillfully and well.

Volume I, which has taken its place as an important contribution to the literature of engineering science, covers the basic concepts and fundamental topics of heat transfer by radiation, conduction and convection. The present volume deals primarily with selected special topics. The first two chapters cover radiation between surfaces and through absorbing media. This material properly is an extension of the chapters on radiation in volume I. The remaining sections are on new topics. Although the possessor of the present volume undoubtedly will wish to have volume I also, volume II may be read independently of the earlier volume and is quite self-contained.

The fields selected for detailed treatment are: heat transfer in thermometry; ordinary heat exchangers (regenerators); cooling towers; cooling by falling liquid films; cooling of surfaces exposed to hot gases; heat transfer through laminar and turbulent boundary layers at high velocities; heat transfer in liquid metals; and steady state heat transfer in packed columns. A series of short supplementary chapters bringing up to date the material in the corresponding chapters in volume I is added. Finally, appendices containing problems, tables of nomenclature and conversion factors, references and index complete the text.

All of the chapters in this book have certain common characteristics. The subject of the chapter is introduced generally and placed in perspective with heat transfer as a whole. Historical sources are carefully given and priorities fairly assessed. The mathematical theories from important publications are thoroughly and carefully presented and reviewed. For the most part, these discussions are arranged in historical order. The best experimental data are presented and analyzed. The emphasis of the book is somewhat more on mathematics than on experiment. Material from many sources has been organized and presented in a remarkably consistent manner. The nomenclature, although somewhat complex and individualistic, is not difficult to follow. The entire treatment is scholarly.

The chapters on thermometry, regenerators, cooling of surfaces exposed to hot gases, heat transfer at high velocities, and heat transfer to liquid metals, are among the most complete and authoritative treatments of these subjects in English. The remaining chapters are at the same level of thoroughness but other well known publications also have covered these situations.

Jakob's "Heat Transfer" is not a textbook for the uninitiated. Although it has a collection of problems to be worked, there are no illustrative examples given in the text. The book is for the scholar, for the research specialist, and

for the mathematically mature engineer. In its field, it is a superb job and is certain to achieve a high place in the technical-scientific literature.

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**Lehrbuch der Elektrochemie.** By DR. GUSTAV KORTÜM, Professor und Direktor des Instituts für Physikalische Chemie an der Universität Tübingen. Verlag Chemie, G.m.b.H., 17a Weinheim/Bergstr., Pappalallee 3, Germany. 1957. xix + 564 pp. 18 × 24.5 cm. Price, DM 35.80.

The overwhelmingly favorable reviews which greeted the first German edition of Dr. Kortüm's *Lehrbuch* and the subsequent English edition (Kortüm-Bockris) will no doubt be repeated for this new and completely reworked second German edition. The contents and manner of presentation of the two previous editions have, for the most part, been carried over into the new work, although the chapter on electrochemistry of gases has been understandably eliminated. The remainder of the subject matter has been rewritten to include new developments in electrochemistry up to the latter part of 1956. The author is unusually thorough in his treatment of theory, to the extent that the book may be more properly referred to as an "advanced treatise," rather than a textbook. The combination of *thorough* coverage of the field and *thorough* treatment of theory makes the book particularly useful for advanced students and researchers, but for this very reason the author's intent that the book will also be useful to beginners has not been realized—this despite the fact that the discussions are in general very clearly presented. It is simply that practically no undergraduate, and very few graduate, students in chemistry will properly understand many of the terms (as, for example, "div grad  $\psi$ ") which are used in the derivations.

Some smaller points worthy of mention: The footnotes, as well as the numerous sidelights included in small type, should be read with at least as much attention as is given to the rest of the text, as these contain some of the most interesting and informative material presented. One entire chapter is devoted to a fairly complete treatment of the modern theory of acids and bases; it could be argued that this does not properly belong in a textbook of electrochemistry. A final point, but an important one to most American readers, is that the author's composition reads and translates very easily, much more so than the average article in the German literature.

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**Progress in Nuclear Physics.** Volume 6. Editor, O. R. FRISCH, O.B.E., F.R.S., Cavendish Laboratory, Cambridge. Pergamon Press Inc., 122 East 55th Street, New York 22, N. Y. 1957. vii + 297 pp. 16 × 25.5 cm. Price, \$14.00.

