

The Physical and Thermodynamic Properties of Helium. Technical Report D-9027. By JESSE T. SIMMONS, Engineering and Research Division, Wm. R. Whittaker Co., Ltd. Wm. R. Whittaker Co., Ltd., 915 North Citrus Avenue, Los Angeles 38, California. 1957. 79 pp. 23.5 × 28.5 cm. Price, \$10.00.

The following properties of helium, expressed in engineering units, are listed over the pressure range 14.7 to 6,000 pounds per square inch absolute and from -440° to +600° F.: density, specific volume, compressibility factor, entropy, enthalpy, specific heats at constant pressure and at constant volume, the ratio C_p/C_v , viscosity, thermal conductivity, sonic properties and diffusion. Graphs of these properties are given. There is also included a limited amount of data on air.¹

In general the properties of helium given in earlier treatises are converted into engineering units and smoothed to even values of the arguments. One would have greater confidence in the tables if he did not read the introduction in which some strange thermodynamic statements appear.

(1) Taken from "Tables of Thermal Properties of Gases" by J. Hilsenrath, C. W. Beckett, W. S. Benedict, L. Fans, H. J. Hoge, J. F. Masi, R. L. Nuttall, Y. S. Touloukian and H. W. Woolley, National Bureau of Standards Circular 564 (1955).

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Experimental Designs. By WILLIAM G. COCHRAN, Professor of Biostatistics, The Johns Hopkins University, and GERTRUDE M. COX, Director, Institute of Statistics, University of North Carolina. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. xiv + 617 pp. 15.5 × 24 cm. Price, \$10.25.

This book is directed at *experimenters* with a fair knowledge of statistical methodology through Analysis of Variance techniques. When the first edition appeared in 1950 it was by far the best treatment of the statistical aspects of experimental design for such an audience. This was still true just prior to the appearance of the edition reviewed here and the case is reinforced by its appearance.

The framework of the book remains the same. The first three chapters treat the relation of statistics to experimentation and, briefly, the statistical notions and techniques requisite for the balance of the book. The wealth of experience and good sense which the authors bring to the discussion is particularly evident in this section. In the remainder of the book the several different classes of experimental designs are treated one-by-one. For each there is presented the computational technique, standard error and missing value formulas, and numerical examples. Of special value are the authors' general recommendations about each of the designs and the comparisons of various designs when this is relevant. Although the great increase in the number of particular experimental plans worked out since 1950 makes the book no longer the complete catalog it was in its original edition, a very large number of plans are included as well as an adequate index to those available but not included.

For readers of THIS JOURNAL it must be remarked that nearly all of the illustrated material in the book is drawn from biological, particularly agricultural, experimentation. Although the desirability, from the reader's viewpoint, of familiar examples is admitted, the quality of the exposition in this book more than compensates for the shortage of examples from industrial and physical science experimentation.

For those familiar with the first edition, and of particular interest to readers of THIS JOURNAL, two sizable additions to the first edition are chapters 6A and 8A on Fractional Replication and methods of Study of Response Surfaces, respectively. Designs in both of these areas have found wide application in industrial experimentation. All new material in the book is clearly indicated, and in addition to the two chapters just mentioned includes the sections described in the following quotation from the preface:

Section 2.22a presents a table for estimating the number of replications needed for comparing two treatments when the data are arranged in two classes, as dead or alive,

sound or defective. Sections 4.15a and 4.27a give the methods of analysis with data of this type for completely randomized block designs. These sections fill a gap in the first edition, which gave methods of analysis only for continuous data.

Sections 4.61a to 4.66a contain a discussion of the use of latin squares in adjusting for residual effects which may be present when the treatments are applied in sequence to the same subject.

Topics that are presented more briefly are sequential experimentation (section 2.23a), the testing of effects suggested by the data (section 3.53), the problem of making several tests of significance in the same experiment (section 3.54a), Yates' automatic method of computing factorial effect totals (section 5.24a), additional standard error formulas for split-plot experiments (section 7.22), the effects of errors in the weights on the recovery of inter-block information (section 10.12a), and the use of balanced incomplete block designs in taste and preference testing (section 11.1a).

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Heterocyclic Compounds. Volume 5. Five-membered Heterocycles Containing Two Hetero Atoms and their Benzo Derivatives. Edited by ROBERT C. ELDERFIELD, University of Michigan. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, New York. 1957. vi + 744 pp. 16 × 23.5 cm. Price, \$20.00.

This volume maintains the same high standards which were set by the preceding volumes. As the title indicates volume 5 is devoted to five-membered heterocycles containing two hetero atoms and their benzo derivatives. Accordingly, the eight chapters are devoted to (1) 1,3-Dioxolane and Derivatives (44 pages), (2) Pyrazoles and Related Compounds (116 pages), (3) Indazoles (31 pages), (4) Imidazoles and Condensed Imidazoles (103 pages), (5) Oxazole and its Derivatives (129 pages), (6) Benzoxazoles and Related Systems (33 pages), (7) Isoxazoles (31 pages), and (8) Thiazoles and Benzothiazoles (238 pages). These chapters were contributed by Robert Elderfield and Franklin Short, Thomas L. Jacobs, Robert Elderfield, Edgar S. Schipper and Allan R. Day, J. W. Cornforth (chapters 5 and 6), Roderick A. Barnes, and James M. Sprague and A. H. Land, respectively.

A table of contents for each chapter greatly facilitates the location of a particular topic and extensive literature citations including patent literature are found throughout each chapter. These citations are up-to-date and they include references to some rather uncommon literature sources.

Dr. Elderfield and his co-workers are to be complimented for making the literature dealing with heterocyclic compounds more conveniently available to organic chemists. This is an undertaking of considerable magnitude. The combination of competent authors, editor and publishers in this series deserves the commendation of organic chemists.

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Some Aspects of the Chemistry and Toxic Action of Organic Compounds Containing Phosphorus and Fluorine. By BERNARD CHARLES SAUNDERS, M.A., Ph.D., Sc.D., D.Sc., F.R.I.C., Fellow and Charles Kingsley Lecturer in Natural Sciences, Magdalene College, University Lecturer in Chemistry, Cambridge. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1957. xvi + 231 pp. 14.5 × 22 cm. Price, \$6.00.

Dr. Saunders in this book has described the work he and his colleagues have carried out at Cambridge since the beginning of World War II. The book is based largely on a course of lectures given in 1950 in the Netherlands, and in 1954 in both the U.S.A. and Canada. The phrase "Some aspects" in the title of the book is important, because the book covers only those areas of phosphorus and fluorine chemistry with which the author had direct contact. In