

Each of these chapters is well planned, lucidly written, and includes well-chosen problems illustrating the points made.

These alone would make this book a worthwhile addition to the literature, but its true value lies beyond this in the depth of the discussion of what, for lack of a better term, must be called the philosophy of experimentation. This subject which goes to the roots of physics involving, as it does, the reciprocal relations between theory, measurement, and experiment is a field too often passed off by a brief preface in a laboratory manual. Yet, it is this philosophy that gives point to our laboratory efforts and raises them above the level of tinkering.

Again, the book has value beyond its use as an adjunct to a laboratory course for it makes an excellent book to hand to each newcomer to a research laboratory and also for the older people who need reference to least squares, normal distribution and the like. The utility of the book is enhanced by its sturdy looking semi-limp binding.

I believe congratulations are due to all involved in the book's preparation.

Progress in Biophysics and Biophysical Chemistry, Volume 2. J. A. V. Butler, B. Katz, R. E. Zirkle, eds. 277 pp. Pergamon Press, New York, 1961. \$12.50. Reviewed by Joseph G. Hoffman, University of Buffalo.

THE six review articles presented are timely and highly commendable, but the atomic age with its emphasis on radioactivity is seen again: three of the papers involve ionizing radiations and living systems. The first of these, "Natural Radioactivity of the Human Body", by W. V. Mayneord, might well have been entitled The Alpha Activity of the Human Body and of Human Foods. In these days of endless inquiry about radiations and human-tissue tolerances, Mayneord's paper gives a timely report on a fundamental aspect of radioactivity in living systems. Alpha activities are exceedingly small, yet most of us are curious to see what they are in mundane things such as sardines, walnuts, tapioca, chocolate, peanuts, and so on. Of the nearly two hundred foods listed it is noteworthy that the extreme case is in Brazil nuts. In arbitrary units, Brazil nuts count at 1750, while the next highest food in magnitude is a cereal (United Kingdom) at 58. Peanut butter is 12, bread is 3, and ice cream is 0.7. The lowest of alpha activities is less than 0.1 for baked beans. As for human tissue, Mayneord's figures for an Egyptian who died about 4000 years ago are about equal to those for bones from humans in this century. Animals such as cattle and other domesticated animals have wide ranges of alpha activity at much higher levels than humans. A typical human sustains in a 70-year lifetime about 3.3×10^{10} alpha disintegrations in his tissues. This is about one curie second and is extremely low from the dosage standpoint even though each disintegration in a live cell would be lethal for that cell.

Mayneord's 23-page report is concise and is recommendable to the general reader as well as the technical specialist.

The other two radiation papers are by R. Goutier on the mode of action of x rays on the biosynthesis of nucleic acids, and by L. G. Lajtha on the effect of ionizing radiations and chemotherapeutic agents on bone marrow. One of the most intriguing and also the most difficult paper is by A. N. Uttley on the engineering approach to the problem of neuro-organization. Four different kinds of technical language are used: psychology, neuro-psychology, physics, and computer mathematics. The reader soon is aware that the mind that studies is quite different from the mind that is studied, and that, moreover, the language for describing the physical construction of mind needs to be developed. Uttley's paper gives an excellent indication of the unique nature of the problems arising when one tries to say what a perceptive response is.

The two remaining papers are on vastly different areas of biology. The fifth paper by P. I. Corner deals with some factors influencing the dispersion of indicator substances in the mammalian circulation. The sixth paper by E. J. Denton is a review of the problem of the buoyancy of fish and cephalopods. Control of buoyancy is one of those typical biologic phenomena, which seem to violate physical law. Like the sodium ion pump, it evokes teleologic ideas. This is an extended review of about 54 pages on the description of fish and a review of the research which had led to the findings of various types of gas-filled buoyancy chambers as well as examples of fish which do not have a gas-filled swim bladder.

There is a seventh chapter in this book on cytoplasmic particles and their role in protein synthesis. It reviews an informal discussion held in March 1960 at the University of Reading in a series of abstracts and it contains a bibliography on subjects related to cytoplasmic particles.

