Instruments for, and instrumental methods of, measuring absorbed dose are discussed in eight authoratative articles in this, the first of a three volume set entitled *Radiation Dosimetry*. Volume I, *Fundamentals*, is to be published in a few months, and Volume III, *Sources, Fields, Measurements and Applications*, is promised toward the end of the year.

Individual chapters, authored by distinguished authorities, are, for the most part, carefully prepared and give rather complete coverage of recent advances. One will find somewhere in the collection a description of all established dosimetric techniques, and the editors have kept overlap to a minimum. The index is complete and carefully prepared. Typographic errors are few, but more numerous than this reviewer expected to find in a volume worked over by these editors.

In spite of these strong points, this is a collection of essays and shows it in unevenness in style and approach from chapter to chapter. It is by no means a book to be read from cover to cover in a sitting or two. The treatment of specific physical principles underlying each topic varies greatly from chapter to chapter, from short, with pithy references to where to look further, in the case of Dudley's "Dosimetry With Photographic Emulsions" and Emery's "Geiger-Mueller and Proportional Counters," to expansive and detailed in Boag's "Ionization Chambers," to shallow and incomplete in Ramm's "Scintillation Detectors."

Even as a reference work it is of limited utility standing alone, because elements necessary for understanding have been excised from each chapter to be included in Volume I. Professor Boag's excellent chapter provides a thorough description of how ionization chambers are built and how they work, but gives no indication of how they might be used to measure absorbed dose. This fragmentation is a problem throughout, but less important in the remaining chapters. There are, however, extensive cross references, and the appearance of companion volumes will relieve, if not rectify, this difficulty.

"Hine & Brownell" has come to mean a shop-worn blue volume entitled *Radiation Dosimetry* that has served for a decade as primer for novitiate radiation effects workers and "Hoyle" in inter- and intra-laboratory discussions. Perhaps the most valid way of evaluating this fragment of a complete work is in terms of corresponding parts of Hine & Brownell.

Six of the eight chapters in the present work cover subjects presented in the first edition of Hine & Brownell. All are substantially improved by inclusion of reference to and discussion of new work. Each bibliography contains a surprisingly high percentage of references to work since 1954. More than two thirds of the references in Dudley's chapter "Dosimetry With Photographic Emulsions" are to reports appearing since publication of the first edition. This chapter, excellent in the first edition, is better in the second, and Fricke and Hart's "Chemical Dosimetry" substantially improves on the discussion of this subject in the first edition.

The two new chapters, Fowler's "Solid State Electrical Conductivity Dosimeters" and Fowler and Attix's "Solid State Integrating Dosimeters," treat systems that have developed exceedingly rapidly over the last ten years. In each case the presentations are lucid and remarkably complete in their coverage of the variety of systems, ranging from bits of glass to candy wrappers, embraced by these new topics. Particularly admirable is Fowler and Attix's attempt to evaluate potential value and pitfalls of each system.

The minimum requirement for a new edition of a valued work is revision to include new and important knowledge. Volume II, *Instrumentation*, succeeds admirably in this. The complete new edition will have 33 chapters, 15 more than the first, and if follow-on volumes succeed as well as the first, this long-awaited revision of a most important and useful work will be a very welcome addition.

Nathaniel F. Barr, now Technical Advisor to the AEC's Assistant General Manager for Research and Development, was until recently with the AEC's Division of Biology and Medicine, where he was responsible for research programs in radiation physics, health physics, and instrumentation. He has taught biophysics at Cornell, and has done research in radiation chemistry and dosimetry at Brookhaven National Laboratory, Sloan-Kettering Institute, and Columbia University, where he also received his PhD (physical chemistry) and taught chemistry.

RADIOISOTOPE APPLICATIONS

Title The Technical Applications of Radioactivity, Vol. I

Authors E. Broda and T. Schonfeld

Publisher Pergamon Press, 1966, First English Edition

Pages xvi + 353

Price $15.00

Reviewer H. R. Lukens

This volume presents many facts concerning radioisotopes and their uses. Hundreds of significant industrial applications, well indexed, are described, and an excellent bibliography is included with each chapter. Radiation processing and the uses of radiation absorption and scattering in measurement and control are topics reserved for a subsequent volume.

The text does not treat radioisotopes, radioisotope measurement, radiochemistry, nor any of the multitudinous applications in depth, and there is a minimum of mathematical formulae. Thus, its use as a primary instructive volume on the subject of radioisotopes and their applications is impaired. For example, although mixing studies with radioisotopes are referred to many times, many of the various pertinent experimental data are omitted, and the mathematical considerations of mixing are not given. Again, whereas gamma-ray spectrometry is discussed, the reduction of gamma-ray spectrometry data is not treated.

