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Book Reviews

Principles of Radiation Protection Engineering. Translation of Jaeger's *Principles of Radiation Protection.* By Lawrence Dresner, McGraw-Hill (1965), 451 pages, $15.00.

This translation is competent in that it reads smoothly and well with only a few inexplicable distortions of accepted terminology, such as "moderating power" instead of "stopping power" for alpha particles and "highest permissible" exposure instead of "maximum permissible."

It is possible that the clarity of writing by authors at Oak Ridge and Argonne National Laboratories, the former Hanford Laboratories, and other US installations can be improved. It is not likely that the best way to do it is to have the work translated into German by Jaeger, then back into English by Dresner. Inevitably, because of the superior lead of the US in the field, the book can present little else. Inevitably, too, the material is out of date, being at best six years old. This age is particularly noticeable in the use of obsolete radiation units and the omission of significant recent advances in both reactor containment and the storage of radioactive wastes.

Accounts of more established subjects, such as the geometry of radiation sources, are, of course, not affected by age. However, the order of presentation of this material is less systematic than that found elsewhere, and the references are not fully representative.

The text seems to fall far short of the present claims made for it. Grossly inadequate chapters on radiation detection and radiobiological fundamentals certainly do not arm the engineer with the basics needed to produce the most effective and practical design. He will have no professional feeling for radiation protection, and, when he tries to design to protection criteria established for him, he will be faced too often with parenthetical observations whose derivations, for the particularly important practical case, are too complicated to be included.

Chapters on attenuation and heat generation are not adequate as teaching instruments. The central section of the book is rather loose, with more than its share of errors, potentially misleading statements, and inconsistencies. Later sections are mainly interesting condensations of actual examples of shielding practice for reactors, medical facilities, accelerators, hot laboratories, and radioactive waste management facilities. The merit would have been increased if selections were accompanied by critical appraisal and evaluation of alternative solutions.

In fairness to the original author, the more modest objectives defined in his preface have been substantially achieved. He has put together a body of information with which the civil engineer and architect who work in this field must be generally conversant. From the point of view of a German audience in 1960, the text was doubtless most helpful and time-saving. For the American engineer in 1966, it is not correctly balanced to serve as a major instructional text. Its value as a "conversancy medium" for current engineering practice is falling rapidly with time in such a vigorously advancing field.

H. M. Parker
W. L. Bunch

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January 12, 1966

About the Reviewers: Herbert M. Parker is presently Consultant to the Director of Battelle Memorial Institute's Pacific Northwest Laboratories in Richland, Washington. Prior to that, he was Manager of the Hanford Laboratories for nine years. His academic background was in physics in England (MSc., F. Inst. P.). After ten years as a radiological physicist, he joined the Manhattan Project in Chicago in 1942, and he subsequently headed the radiological sciences program at Oak Ridge and at the Hanford Works, Richland. He has just completed a term as a member of the Board of Directors of the American Nuclear Society.

Wilbur L. Bunch is a Senior Research Scientist at the Pacific Northwest Laboratories of Battelle Memorial Institute. He has been associated with various research and development programs in the nuclear energy field for the past 15 years. His studies of the attenuation properties of various concretes served as a basis for the design of the newer reactor shields at Hanford. He has also contributed to the development of in-core neutron-monitoring techniques and reactor instrumentation. His BS and MS degrees in physics were obtained at the University of Wyoming in 1949 and 1951. He currently serves as secretary of the Richland Section of the American Nuclear Society.

The Solid-State Chemistry of Binary Metal Hydrides. By George G. Libowitz. W. A. Benjamin, Inc., New York and Amsterdam (1965). 139 pp. $7.50

The laudable objective of this book to provide a systematic and concise introduction to the behavior of solid binary hydrides has been excellently fulfilled. The study of metal hydrides has suffered in the past from a tendency to consider these compounds as a weird class of substances to which the usual laws of chemistry and thermodynamics did not necessarily apply. It was very gratifying to find the reaction of hydrogen with a metal not referred to as "occlusion." The thoroughly rational approach of this author should be helpful in the systematic development of research in this field.

