shell and tube heat exchangers, compact heat exchangers); prime movers (steam turbines and engines, gas turbines, internal combustion engines, jet and rocket engines); coal technology; nuclear technology; petroleum technology; gas technology; solar-derived power; geothermal energy; environmental control; electricity generation, distribution and use; advanced energy systems; guide to codes, standards, and reference material; engineering mathematics; conversion factors; physical and critical constants; transport properties; steam tables, etc.

As might be expected of a handbook prepared by nearly 100 authors, individual contributions and chapters exhibit widely varying quality and topical coverage. Many chapters are marred by inadequate lists of references, which appear thorough elsewhere (e.g., in the chapter on nuclear technology and the section on biomass conversion under solar-derived power). This problem requires correction in a future edition. The index appearing at the end of the book, however, is complete and useful.

There are important developing energy technologies that are covered either too briefly or not at all, *viz.*, tars and heavy oils, synthetic fuels, fusion energy, and geothermal energy from hot, dry rocks. The chapter called "Advanced Energy Systems" is an unusual collection of topics, namely, the hydrogen economy (rather complete), fusion power (disposed of in 7 pp), and laser diagnostics (dealing only with holography, speckle interferometry, and computer-aided interpretation of laser images). Chapter 17 on "Engineering Mathematics" is a substantially augmented handbook compilation of mathematical formulas.

This book has some, but not many typographical errors. Essentially all of the topics are covered by experts, who possess firsthand information about the systems and techniques they describe. The utility of the book derives from this hands-on experience of the authors, as will become apparent to readers of the chapters dealing with energy systems, coal, nuclear, petroleum, solar, and geothermal technologies. This handbook should prove to be useful to energy engineers working in many fields.

S. S. Penner
Professor of Engineering Physics and
Director, Center for Energy
and Combustion Research
University of California, San Diego
La Jolla, CA 92093

Fluid Mixing Technology

By James Y. Oldshue, McGraw-Hill, New York, 1983, 574 pp., $41.00.

Mixing in the Process Industries

By N. Harnby, M. F. Edwards, and A. W. Nienow, Butterworths, London, 1985, 374 pp., $87.95.

Liquid-liquid, liquid-gas, and liquid-solids mixing in batch vessels is the primary topic of both these books. It has been nearly twenty years since the last comprehensive treatment (Uhl and Gray, *Mixing: Theory and Practice,* Academic Press, 1966), and the present books provide a welcome update and overview. *Mixing in the Process Industries* will be of more use to researchers, while *Fluid Mixing Technology* is recommended for the practicing engineer who has no interest in becoming a specialist but wants some general background in the field.

The Oldshue book defines the terminology of batch mixing and explains some general design considerations. A helpful feature in the book is the keywords section and miniindex provided at the end of each chapter, which allows the reader to review the main points. The book rarely provides enough information to make a specific design choice. Many graphs display "typical results" without specifying the experimental system. This is acceptable in a field that relies heavily on past experience and on the conservative scaleup of specific, pilot plant results. *Fluid Mixing Technology* realistically portrays modern, commercial practice in the design and analysis of batch mixers. There has been comparatively little impact from the transport phenomena approach that had revolutionized some aspects of chemical engineering design. Those interested in research on mixing must accept this both as a frustration and as a challenge.

Mixing in the Process Industries was cohesively written by the editors, who were also the major contributors. All three are academics, and they set a rather different tone for the book than that by Oldshue.Their coverage tends to be more detailed, and they provide comprehensive references and an indication of current research directions. Although their book is still primarily intended for the nonspecialist, Harnby, Edwards and Nienow hint at how the field may ultimately evolve from engineering empiricism to engineering science. A special feature in the book is an extensive discussion of solids-solids mixing. A notable omission is a chapter devoted to turbulence theory and modeling.

E. B. Nauman
Dept. of Chemical Engineering
Rensselaer Polytechnic Institute
Troy, NY 12180-3590

What Every Engineer Should Know About Computer Modeling and Simulation

By D. M. Ingels, Marcel Dekker, Inc., 1985, 176 pp., $27.50

The title gives the impression that this book could be a guide for students and practicing engineers interested in computer modeling and simulation. Unfortunately, the text falls short in many areas and turns out to be little more than a philosophical overview of the process of computer modeling and simulation. Although the intended audience are newcomers to the field, the book provides little more than an organization of the step-by-step approach used in the production of large software packages.

The text opens with a brief introduction into computer modeling and simulation. The next three chapters deal with methodology, defining and analyzing the problem, and generating mathematical models, respectively. These chapters do not contain significant amounts of useful information and lack the illustrations required to emphasize major points. The material presented in these chapters is better stated with greater applicability to chemical engineering in the text by R. Aris, *Mathematical Modelling Techniques,* Pittman, 1978.

Chapter 5 describes solution techniques for mathematical models. The techniques illustrated are very old and many are no longer used in modern mathematical software. The latest reference in this chapter is 1977 with many in the 1950's and 1960's. Since numerical analysis is a rapidly changing area, this chapter is out of date.

Chapters 6 and 7 deal with the development of the computer model and the overall simulation, respectively. Chapter 6 is well written and is the saving point of the text. A good discussion of computer languages suitable for simulations and characteristics of good software, e.g., transportability are presented. Finally, Chapter 7 reviews many of the previous discussions and provides an outline of steps to follow from the beginning to the end of a computer simulation.

In summary, this book seems to fill no special void in the literature on computer modeling and simulation. Although the intended purpose clearly stated in Chapter 1 is to present "material that every engineer should know, and not a complete discussion of everything an engineer should know about modeling," the text lacks sufficient detail to act as a guide for modeling and simulation.

Mark E. Davis
Department of Chemical Engineering
Virginia Polytechnic Institute and
State University
Blacksburg, VA 24061

Gas Purification

By A. L. Kohl and F. C. Riesenfeld Gulf Publishing Co., 1985, 4th Ed., $59.95.

Over a twenty-five year period *Gas Purification* has grown into a classic work containing process and operating data that is widely scattered in the literature and in a few cases almost unobtainable. It is indispensable to those interested in commercially significant gas purification and dehydration processes. The coverage is almost encyclopedic although a review of the references suggests that this edition was revised in late 1982; references to 1983 and 1984 literature are quite sparse.

A comparison of the Fourth Edition chapter by chapter with my well thumbed Second Edition shows an increase in size of roughly 20%. However, the revisions are concentrated in only five chapters: Chapter 2, Alkanolamines for H_2S and CO_2 removal; Chapter 7, Sulfur Dioxide removal; Chapter 9, Liquid Phase Oxidation Processes for Removal of Sulfur Compounds; Chapter 13, Catalytic Conversion of Gas Impurities; and Chapter 14, Miscellaneous Gas-Purification Techniques. Unfortunately, this last chapter is a melange of absorption, low temperature distillation, physical solvents and membrane permeation processes. Chapter 14 is definitely not up to the standard set elsewhere in the book.

The emphasis in this edition as in previous ones is on practical experience. This is not the book to use to design a gas treating process or to make a process selection for a given duty. Indeed, it can be misleading in both these areas. However, if it's practical data you want, this is the book.

Attilio Bisio
Exxon Research & Engineering Co.
Annandale, N.J. 08822