rem" (p. 206) as the three-dimensional Leibniz formula (see Eq. A.5-5 in *Transport Phenomena*, by Bird, Stewart, and Lightfoot, Wiley, New York, 1960, p. 732) appropriately applied to a "dyed" volume element. On p. 207 the Dahler-Scriven paper (*Nature*, **192**, p. 36, 1961) should have been cited in connection with the assumption of the symmetry of the stress tensor.

The book would be very good for a general introductory course on fluid dynamics. It does not, however, contain the optimum choice of topics for chemical engineers, who need some background in non-Newtonian fluids, suspensions, emulsions, reacting multicomponent fluids, and nonisothermal systems. Teachers of fluid dynamics courses should have this book in their personal library to use as collateral reading and as a source of inspiration. All in all, an excellent book.

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Modelling Phase Equilibria: Thermodynamic Background and Practical Tools

By S. Malanowski and A. Anderko, Wiley Series in Chemical Engineering, 272 pp., $69.95.

As the title suggests, the main topic of this monograph is the calculation of fluid-phase equilibria by classical thermodynamic methods. The level of the book suggests that the intended audience is practicing engineers, as well as advanced undergraduate or graduate students, involved in phase equilibria modeling.

The 300-page book is divided into five chapters. Chapter 1 deals with an outline of fundamental thermodynamic principles, following the axiomatic approach of Carathèodory. Relationships between thermodynamic functions useful to the calculation of phase equilibria are also presented. Chapter 2 summarizes briefly methods for calculation of pure-component properties. Chapter 3 "The Gamma-Phi Method," discusses activity and fugacity coefficient models. Chapter 4 is the longest (approximately 1/3 of the total book) and deals with equation-of-state methods. An extensive discussion is given on cubic equations and their derivatives. Mixing rules are reviewed, including the relatively recent group of composition- and density-dependent mixing rules. Chapter 5 presents elements of thermodynamic consistency checking, and the book concludes with two brief appendices on definitions and some mathematical theorems.

The book has a number of distinguishing features in its favor. In particular, it makes extensive references to eastern European sources of data and correlations, which are not often known to western researchers and practitioners. The long chapter on equation-of-state-based calculations of phase equilibria is comprehensive and up-to-date. On the other hand, many will find that several sections of the book cover essentially similar material to other available up-to-date monographs and textbooks. In particular, there are significant overlaps with the books on *Molecular Thermodynamics of Fluid-Phase Equilibria* by Prausnitz et al. (1986) and *Properties of Gases and Liquids* by Reid et al. (1987). While many researchers and practitioners, especially those interested in equation-of-state methods, will find the present book a useful addition to their library, I think that it lacks the comprehensive coverage to be a good replacement for these standard reference books.

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Filtration Equipment for Wastewater Treatment

By Nicholas P. Cheremisinoff and Paul N. Cheremisinoff, Prentice-Hall, Englewood Cliffs, NJ, 1993

This book claims, "This third volume in the series is written to provide a working knowledge of the equipment and operational concepts of filtration." The notion that the book is concerned with filtration equipment for wastewater treatment is a misnomer.

It includes seven chapters, most of which have no references of significance involving wastewater treatment: "Filtration as a Unit Operation" (11 pages, no references) and "Filtration Equipment" (74 pages, 10 references none of which are dated after 1982). This chapter describes, in general terms, types of cake, cartridge, basket, and diaphragm, filters, thickeners, filter and screw presses, and centrifugal filters. No applications in wastewater treatment are described.

Chapter on Ultrafiltration (17 pages, 10 references between 1966 and 1982). It describes kinds of submicrometer semipermeable membranes, the effective thickness of various membranes and the importance of osmotic pressure. It discusses operational modes (purification, fractionation, concentration and partition) and differentiates dead-end vs. cross-flow filtration. UF applications for electrodeposition of paint, cheese and whey processing and oil/water emulsion treatment are described very briefly.

Chapter on Microporous Membrane Filtration (27 pages with 25 references mostly from the 1970s). It discusses particle removal by sieve retention as a function of pore-size and particle-size distributions, depth-type filters, nominal and absolute ratings, and mechanisms of particle capture, as well as pore-size ratings, pore size and retention, capillary rise, and integrity testing of membranes.

Chapter on Reverse Osmosis (27 pages with 15 references, all prior to 1981). It describes the general principles of RO and different types of RO membranes, as well as 13 installations and case histories, in which RO was used in utility water treatment systems, and in municipal water and wastewater systems.

Chapter on Selection and Sizing of Prefilter/Final Filter Systems (34 pages, with 5 references from 1977 to 1981). It cites information needed to size filter systems and describes effects of differential pressure, parallel vs. series systems, and