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Vapor-liquid Equilibrium Data. Ju Chin Chu, Shu Lung Wang, Sherman L. Levy, and Rajendra Paul. J. W. Edwards, Publisher, Inc., Ann Arbor, Michigan (1956). 754 pages, $9, paperbound.

This book, presenting data for 466 binary and ternary systems, is a sequel to "Distillation Equilibrium Data" by J. C. Chu, R. J. Getty, L. F. Brennecke, and Rajendra Paul [Reinhold Publishing Corporation, New York (1950)]. Data appearing in the earlier volume are indexed but not reprinted in the present work. The systems covered are extensively indexed, and reference is made to the original papers. A partial list of corrections to the first volume is included.

The initial volume purported to "include all pertinent experimental results of workers in all parts of the world working with all kinds of equipment" and was to cover data through December of 1949. The degree to which it failed may be assessed from the fact that of the first 100 entries in the alphabetical listing of references to the new work 47 are to papers published prior to January, 1949.

The present book attempts to cover the literature of the field up to June, 1954. No claim to exhaustive coverage is made. A limited check of the systems indexed showed a few omissions, mostly of data duplicating earlier work. The authors state no policy here, but it is the opinion of this reviewer that the interests of the chemical community would best be served by printing the most complete bibliography available for each system together with selected values of data for systems where the data of various investigators may overlap.

A great deal of work has obviously gone into the preparation of this compilation, which should find wide use. Besides furnishing ready access to the literature of specific systems it should prove invaluable to students of vapor-liquid equilibrium who wish to compare the relative bahaviors of groups of real systems.

EDGAR W. SLOCUM

Mass-Transfer Operations. Robert E. Treybal. McGraw-Hill Book Company, Inc., New York (1955). 666 pages, $9.50.

Primarily, Professor Treybal's recent book is intended to be an undergraduate text for the study of those chemical engineering unit operations concerned with diffusion. The work differs in scope from its contemporary elementary chemical engineering texts by virtue of its treatment of the diffusional operations exclusively, rather than of the unit operations in general.

The fundamentals of molecular and turbulent diffusion are discussed first. Then the topic of interphase mass transfer is introduced and serves to acquaint the student with the use of the two-film theory and the material balance as applied to various types of contacting operations. The specific operations are then presented with emphasis mainly on fundamentals and with only brief treatment of the more advanced topics. Gas absorption, humidification, distillation, li-

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quid extraction, adsorption and ion exchange, drying and leaching are all accorded detailed treatment, each being presented in a well-balanced combination of descriptive and mathematical material. Brief consideration of dialysis and gas-gas separations completes the volume.

Throughout, the author develops theory and applications simultaneously, never allowing one to become detached from the other. Although the quantity of material presented is more than can ordinarily be covered in an undergraduate course, topics of subordinate interest easily may be omitted or briefly treated.

There are numerous illustrative examples worked out in the text as well as problems for the student at the end of each chapter. Also, mention should be made of the exceptionally well-chosen references given at the end of each chapter.

ROBERT M. SECOR

Tables of Thermal Properties of Gases. Joseph Hilsenrath, C. W. Beckett, W. S. Benedict, Lilla Fano, H. J. Hoge, J. F. Masi, R. L. Nuttall, Y. S. Touloukian, and H. W. Woolley. National Bureau of Standards Circular 564. Government Printing Office, Washington 25, D. C. (1955). 488 pages, $3.75.

This work is a compilation of the thermodynamic and transport properties of air, argon, carbon dioxide, carbon monoxide, hydrogen, nitrogen, oxygen, and steam. With a few exceptions, values of the compressibility factor, density, entropy, enthalpy, specific heat, specific-heat ratio, and sound velocity at low frequency of the real gas are tabulated at close temperature intervals at pressures from 0.01 to 100 atm. Extensive ranges of temperature are covered, varying from the 380° to 850°K. range of the steam data to the 70° to 5,000°K. range of some of the data for argon. Spectroscopic measurements and pressure-volume-temperature data form the basis for the tabulated thermodynamic properties.

Values of specific heat, enthalpy, entropy, and free-energy function for the ideal gases are tabulated to 5,000°K. at 0.01 atm. for steam and at 1 atm. for the other gases. The data start at 50°K. for carbon dioxide and steam, at 60°K. for carbon monoxide, and at 10°K. for the remaining gases.

Vapor pressure, viscosity, and thermal conductivity are tabulated over broad temperature ranges at various pressures for steam and at 1 atm. for the other gases. Prandtl numbers as a function of temperature at 1 atm. pressure are tabulated for all the gases except steam.

Extensive references and a series of plots comparing the tabulated values with the experimental data are presented.

The authors and the National Bureau of Standards have performed a very valuable service in analyzing and making easily accessible the results of the numerous experimental investigations in this field.

EDGAR W. SLOCUM

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