viewer that it is desirable to bring the new subject of rocket engineering to the attention of physicists, since the design of rockets requires exploration into new problems of thermodynamics, materials, structures, physical chemistry, combustion, heat transfer, hydraulics, and fluid dynamics.

G. P. Sutton's book Rocket Propulsion Elements is an endeavor to bring together in less than three hundred pages sufficient information on these various topics to give a perspective on rocket design to persons unacquainted with the field, but who have the usual undergraduate training in thermodynamics, chemistry, and mechanics. This work is the first publicly available and unclassified book on the specific subject of rockets.

There is a chapter on the vocabulary and the concepts peculiar to rocketry, after which comes a quick sketch of rocket history, which dates back to the year 1232. This is followed by a long quantitative chapter on "nozzle theory," which combines enough thermodynamics with fluid mechanics to permit calculation of the velocity of the exhaust jet and the magnitude of the rocket thrust. This material is essentially an application of the supersonic de Laval nozzle flow theory used in turbine and wind-tunnel design.

The fourth chapter discusses to a rather limited degree the physical chemistry necessary to calculate the temperature and velocity of the exhaust gases when a particular chemical reaction is specified. In the fifth chapter a descriptive catalog of the qualitative properties of the most common liquid rocket propellants is given, after which in chapter six a discussion of the mechanical design of the rocket motor proper is presented. This latter topic is one in which the author is well versed by experience, and he discusses the hydraulic and heat transfer aspects of the mechanical design with commendable clarity.

An important chapter is number seven, on liquid propellant feed systems. The design of gas pressurizing systems, pumps, and tanks largely determines the empty weight and hence the efficiency of the overall rocket vehicle. This chapter features a diagram of the "plumbing" of a V-2 rocket, a system fully as complex as a gas flame refrigerator.

The concluding chapters on ballistics of rocket vehicles, experimental rocket test procedures, and solid propellant rockets are so limited in extent as to be of more cultural than engineering value. It is unfortunate that security restrictions and the author's own personal preferences precluded a fuller treatment of the important field of solid propellant rockets.

In summary one may say that a judicious selection of material has been clearly presented at an elementary to intermediate level. Space limitations have prevented really adequate treatment of a number of topics, but the book accomplishes its stated function of discussing the "elements" of rockets in a very satisfactory and workmanlike manner. It should prove interesting to a large group of students, engineers, and applied physicists.

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Useful Isotopes

ISOTOPIC CARBON. Edited by Melvin Calvin, Charles Heidelberger, James C. Reid, Bert M. Tolbert, and Peter E. Yankwich. 376 pp. John Wiley & Sons, Inc., New York, 1949. $5.50.

Isotopic Carbon gives its reader an authoritative and extremely complete discussion on the techniques of using stable and radioactive carbon isotopes. The book presents not only the advantages but also the pitfalls in the use of these materials, and contains a wealth of specific examples of isotopic utilization along with numerous diagrams of equipment employed. A considerable portion of the volume is devoted to biological and chemical synthesis of isotope labeled compounds. The appendices contain much helpful information on radioactivity assay, appropriate statistical methods, and equipment generally used for isotopic carbon research—features which will prove extremely helpful to the neophyte in the field as well as to workers in the most advanced laboratory.

The make-up of the book is good; the illustrations and presentation are clear. The authors are to be congratulated on the quality of the manuscript.

Paul C. Aebersold
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Books Received

HEAT TRANSFER, VOLUME I. By Max Jakob. 758 pp. John Wiley and Sons, Inc., New York, 1949. $12.00.

AN INTRODUCTION TO CRIMINALISTICS. By Charles E. O'Hara and James W. Osterburg. 705 pp. Macmillan Company, New York, 1949. $10.00.

AN INTRODUCTION TO THE MECHANICS OF VISCOUS FLOW. By H. F. P. Purday. (Printed in England as STREAMLINE FLOW.) 185 pp. Dover Publications, Inc., 1949. $2.50.

MATHEMATICS DICTIONARY. (Revised and Enlarged Edition.) Edited by Glenn James and Robert C. James. 432 pp. D. Van Nostrand Company, Inc., New York, 1949. $7.50.

MODERN OSCILLOSCOPES AND THEIR USES. By Jacob H. Ruiter, Jr. 326 pp. Murray Hill Books, Inc., New York, 1949. $6.00.

MODERN SCIENCE AND ITS PHILOSOPHY. By Philipp Frank. 324 pp. Harvard University Press, Cambridge, Massachusetts, 1949.

ELEMENTARY MODERN PHYSICS (Revised Edition of AN ELEMENTARY SURVEY OF MODERN PHYSICS). By Gordon Ferrie Hull. 503 pp. Macmillan Company, New York, 1949. $5.25.

THE NATURE OF PHYSICAL THEORY. By P. W. Bridgman. 138 pp. Princeton University Press, 1936. Dover Publications, Inc., 1949. $2.25.

INTRODUCTION TO SEMIMICRO QUALITATIVE ANALYSIS. By C. H. Sorum. 196 pp. Prentice-Hall, Inc., New York, 1949. $2.65.

THE THEORY OF ATOMIC COLLISIONS. Second Edition. By N. F. Mott and H. S. W. Massey. 388 pp. Oxford University Press, London, 1949. $8.75.

THE THEORY OF GROUPS AND QUANTUM MECHANICS. By Hermann Weyl. Translated from the Second Revised German Edition by H. P. Robertson. 422 pp. Dover Publications, Inc., New York, 1949. $4.50.

THE PHYSICAL PRINCIPLES OF THE QUANTUM THEORY. By Werner Heisenberg. English Edition. 183 pp. Translated from the German by Carl Eckart and Frank C. Hoyt. Dover Publications, Inc., New York, 1949. $2.50.