There are numerous instances where specific information could have been afforded. For example, whereas liquid scintillation counting is mentioned, no liquid scintillation recipes are given, no quenching agents other than oxygen are cited, and typical scintillator efficiencies are not listed. Such omissions require the reader to turn to other texts for practical information.

The authors obviously intended their work to be a guide to radioisotope applications rather than a primary text, and in this respect they have been eminently successful. The reader will find a wealth of applications mentioned; scarcely any topic or use is cited without a reference to a paper on the subject. It is virtually impossible to read this book without being impressed by the power and scope of radioisotope applications.

H. R. Lukens is responsible for several research projects and for TRIGA reactor-based analyses in GA's Activation Analysis Service group. With an AB in biochemistry (1945, U. of Cal.) he entered radiochemistry in 1948. He has contributed to activation analysis, liquid scintillation counting, and radiotracer studies in organic, physical, and petroleum chemistry at Tracerlab, Shell Development, and, since 1962, at General Atomics.

TIMELY HANDBOOK

Title Fast Reactor Technology: Plant Design

Editor John G. Yevick; (A. Amorosi, Associate Editor)

Publisher The MIT Press, 1967

Pages xviii + 754

Price $35.00

Reviewer Leon Green

This timely book, a compilation of information covering 15 years of fast-reactor technical development, comes at a crucial time and will be of most interest to those actively engaged in fast-reactor programs. Because of the large body of information presented in this book, it will also be of general interest to almost everyone in the nuclear reactor field. Broad coverage is clearly indicated by the listing of 12 authors and 68 contributors who represent practically every organization that has been active in the fast-reactor program. The subject (Fast Reactor Plant Design) has been divided into 11 almost independent chapters. The text is arranged handbook style with each chapter well sectionalized and preceded by a table of contents. In addition, each chapter is followed by a comprehensive list of references. Because of the multi-author approach, the chapters are somewhat uneven in style, some sections being only descriptive and some very detailed, containing many charts, tables, and illustrative examples. However, this heterogeneity detracts very little from the value and purpose of the book.

Chapter II, which deals with coolant properties, heat transfer, and fluid flow, and Chap. IV, which considers heat-transport system design, give complete coverage of the use of liquid sodium as a fast-reactor coolant. Little mention is made of alternate coolants such as helium or steam. This omission is probably due to the editors' decision to limit the coverage to operating reactors or reactors under construction.

Chapter III covers structural analysis in a more or less descriptive manner so that the reader will have to look to the extensive reference list at the end of the chapter for more detailed information. Reactor designers will find Chap. VII, Fuel Handling, and Chap. VIII, Shielding, particularly comprehensive since these two subjects are well covered in a detailed handbook style. Chapter X on Economics presents information based on costs of experimental and prototype reactors, but unhappily it will be difficult to use this information to extrapolate costs of commercial-size plants.

Chapter I, the Introduction, and Chap. XI, Description of Fast Reactors, give a concise resumé of the fast-reactor programs up to the present time. The editors chose to omit any detailed description of fuel elements and core design since it was felt that coverage of this subject would require a separate volume.

Except for some minor editorial errors, this volume is a well-presented and illustrated reference book that covers an important subject in great detail.

Leon Green (BS, Che, Drexel Institute of Technology) is a Senior Officer in the Division of Nuclear Power and Reactors in the International Atomic Energy Agency, Vienna. In 1956 he joined Brookhaven National Laboratory (Nuclear Engineering Department), and for ten years was involved with design and analysis of a number of advanced reactor concepts. Before taking his two-year appointment with IAEA, he headed the Evaluation and Technical Assistance Group at BNL.

CONVENTIONAL BUT EXPENSIVE

Title Radioisotope Measurement Applications in Engineering

Authors Robin P. Gardner and Ralph L. Ely, Jr.

Publisher Reinhold Publishing Corp., 1967

Pages xii + 483

Price $16.00

Reviewer V. Lawrence Parsegian

A major byproduct of the atomic age has been the large increase in man-made radioactive isotopes of the conventional elements. These radioactive forms of elements, which number over a thousand, offer unique advantages for many industrial and research applications. When incorporated in chemical, metallurgical, and biochemical systems, radioactive isotopes usually behave much the same way as do their corresponding stable cousins. But because they emit ionizing radiation, even minute quantities of radioactive isotopes can be detected or *traced* by the tracer technique. These same isotopes can also become sources of penetrating, ionizing radiation which can be utilized for gauging the thickness of materials or used in place of x-ray sources for making radiographs of parts. These uses are discussed in this volume.

Although tracer research, gauging, and radiography have assumed considerable importance in many industries and laboratories, with few exceptions graduates from science