Instruments and Measurements. Conf. Proc. (Stockholm, Sept. 1960). Helge von Koch, Gregory Ljungberg, Vera Reio, eds. Vol. 1, Automatic Process Control, Physical Methods of Chemical Analysis, 506 pp., \$16.00; Vol. 2, Nuclear Instrumentation, Measurement of Electric and Magnetic Quantities, Reactor Control, 721 pp., \$22.00. Academic Press Inc., New York, 1961. Reviewed by Peter L. Balise, University of Washington.

AS is typical of proceedings, the 120 papers in these books vary widely in subject matter and quality, ranging from descriptions of commercial instruments and reviews of basic techniques to interesting theoretical suggestions. The classification into five divisions seems arbitrary, since there is considerable overlapping of subjects and no segregation of papers within each category. About a quarter of the work is in German, the rest in English.

The greatest emphasis in the automatic process-control section is on computer control, with several appli-

☐ **ELECTRICAL AND MECHANICAL NETWORKS: An Introduction to their Analysis**

By W. W. HARMAN, *Stanford University*; and D. W. LYTLE, *University of Washington*. McGraw-Hill Electrical and Electronic Engineering Series. 608 pages, \$11.50.

An introductory treatment of the analysis of electrical, mechanical and electromechanical networks. The basic approach is the conceptually simple but potentially rigorous and powerful method of describing the linear network by finding the ratio of excitation to response when the excitation is of the form e^{st} . The approach is developed through carefully chosen, graded series of examples in which the student is led to consider how one might have come originally to think of the analysis method he is to learn. Emphasis is on the development of an attitude and a type of approach, rather than on an exhaustive treatment of the analysis methods developed.

☐ **ENGINEERING CIRCUIT ANALYSIS**

By WILLIAM H. HAYT, JR., *Purdue University*; and JACK E. KEMMERLY, *The Ford Motor Company*. Available in November.

Text was primarily designed for first course electrical engineering classes . . . normally attended by college sophomores. Introductory calculus is a prerequisite—other necessary mathematics is taught throughout the book as the need arises. Major emphasis is placed on the circuit model. Complicated analysis methods are presented early in the discussion of resistive circuits, so that numerical solutions to problems are simplified. Within each chapter, the learning process proceeds from the specific to the general. A method of analysis is presented by first working specific numerical problems and then applying the method to general classes of problems.

☐ **THE FOURIER INTEGRAL AND ITS APPLICATIONS**

By ATHANASIOS PAPOULIS, *Brooklyn Polytechnic Institute*. Electronic Science Series. 336 pages, \$10.75.

This text bridges the gap between the mathematical treatments that go beyond the understanding or interest of engineers and the applications that are only separately treated in various specialized books. The first of its kind, it is simple and clear in approach, without sacrificing rigor or thoroughness. Discusses singularity functions (or distributions) and their incorporation into the theory; filters in terms of their frequency characteristics; power spectra and correlation functions without any probabilistic considerations; transforms of causal functions and their relationship to the Laplace transform.

☐ **NONLINEAR THEORY OF CONTINUOUS MEDIA**

By A. C. ERINGEN, *Purdue University*. McGraw-Hill Series in Engineering Sciences. Just published.

The first advanced book on this subject in the Western Hemisphere. It pursues the single unified theory advanced by Truesdell which can predict the mechanical behavior of all continuous media, fluid or solid, under any external influence such as force, heat, or even electricity and magnetism. It is an excellent text for graduate teaching in schools where a definite program to cultivate the physical and mathematical foundations of Continuum Physics exists. It will also be extremely valuable to research workers in this field because it collects under one cover the results of many significant investigations.

☐ **VISCOUS HYPERSONIC FLOW
Theory of Reacting and Hypersonic
Boundary Layers**

By WILLIAM H. DORRANCE, *The Aerospace Corporation*. McGraw-Hill Series in Missile and Space Technology. Available in October.

