BOOK REVIEWS

Production of Heavy Water. National Nuclear Energy Series. Edited by George M. Murphy, Department of Chemistry, New York University. Part I by JAMES O. MALONEY, GEORGE F. QUINN and HAROLD S. RAY (deceased). Part II by MAXWELL L. EIDINOFF, GEORGE G. JORIS, ELLISON TAYLOR, HUGH S. TAYLOR and HAROLD C. UREY. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1955. xvii + 394 pp. 16 × 23.5 cm. Price, $5.25.

Like its predecessors in this series Volume III-4F is designed to provide a comprehensive source of information which may be helpful in the "practical exploitation of nuclear data by American science and industry." Withheld by classification policy until only recently, much of the material is ten years old. It is of interest, however, as a complete account of the plants and processes which first produced ton lots of heavy water.

The book is divided into two parts. Part I presents data relative to the general engineering features, basic cost information and operating data for the catalytic exchange-electrolytic, water distillation and hydrogen distillation processes for the commercial production of heavy water. Plants at Trail, British Columbia, and Morgantown, West Virginia, are described, while results of the work at Columbia University, the National Bureau of Standards and elsewhere are used for estimating the cost of production of heavy water by the hydrogen distillation process. Of course, it must be borne in mind that the costs are given in terms of the 1945 dollar. The number of diagrams in this section is not excessive although adequate to show the essential details of the plant designs.

Part II describes laboratory and pilot plant studies of the various separation processes which were investigated. The theory is discussed in a clear and interesting manner with emphasis upon its applications in engineering practice. Chapter 9 deals with the development of the nickel–chromium oxide catalyst and its use in promoting the exchange reaction between hydrogen and water. Chapter 10 follows with a description of the development of platinum and palladium catalysts. Various pilot plant studies are included in Part II also.

Numerous references, principally to previously classified reports, may be found at the end of each chapter. Throughout the book names of persons, places and organizations associated with various aspects of the work are included in the text. Relatively little variation in style from chapter to chapter is found; the non-specialist reader will not encounter great difficulty.

Repetition is inevitable in any book written by several contributing authors, but this does not appear to an objectionable degree in this volume. However, in this reviewer's opinion the material comprising the second part should have been presented as Part I.

Chemists and engineers alike will find this volume interesting and profitable reading.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF KENTUCKY LYLE R. DAWSON
LEXINGTON 29, KENTUCKY

Standard X-Ray Diffraction Powder Patterns. By HOWARD E. SWANSON, NANCY T. GILFRICH and GEORGE M. UGRINIC. National Bureau of Standards Circular 539. Volume V. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 1955. 75 pp. 20 × 26 cm. Price, $0.45.

This paper-bound circular is the fifth of a series of standard X-ray diffraction powder patterns prepared by the National Bureau of Standards in its program for revision and evaluation of X-ray data. The project is sponsored by a joint committee composed of members from the American Society for Testing Materials, the American Crystallographic Association, the British Institute of Physics and the National Association of Corrosion Engineers.

Standard patterns for forty-five inorganic substances are presented. All but Cs_2PtCl_6, Cs_2SnCl_6, CuF_2, GeI_4, HIO_3, Rb_2PtCl_2 and Tl_2PtCl_6 were previously included in the ASTM file and references to new and old card numbers are given. The NBS patterns were made with a Geiger Counter X-Ray Diffractometer, using specially prepared samples of "exceptionally high purity." A detailed comparison is made of all powder diffraction data available for each substance previously investigated. d-spacings in internationally defined Ångström units are calculated to four or five significant figures and are assigned Miller indices. Densities and lattice constants are calculated, and refractive indices reported where measurements were possible.

Intensity data have been evaluated from the peak height above background and are expressed as percentages of the strongest line. Reproducibility was checked with at least two independent patterns, using particle sizes within the range of 5 to 10 μ. A table comparing the three most intense lines of each pattern (as observed by various investigators) is included. These values are of particular concern since the use of the ASTM card file for identification of materials is based on sorting by first, second and third strongest lines.

A cumulative index is given listing all substances included in Volumes I, II, III, IV and V. Errata noted in volumes III and IV are listed. Volume V as well as its predecessors will certainly be of great value to all those interested in the structural properties and identification of inorganic substances.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF WASHINGTON N. W. GREGORY
SEATTLE, WASHINGTON

Fifth Symposium (International) on Combustion, Combustion in Engines and Combustion Kinetics, at the University of Pittsburgh, Pittsburgh, Pennsylvania, August 30–September 3, 1954. By BERNARD LEWIS, HOYT C. HOTTEL AND A. J. NERAD (Standing Committee on Combustion Symposia). Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1955. xxvi + 802 pp. 18.5 × 26 cm. Price, $15.00.

Combustion is an exceedingly complicated phenomenon. From the scientific standpoint it involves chemical chain reactions, heat conductivity and diffusion, turbulence, and intricate boundary conditions. Ever since the first caveman roasted a piece of meat, man has enjoyed heat, power and light from flames without ever really understanding the phenomenon. Internal combustion engines and gas burners were developed empirically on a strictly Edisonian basis. One found from experience which were the good fuels and what were the optimum burning conditions. Up to quite recently the problems of engine design and combustion in general have been regarded as purely engineering problems.

Dr. Bernard Lewis was one of the first people to recognize the role of chemistry in combustion. It is largely through his influence that at the present time there is a large amount of chemical research being carried out to determine the detailed chain mechanisms in flames—the chemical profile, the flame spectrum, etc. It is largely through the tremendous efforts which Dr. Lewis has expended that periodically the combustion experts of the world are brought together in a series of international symposia on combustion. The Fifth Symposium (International) on Combustion, like its predecessors, contains a wide variety of papers by a galaxy of experts and stresses the purely chemical problems of combustion.

This book and the previous international symposia on combustion are necessary additions to the library of any group working on combustion. All other papers on this fast-growing and fascinating subject are spread throughout the engineering, chemical, physical and technical journals of the world. There is a great need for a high grade journal on the scientific aspects of combustion research. Until such a journal is set up, it will be necessary for experts to keep up to