Book Reviews

Binary Diffusion Coefficients of Liquid Vapors in Gases. By A. N. Berezhnoi and A. V. Semenov. Begell House, Inc., New York. 1997. 200 pp. $88.50. ISBN 1-56700-078-9.

In this volume on vapor−gas binary diffusion coefficients, the authors describe methods that have been used for their measurement and give empirical equations that they have developed for the representation of such data. The final two-thirds of the book is the Supplement, which gives tables of binary diffusion coefficient data for 221 mixtures calculated from their generalized equation at "normal" pressure and temperatures from 213 K to the normal boiling point. A comparison is made with the somewhat limited experimental values.

The main recommendation for this book for an English speaker is that it collects together the results reported in various Russian sources and includes previously unpublished measurements of the authors. It also gives references to the original papers wherein their "similitude equation" for calculating relative diffusion coefficients was applied to experimental data. However, since these references are not readily accessible, it is a matter of regret that the authors did not take the opportunity to explain more clearly the development and application of equation (2.2.7). No comparison is made with the results of other methods that have been proposed for the correlation of binary diffusion coefficients.

There are several errors in the book, starting with the equation for Fick's second diffusion law on p 1. There is no index to the Supplement, which would not be a problem if the systems had been given in a logical manner, but here, for example, "isobutyl alcohol−air" follows "octyl alcohol−air" whereas "isobutyl alcohol−nitrogen" precedes "propyl alcohol−nitrogen". There are many such inconsistencies throughout this section, together with errors such as "tetrachlorobrominemethane−air" (p 86) and "ethyl ester−air" (p 84). Also, since the experimental methods employed have different experimental uncertainties, it would have been useful if a note of the actual experimental method or, preferably, an estimate of the uncertainty had been given in the Supplement.

Finally, it should be noted that there are very few references post-1980.

John H. Dymond
University of Glasgow

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Handbook of Physical Properties of Liquids and Gases Pure Substances and Mixtures. Third Augmented and Revised Edition. By N. B. Vargaftik, Y. K. Vinogradov, and V. S. Yargin. Begell House, Inc., New York. 1996. 1359 pp. $165.00. ISBN 1-56700-063-0.

This extensive tabulation of equilibrium thermodynamic and transport property data of liquid and gaseous substances and binary mixtures is the third augmented and revised edition. Values are presented for molar volume, enthalpy, entropy, heat capacity, sound velocity, surface tension, viscosity, and thermal conductivity for pure substances with chapters devoted to hydrogen and hydrogen compounds, metals, carbon compounds (carbon monoxide and carbon dioxide), hydrocarbons and some organic compounds (which includes alcohols, ethers, acetone, and carboxylic acids), nitrogen and ammonia, oxygen, sulfur dioxide, sulfur hexafluoride, halogens, and monoatomic (monatomic) gases. This forms the major part of the volume (85%). The remainder is devoted to mixtures with a chapter on the properties of air, followed by chapters on diffusion in gases, thermodiffusion (thermal diffusion) in gases, thermophysical properties of gas mixtures and solutions (which is too general a title since only the viscosity and thermal conductivity of binary gas mixtures and solutions are included), liquid fuels, high-temperature heat transfer agents, and oils.

As with the earlier editions, this book is basically a collection of tables of data from different sources, mainly from the Russian literature. This in itself is of great value since otherwise much of this data would remain unknown. The present edition is stated in the forword to contain 60% new data, with an extended list of substances and a greater range of state parameters. For the more common technologically important compounds, values for the properties are presented at closely spaced temperatures and pressures, which makes the tables easier to use.

The authors state that where available, the accuracy estimates for the tabulated values are specified. However, for transport properties, for example, there are few assessments of accuracy. It would add greatly to the value of this tabulation if estimates of the accuracy could be included for all tables. I would also very much echo the sentiments expressed by Dr. Touloukian in his forword to the second edition, where he expressed the hope that that work might constitute the basis for future cooperative endeavors for the generation of an internationally agreed-upon set of thermophysical properties tables for gases and liquids. This is even more timely now in view of the extensive accurate measurements that have been carried out worldwide in recent years. This would also require the adoption of an agreed notation. For example, "I, i" for enthalpy, "R" for "heat" of vaporization, "q" for heat of melting, and "G" for Gibbs potential are not in accord with the recommendations of the International Union of Pure and Applied Chemistry. It would be useful in such tables if common units were used for a given property. For example, pressure in different tables has units of MPa, bar, and atm; viscosity values are given in units of Pa s and in g/cm s.

In such a lengthy undertaking, typographical errors are certain to creep in, but these are few in number and usually self-evident. The authors are to be congratulated for this well-produced compilation.

John H. Dymond
University of Glasgow

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