Book describes the theories needed for treating the laminar and turbulent boundary layers of reacting gas mixtures. The theories are developed from fundamentals; all related chemical, thermodynamic, and

physical concepts are illustrated. Suitable for those performing research or engineering analyses of hypersonic atmospheric re-entry bodies, ablation heat protection systems, and rocket nozzle analyses. Also for students associated with aeronautics, aerospace or mechanical engineering departments.

☐ **PHYSICAL CHEMISTRY**

By GORDON M. BARROW, *Case Institute of Technology*. 694 pages, \$8.95.

A modern text prepared with an eye toward unifying the content of physical chemistry by interpreting quantitative chemical behavior in terms of molecular behavior. All physical chemistry is treated from a structural approach, emphasizing the knowledge of the molecular world that can be gained by theory or experiment and the application of this knowledge to the understanding of macroscopic behavior. A problem book will be available.

☐ **EXPERIMENTS IN PHYSICAL CHEMISTRY**

By DAVID SHOEMAKER and CARL W. GARLAND, both of *Massachusetts Institute of Technology*. 480 pages, \$8.95.

Suitable as a text for advanced physical chemistry laboratory courses. Each of the 44 class-tested experiments is accompanied by theoretical development, providing a lucid understanding of the method, the calculations, and the significance of final results. Both traditional and modern experiments are included. The book also contains supplementary material concerned with modern apparatus and techniques in physical chemistry.

☐ **EXPERIMENTAL PHYSICAL CHEMISTRY, Sixth Edition**

By FARRINGTON DANIELS, *Professor Emeritus of Chemistry*; J. W. WILLIAMS, PAUL BENDER, ROBERT A. ALBERTY, and C. D. CORNWELL, all of the *University of Wisconsin*. 640 pages, \$7.95.

A revision of a classic. This comprehensive textbook for elementary physical chemistry laboratory courses introduces techniques used in physical chemistry research. A large variety of experiments enables the instructor to elect the ones best suited to his needs and equipment. Many new class-tested experiments have been added to this edition; some of the simplest experiments from previous editions have been eliminated. Includes a unique introduction to basic principles of a.c. circuits and electronic devices.

☐ **PROGRAMMING AND UTILIZING DIGITAL COMPUTERS**

By ROBERT S. LEDLEY, *National Biomedical Research Foundation and The Johns Hopkins University*. McGraw-Hill Series in Information Processing and Computers. 592 pages, \$12.50.

This textbook for undergraduate and graduate courses discusses programming on both scientific and business levels. It covers machine language programming; the three-, two-, and one-address instruction systems; automatic programming languages, with chapters on ALGOL and COBOL; and methods for utilizing computers, designed as a source for programming problems. Concrete examples illustrate all discussions. Approximately 500 exercises follow each chapter.

☐ **HUMAN FACTORS IN TECHNOLOGY**

By E. BENNETT, J. DEGAN and J. SPEIGEL, all of the *Mitre Corporation, Bedford, Massachusetts*. Available in October.

Favorably received by the Human Factors Society, text was prepared with the assistance of outstanding human factors scientists and engineers representing a broad spectrum of disciplines and areas of investigation. Offers exciting view of some of the newest and most interesting aspects of contemporary human factors in science and engineering. Will be useful to technically trained people in a wide variety of areas and specializations. Text is especially suitable for supplementary reading in graduate courses concerned with human factors in technology or in upper level undergraduate courses in engineering or applied psychology and human engineering.

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cations described and some analysis of mathematical models. Surprisingly, there is only one specific study of nonlinear control functions. Several control papers are primarily concerned with measurement devices. The section on physical methods of chemical analysis is oriented towards laboratory measurements rather than industrial applications. A majority of the papers deal with mass spectrometry and other spectrum methods. The powerful newer field of gas chromatography is almost ignored compared to what might be expected. The nuclear-instrumentation section concerns both radioactivity measurements, as in the human body, and industrial isotope applications. The widest variety is in the section on electric and magnetic measurements. Besides techniques for measuring many different quantities, there are a laboratory description and discussions of digital handling. The section on reactor control discusses the instrumentation and reports the experiences at a number of nuclear power installations.