The classification of hydrides by bond type is short but adequate and includes an impartial discussion of the un-

settled question of bonding in the metallic hydrides. The preparation and chemical properties are generalized nicely and the confusing details of isolated, specific cases have been eliminated. The short discussion of x-ray and neutron diffraction may not be necessary for all the readers, but it is an excellent review of the operational basis of structure information. The chapter of crystal structure shows the similarity of many of the hydride structures and dispels the myth that hydrides are solid solutions based on the parent metal lattice. The discussion of thermodynamic properties handles the problems of the application of thermodynamics to nonstoichiometric phases very well. The electrical and magnetic properties are related to structure and bonding in a tentative and critical way, in keeping with the uncertainty in the relationship at the present time.

This book is not a handbook of data on binary hydrides. Rather, it is a concise introduction and critical review which would prepare an engineer or physical scientist to understand the literature in this field and to undertake research in this area. In my opinion, it is an outstanding critical review of the subject as well as an advanced textbook.

David T. Peterson

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January 21, 1966

About the Reviewer: David T. Peterson received his PhD in physical chemistry from Iowa State University in 1950. Since that time, he has been associated with the Metallurgy Division of the Ames Laboratory of the Atomic Energy Commission and the Metallurgy Department at Iowa State University. His research interests have centered about the preparation of pure metals, metal-hydrogen systems, and thermodynamics of metal reactions.

Atomic and Ionic Impact Phenomena on Metal Surfaces. By Manfred Kamisky. Academic Press, New York (1964). 432 pp. $14.50

For its size, this book covers a truly remarkable range of subjects varying from thermal energy accommodation, adsorption, and surface ionization to high-energy ion reflection and sputtering. The connection between all of these phenomena is quite logical since, for example, it is necesto understand the criteria for surface cleanliness in order properly to evaluate the results of an experiment on secondary electron ejection by high-energy ions. Moreover this is the first time, to the reviewer's knowledge, that a book encompassing these diverse but intimately related fields has been attempted.

In the author's words, "The intention has been to give the reader a balanced view of the subject from both the experimental and theoretical standpoints and to emphasize the well established principles which emerge and the many peculiarities, obscurities, and uncertainties which still remain to be resolved." In this regard the author has succeeded rather well considering the length of the book. However, partially because of the difficulty of obtaining well-defined surface conditions, there are so many peculiarities, obscurities, and uncertainties in this field that it is impossible to cover them all in the allotted space with complete coherence. This has resulted in a certain amount of confusion in the handling of individual experimental results and in a rather severe curtailment of the necessary theoretical background. Although this latter fault will probably cause no difficulty for those intimately involved in the field, workers in other fields using this book as a reference might have some difficulties. There are, however, sufficient references to original source material. The summary of the experimental methods is good, and the extensive tabulation and correlation of experimental results will be particularly useful for quick reference to specific systems.

As is the case with any book dealing with current research topics, the time lag between completion and publication can render some portions of it obsolete. In general, however, this book is a comprehensive and concise review of the subject literature up to 1963.

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January 26, 1966

About the Reviewer: Sheldon Datz is presently a group leader in the Chemistry Division at Oak Ridge National Laboratory and has worked in the fields of molecular beam scattering, surface ionization, and gas surface interaction. He was a guest scientist at the Laboratory for Mass Separation in Amsterdam, The Netherlands, in 1962-1963, where he worked on sputtering and ion-surface reflection phenomena.

Foundations of Plasma Dynamics. By E. H. Holt and R. E. Haskell, The Macmillan Company, New York (1965). 590 pp. $12.95.

This book is devoted more to background material than to plasma physics itself. It is offered as a senior and graduate text mainly for engineers, and as a reference work for practicing engineers and scientists. As background, there are chapters on tensor notation, electrodynamics, binary collisions, ion orbits, kinetic theory (not assuming prior knowledge of the Boltzmann equation), and gas and surface dynamics in discharges. This leaves, excluding still more interspersed supporting material, less than 150 pages on specific plasma subjects. These include mainly collisional effects, Langmuir oscillations and electromagnetic wave propagation in stable plasmas (notably the ionosphere), and a brief account of magneto-fluid dynamics.

A serious omission is a descriptive chapter on plasma instability. From this book, the student would get little inkling of the typical tendency of laboratory plasmas to be unstable or turbulent with attendant collective transport. There are occasional oblique references to the Langmuir paradox in the introduction, to anomalous diffusion (one paragraph), etc. But probably the student would not appreciate how often the many pages devoted to calculating collisional transport would be irrelevant in the laboratory because collective processes dominate.