Book Reviews

Nuclear Energy, 2nd ed. By Raymond L. Murray, Pergamon Press, Inc., Elmsford, New York (1980). 312 pp. $15.00 flexcover; $36.00 hardcover.

This book purports to "provide a factual description of basic nuclear phenomena . . ." and is ". . . designed for use by anyone who wishes . . . to learn nuclear concepts. . . ." Approximately a third of its contents is devoted to "Basic Concepts," summarizing information from the simple atom through nuclear reactions to fission and fusion processes; another third, entitled "Nuclear Systems," primarily concerns nuclear reactor fundamentals. A final section on "Nuclear Energy and Man" includes the basics of health physics and reactor safety along with such diverse topics as waste disposal, radiation applications and benefits, and environmental matters.

The best sections are those on nuclear reactors, including waste disposal and fuel reprocessing along with related matters. Here the author's expertise is demonstrated as a wealth of fundamental material is appropriately treated; in fact, one might recommend the book for these sections alone. On the other hand, the discussions of such items as alternative energy systems, environmental topics, and radiation applications are pedestrian, being little better than the "pot-boilers" found in "popular literature." It is unfortunate that the author did not extend his own specialized knowledge and insight to these analyses and thus add an important dimension to the subject discussions. He does give an excellent short "Philosophy of Safety" wherein he points out the major and essentially overriding involvement of nonscientific "social-economic-political processes" therein.

The most glaring discrepancy of the book is its failure to use S.I. metric units as stated; in fact, atomic dimensions are given in centimetres! For those specialized quantities relatively peculiar to the field, the older (and usually original) units are used; thus, nuclear activity is expressed in curies with no mention of the becquerel. (This reviewer heartily approves that particular usage!) The relevant conversion table in the appendix may be useful in certain engineering specialities, but not for the general nuclear field.

From the overall field of nuclear energy, the author's choice of topics for inclusion is reasonably appropriate. However, a chapter is devoted to particle accelerators, which are probably only peripherally important, and, although reactor safety is reasonably well covered, no mention is made of criticality control (or nuclear safety) despite its importance to various nuclear activities such as waste disposal and chemical processing.

An appropriate audience is somewhat difficult to identify despite the author's claim that a one-semester course based on the book resulted in students having a "surprising level of understanding." The mathematics is held to a subcalculus level, but many of the concepts are handled much too quantitatively for the usual "appreciation" type of course, and introductory physics is certainly desirable if not necessary. Various topics receive rather uneven treatment; for example, a rather mathematically detailed chapter on neutron behavior is followed by an almost completely qualitative treatment of radiation attenuation. The index is adequate; useful material is included in an appendix, and the illustrations are clear and appropriate. A large number of problems, with answers, are provided, and a solutions manual is available.

Overall, this book is a reasonably adequate introduction to its field and would be a useful addition to a general library. However, it is somewhat disappointing to this reviewer who feels it does not live up to its author's competence.

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About the Reviewer: Hugh F. Henry, now retired from DePauw University, had more than two score years in the academe at the University of Georgia and at DePauw except for a decade in practicing health physics and nuclear criticality safety at the Oak Ridge Gaseous Diffusion Plant. Dr. Henry's graduate studies were at the University of Virginia.

Introduction to Metallurgical Thermodynamics, 2nd ed. By D. R. Gaskell, Hemisphere Publishing Corporation, Washington, D.C. (1981). $29.95.

A brief examination of the book reveals it to be the second edition of an introductory textbook first appearing in 1973, with emphasis on matters relevant to metallurgy. It seems to be a rather nice treatment, but it does not differ radically from other texts on thermodynamics. Furthermore, the second edition differs from the first edition, primarily by the adoption of S.I. units in the former, the addition of some material on Pourbaix diagrams, and an increase in the number of solved examples. The book is very clearly written and the inclusion of many worked examples is quite useful from a pedagogical point of view or for self-study.

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About the Reviewer: David O. Welch is the assistant head of the Metallurgy and Materials Science Division, Brookhaven National Laboratory, where his research interests are in theoretical materials sciences, superconductivity, and crystal lattice defects and mass transport. He has held teaching appointments at Princeton University, University of Sao Paulo, and State University of New York at Stony Brook. Dr. Welch completed his graduate studies at the University of Pennsylvania and was subsequently a NATO fellow at Harwell.