An Introduction to Magneto-Fluid Mechanics.

By V. C. A. Ferraro and C. Plumpton. 181 pp. Oxford U. Press, London and New York, 1961. \$4.00. *Reviewed by L. Talbot, University of California.*

TO quote from the authors' preface, "The object of this book is to provide an introduction to magneto-fluid mechanics for the use of physicists and engineers." There is a need for a book which fulfills this stated object, but unfortunately this volume does not quite succeed.

The introduction of the book is in essence the text of an address given by Ferraro at the British Theoretical Mechanics Colloquium in 1960 on the history of magnetohydrodynamics research. This interesting and informative review is, however, marred by the almost complete absence of adequate source data for the references cited. In fact, this defect persists throughout the entire volume; it is a frustrating and often impossible matter to track down the locations of many of the references, even with the aid of the annotated bibliography.

The main body of the text is divided into two parts. Part 1, Magnetohydrodynamics, comprises five chapters in which the topics discussed include a review of general principles, magnetohydrostatics, magnetohydrodynamic waves, turbulence and hydrodynamic shock waves. Mks units are used in Part 1. Part 2, entitled Plasma Dynamics, comprises three chapters which contain material on particle motion, collision theory based on a relaxation-model of the Boltzmann equation, and additional material on plasma waves. Gaussian units are used in Part 2.

Although some of the individual sections of the book are well written, the volume as a whole is poorly organized from a pedagogical point of view and gives this reviewer the impression that it was rather hastily assembled. The worker in the field of MHD may find certain portions of this book useful, but it is not the answer to the quest of a scientist, newly arrived on the

MHD scene, for a slim volume which will take him carefully through the first principles of the subject and prepare him for more specialized study. (In fact, the fluid dynamicist may be shaken rather early by reading in Chapter 1 that the transition Reynolds number for pipe flow is of order unity!)

Progress in High Polymers, Volume 1. J. C. Robb and F. W. Peaker, eds. 340 pp. Academic Press Inc., New York, 1961. \$12.00. *Reviewed by Stuart A. Rice, Institute for the Study of Metals, University of Chicago.*

EVERY time a new review volume or a new journal appears on my desk, my emotions range from an involuntary shudder to violent rage. The multiplicity of journals and review volumes is truly enormous and each case must be examined carefully to determine its value.

Fortunately, I believe the volume under review to be a useful addition to the literature. In my own work, I have already found the article by W. Cooper on stereospecific polymerization to be of considerable assistance. The article by R. S. Lehrle on ebulliometry is an authoritative and relatively exhaustive discussion of the subject. The review articles by G. M. Guzman on fractionation of high polymers and G. J. Howard on molecular distribution are also quite useful. However, I found the article by T. B. Grimley on the theory of high-polymer solutions to be deficient in a number of respects. For a review volume to be truly useful, there must be as little overlap as possible between the article and standard texts. The article must also present to the reader as much as possible of the latest development in the field. It is therefore with surprise that I found in Grimley's article reviews of elementary light scattering theory, the McMillan-Mayer theory, and general statistical mechanics, but no mention of the work of Yamakawa or of the recent work of Fixman.

In all, the current volume justifies its existence. It will be necessary, however, for the editors to continue to exercise judgment and to choose only articles of importance. It would be best if the review volumes would appear only when sufficient articles of merit accumulate rather than on a regular annual or semiannual schedule.

Instrumental Optics. By G. A. Boutry. Transl. from French by R. Auerbach. 544 pp. Interscience division of John Wiley & Sons, Inc., New York, 1962. \$27.50. *Reviewed by W. T. Wintringham, Bell Telephone Laboratories.*

USUALLY one finds upon study that a new text fits neatly into a well-defined niche. The reviewer's task in such cases is easy and straightforward. However, Professor Boutry's *Instrumental Optics* is different and there seems to be no simple way of categorizing it. Nevertheless it is interesting, although at times tedious reading.

Professor Boutry's major premise is that an optical instrument should be designed to match the receiver with which it is to be used, i.e., the performance of