Book Reviews

Decay Schemes of Radioactive Nuclei. By B. S. Dzhelepov and L. K. Peker. Pergamon Press, London, 1961. 786 pp. (essentially all illustrations). $20.00

The authors, located at the Radium Institute of Leningrad, are both active in the Academy of Sciences of the U.S.S.R., and have been interested in the decay pattern of radioactive nuclides for some time.

The book is composed almost exclusively of diagrams for the isobaric chains of nuclides, whether as diads, triads, tetrads, etc. The ordinate depicts the energy content of a nuclide. On the abscissa are given the details of the transformation from one element to another. The over-all net effect is that isobaric transformations are shown by a large V, giving the details of transformations from neutron deficiency (β^+ decay) to neutron excess (β^- decay) through the point of maximum stability (i.e., minimum point of V on graphical representation).

The book represents an extension of a technique for representing isobaric decay of radioactive nuclides which was started by Hornyak and Lauritsen in 1948. There are some modifications of the details for representing certain types of transformations (i.e., Coulomb excitation) but, basically, the book attempts to represent the known information on transformations among all isobaric nuclides. The earliest work by Hornyak and Lauritsen in 1948 was for the very light nuclides ($A \leq 20$). Aside from the fact that the details of nuclear structure are still being resolved in the minds of many experimentalists and theoreticians, there is much in this endeavor to merit attention. With certain exceptions (among the light nuclides), the unraveling of the details of nuclear structure is just beginning. This book, as a first attempt, represents a firm foundation upon which more detailed information in the future may be built. As an example of the meaning of this statement, I might refer to a paper by A. J. Grench and S. B. Burson, *Phys. Rev.* **121,** 831 (1961), on the "Decay of Er^{161} (3.1 hr)." The proposed spins and parities for the energy levels of Ho^{161} (2.5 hr) are based on some detailed studies of Er^{161} decay. The Grench and Burson paper, I am sure, represents only the first of many to elucidate details of the energy levels for radioactive Ho^{161}. The tentative state of the art may be illustrated as follows: so little is known about this particular nuclide that the decay scheme cannot be represented in the book under review. This is true, also, for hundreds of other nuclides that are removed by more than one atomic number unit from stability. Even the data among the alpha-particle emitters, which represent the first form of radioactivity discovered, is just beginning to be elaborated, and there remains much to be learned. In any event, this book represents a good beginning to a vast and complex field of investigation.

William H Sullivan
Oak Ridge National Laboratory
Oak Ridge, Tennessee

[*Editor's Note: Dr. William H Sullivan, best known for his authorship of "The Trilinear Chart of the Nuclides," is currently at the Oak Ridge National Laboratory. After receiving his Ph.D. in physical chemistry at the University of Michigan and working several years as a chemist, he came to Oak Ridge in 1944, moving to Hanford shortly thereafter. He was U. S. Scientific Representative at Chalk River, Canada in 1947–48 and Scientific Director, Naval Radiological Defense Laboratory, 1948–51. He returned to the Oak Ridge National Laboratory that year. During the period 1946–51 he was chairman of the Subcommittee on Nuclear Constants, National Research Council.*

Steam Cycles for Nuclear Power Plant. By W. R. Wootton. Simmons-Boardman, New York, 1958. $2.75.

This small volume is mistitled; a more appropriate title would have been "Elementary Steam Cycles with Particular Attention to Gas Cooled Reactors." No more than the most cursory treatment has been given the large and complex field described by the title. The monograph, 64 4 in. × 6 in. pages, including 39 figures and 6 pages of tables of the heat content of carbon dioxide, is insufficient to fill more than partial text requirements for a third year college survey course which includes gas cooled reactors as a part of its curriculum. The first 23 pages of the monograph are concerned with descriptions of steam cycles employed in the gas cooled, graphite moderated nuclear plants currently being constructed in Great Britain. The author's connection with this type of reactor has enabled him to present a clear, though elementary, discussion. No economic optimization factors are included, and therefore interpretation of the information presented is left as an exercise for the reader. The basic concepts for establishment of steam pressure and temperature conditions as affected by parameters such as inlet and outlet gas temperature, feedwater temperature, and boiler power consumption are well illustrated, as are limiting conditions of the pinch-point between gas and saturated steam temperatures.

Six pages are devoted to pressurized water and boiling water steam cycles; unfortunately the approach taken is even more superficial than in the gas cooled case. Representative steam plant conditions are given, although no basis for design selection could be gained from this brief treatment. The single page of text dealing with liquid metal cooled reactors is both inadequate and misleading. The ancient canard of violent alkali metal–water reactions is again perpetrated; the statement is made that any possibility of leakage of water into coolant must be eliminated. Of course, the violent reaction associated with high school chemistry demonstrations is the reaction of hydrogen with atmospheric oxygen, and not directly from the metal–water reaction itself. An adaptation of the Loeffler cycle is proposed for liquid metal use; to the reviewer's knowledge this scheme has never been seriously considered by those