In reviewing a book of this nature it would be quite useful to know *a priori* the nature of the reading public the Editor had in mind, for then one would be in a better position to judge whether in his opinion the authors had aimed their level of presentation correctly. It seems a reasonable surmise to presume that it is not aimed at the expert but that its purpose is to acquaint knowledgeable scientists with general progress in the field of its title and the discussion shall be based on this supposition. The answer to the question then is yes and no, and this is almost to be expected in such a volume in which there appear nine separate articles, each by a different author or authors. The subjects covered and their authors are in order of appearance: "Isotope Separation by Multistage Methods," T. F. Johns; "Nuclear Models," R. J. Eden; "Nuclear Moments and Spins," K. F. Smith; "The Spectroscopy of Mesonic Atoms," M. B. Stearns; "The Masses of Atoms of  $A > 40$ ," H. E. Duckworth; "Electromagnetic Enrichment of Stable Isotopes," M. L. Smith; "Fission Recoil and its Effects," G. N. Walton; "Masses of Atoms of  $A < 40$ ," J. Mattauch and F. Everling; "Parity Non-Conservation in Weak Interactions," O. B. Frisch and T. H. R. Skyrme.

Each of the articles is followed by what appears to be a fairly complete set of references in the field and several of them, namely those on the masses of the atoms and nuclear moments, contain complete and useful tables relevant to the subject matter.

Generally speaking there appears to be to this reviewer a rather conspicuous failure in the presentation of theoretical material. This is a lack of a simple physical picture or model which would make new ideas or concepts much more digestible. A particularly outstanding example of this appears in the last article on Parity Non-Conservation. In this article the pioneer experiment of Madame Wu and her collaborators in demonstrating the non-conservation of parity is presented in a manner in which it appears the non-conservation of parity in this experiment rests upon a specific model of the neutrino; this is just not so. In further attempting an elucidation of the two neutrino theory of Lee and Yang, the author sticks to a quite formal presentation; this theory can be made much more transparent by a discussion of several limiting cases which are quite simple and physical. However, considering the rapid developments in this field of quite recent origin, the authors appear to have done a commendable job generally speaking.

Of the remaining articles, those by Duckworth and by Smith are outstanding for their clarity and comprehensiveness. Unfortunately it appears to me that the rest suffer by comparison. This appears to be principally a failure in emphasis. Eden attempts to cover the vast field of Nuclear Models in 26 pages, while 30 pages are devoted (and rather poorly) to the certainly much more specialized and narrow field of the Spectroscopy of Mesonic Atoms. Of the two Eden appears to have done the better job though he demands much on the part of the reader.

The volume is excellently printed in large and easy-to-read type. One can, however, seriously question whether the content is at all commensurate with the (quite high) price, particularly if comparison is made with other volumes of a similar nature.

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**Trace Analysis.** Papers presented at a Symposium on Trace Analysis held at the New York Academy of Medicine, New York, N. Y. November 2, 3, 4, 1955. Edited by JOHN H. YOE, M.S., M.A., Ph.D., Professor of Chemistry and Director, JOHN LEE PRATT, Trace Analysis Laboratory, University of Virginia, and HENRY J. KOCH, JR., A.B., M.D., Sloan-Kettering Institute for Cancer Research, New York, N. Y. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. xiii + 672 pp. 15.5 × 23.5 cm. Price, \$12.00.

"The importance of the trace constituents of animate and inanimate matter has been increasingly demonstrated as methods for their detection and quantitation have been developed." "It is the purpose of this book to acquaint the biologist, the physiologist, and the chemist, interested in the trace constituents of matter, with the new as well as the established techniques which are available for their analysis." So stated Dr. Koch in sounding the keynote of the Symposium on Trace Analysis of which this book is the record. Drs. Yoe and Koch are to be doubly commended: in the organization of an interesting symposium in which such outstanding leaders in the field of analytical chemistry participated, and in editing the symposium proceedings to produce this interesting and useful volume.

The table of contents which reads like an analytical chemistry honor roll includes Chromatography and Electrochromatography by H. H. Strain, Ion Exchange by K. A. Kraus, Extraction by L. C. Craig, Chemical Microscopy by W. C. McCrone, Spot Tests by F. Feigl and P. W. West, Colorimetry by M. G. Mellon, Fluorometry by C. E. White, Flame Spectrometry by B. L. Vallee, Potentiometry by N. N. Furman, Coulometry by L. B. Rogers, Polarography and Voltammetry by P. Delahay, Amperometry by C. N. Reilley, Emission Spectrochemical Analysis by L. W. Strock, Spectrochemical Determination of Trace Elements in Biological Materials by R. L. Mitchell, Gamma-Ray Spectroscopy by H. W. Koch, Mass Spectroscopy by M. Ingraham, X-Ray Spectroscopy by T. Hall, X-Ray Micrography by A. Engström, Neutron-Activation Analysis by