

for high school science teachers. It should also be of interest to those in nontechnical work who would like to become acquainted with the nuclear field. It is not recommended as a text for college use.

The last section of the book is devoted to a series of diverse experiments or demonstrations which can be performed with a "minimum of special equipment." Several of the experiments involve the construction or assembly of equipment which can be used as part of other experiments. The outlines of experiments are very concise showing the materials to be gathered, the procedures or methods to follow, and the results or conclusions that should be reached. The experiments range from the response of yeast cells to irradiation (ultraviolet) to the fabrication of fuel elements. The latter experiment obviously requires some special equipment.

The book is well written and serves as an excellent introduction to the field of nuclear science and engineering.

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(About the Reviewer: P. F. Pasqua is Professor and Department Head in the Nuclear Engineering Department of the University of Tennessee. He has been on the staff of that university for the past nine years. He obtained his Ph.D. at Northwestern University in 1952.)

Rare Earth Alloys, A Critical Review of the Alloy Systems of the Rare Earth, Scandium and Yttrium Metals. By KARL A. GSCHNEIDER, JR. Van Nostrand, Princeton, N. J., 1961. 449 + xiii pp. \$12.75.

Scientists whose field includes the rare earth metals should be interested when a man who works at the Los Alamos Scientific Laboratory writes a book on alloys of the lanthanons. When this man has previously worked with Spedding and Daane at the Ames Laboratory and has received the PhD at Iowa State University, the probability is strong that the book will be good and that the author will know whereof he speaks.

Dr. Karl A. Gschneider, Jr. has made a very scholarly effort to collect and to evaluate data critically on the physical metallurgy of alloys containing one or more of the lanthanons, scandium, or yttrium. Data not readily accessible in the United States, particularly information published in some rather obscure Russian journals and books, are included. One hundred phase equilibrium diagrams have been redrawn after being carefully checked against all available sources of information.

The book is well-written. Organized into four sections, its first part deals with the physical properties of the metals themselves. The second section is given over to presentation of the phase equilibrium diagrams, together with an excellent discussion of some applicable portions of the theory of physical metallurgy. A particularly well-written discussion of the Hume-Rothery Rules and the related Darken and Gurry Plots furnishes some meat for the first section of Part II. Darken and Gurry ellipses for eight of the lanthanons are presented in the book. Part III is a carefully and critically evaluated collation of the crystallographic data on the lanthanons, yttrium, and scandium. Part IV, consisting of a list of all references cited in the previous parts of the book,

actually forms a bibliography on rare earth alloys with 653 entries.

One of the most useful aspects of this book is the excellent job of indexing. All binary systems are indexed separately, followed by an index to multicomponent systems. A one-page index to structure types is useful, as is the complete author index.

Many people feel that a book reviewer has not done a good job unless he finds something about which to complain. In order not to disappoint these good people, your present reviewer would make a point that Dr. Gschneider, in his urgent efforts to pick the brains of the eminent Russian experts, may have overlooked a few items of good American work. For instance, the work of Robertson and Kato, at the Albany Station of the U. S. Bureau of Mines, was rather inadequately covered. Kato's work on the dysprosium-zirconium system, complemented by that of Ray and Wasielewski at KAPL on additions of dysprosium to Zircaloy-2, was missed. However, in defense of the author, it was impossible to find, even with reasonably diligent searching, any place in the book "Rare Earth Alloys" where Dr. Gschneider laid claim to complete coverage of all the bits of published information in this broad field.

This is a good book. The style of writing is excellent. Dr. Gschneider says briefly and lucidly what he means. The text is easily understood. No efforts at pedantry were found, and most of the book could be read with understanding and profit by even senior undergraduate level college students of metallurgy or physical chemistry. The format for the book is slightly unconventional, but not in any sense offensive. On the contrary, the format serves its purpose quite well, improving the facility with which the book may be used for reference. This reviewer can only join Dr. Gschneider in recommending the book to those physicists, chemists, and metallurgists engaged in research "in the field of metals" as well as solid state physicists, physical chemists, and engineers who have even a passing idea that some alloy containing yttrium, scandium, or one or more of the lanthanon metals might help them to arrive more quickly at some desirable end.

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(About the Reviewer: Dr. W. Kermit Anderson is Consultant—Materials Engineering to the staff of the Materials Development Operation at the Knolls Atomic Power Laboratory. Trained in chemical engineering and physical chemistry at the Agricultural and Mechanical College of Texas, he received the first PhD granted by that institution in the physical sciences. His interest in the rare earths was first aroused at Oak Ridge during a search for high efficiency shielding materials while employed by the NEPA project. This interest was maintained during employment at the Argonne National Laboratory and, more recently, at the Knolls Atomic Power Laboratory, where his desire to apply the lanthanons as absorbers for control of reactors has led to several publications in the field.)

Protective Construction in a Nuclear Age. Proceedings of the Second Protective Construction Symposium: The Rand Corporation. J. J. O'SULLIVAN, editor. Macmillan, New York, 1961. 2 vols., 884 pp. \$25.00.

Collected in these two volumes are 45 papers presented at the Second Rand Corporation Protective Construction