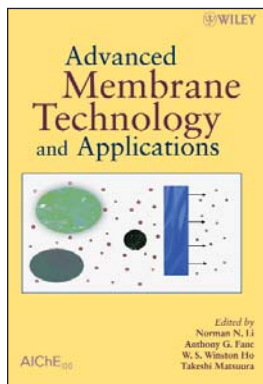


Advanced Membrane Technology and Applications

Edited by Norman N. Li, Anthony G. Fane, W. S. Winston Ho, and Takeshi Matsuura, John Wiley & Sons, Inc., Hoboken, NJ, 994 pages, \$150, Oct. 2008, ISBN: 978-0-471-73167-2



Struck by recent advances in membrane science and the growing need for water treatment and desalination technologies, Li and his co-editors saw a need for an up-to-date presentation of the latest membrane technology and its many applications. They recruited 35 authors to produce this hands-on reference book, covering the fundamental principles and theories of separation and purification by membranes, the

important membrane processes and systems, and major industrial applications. The book goes beyond the basics to address the formulation and industrial manufacture of membranes, as well as membrane applications.

The chapters concentrate more on application than theory, and are organized into six categories: membranes and applications in water and wastewater; membranes and applications in biotechnology and biomedical engineering; gas separations; membrane contactors and reactors; environmental and energy applications; and membrane materials and characterization.

The book's most extensive coverage is devoted to water treatment and purification. Many parts of the world are now in critical need of clean water. Membrane technology is gaining increasing importance in treating and reusing wastewater and in producing potable water from seawater.

Another distinguishing characteristic of this volume is the comparatively large percentage of contributors from industry. Typically, the authors of membrane books have been from academia, whereas nearly half of the contributors to this volume are from some of the major international membrane manufacturing companies.

Membrane manufacturing processes are sensitive to operating conditions and raw material properties, making quality control a key concern in the industry. To this end, the book covers quality management and Six Sigma, and also considers future prospects and strategically important issues in membrane technology.

The book will serve as a timely and comprehensive reference for professionals in industrial manufacturing and separations, and research and development; practitioners in the manufacture and application of membranes; scientists in water treatment, pharmaceutical, food, and fuel cell

processing industries; and process engineers, among others. It will also be a useful resource for researchers in industry and academia, as well as graduate students taking courses in separations, membranes and related fields.

Chemical Reactor Design, Optimization, and Scaleup, Second Edition

E. Bruce Nauman, John Wiley & Sons, Inc., Hoboken, NJ, 608 pages, \$120, Sept. 2008, ISBN: 978-0-470-10525-2



This book can be considered a third edition, since the first edition bearing the current title was based on an earlier book ("Chemical Reactor Design," Wiley, 1987). The new title reflects an emphasis on optimization, and particularly on scaleup — a topic of paramount importance to many practicing engineers. Overall, this is an authoritative sourcebook for chemical engineers in the process industries, in which practitioners will find practical answers to many design questions.

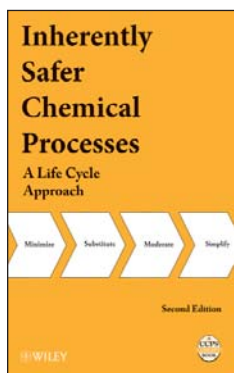
The second edition offers more-extensive treatment of biochemical and polymer reaction engineering. There is also a new chapter on meso-, micro-, and nanoreactors that includes such topics as axial diffusion in microreactors and self-assembly of nano structures.

This new edition has been written to make it more digestible by students at the graduate and undergraduate level. However, the book remains somewhat more advanced in its level of treatment than is the current U.S. standard for texts. The book's goal is less to train students in the qualitative understanding of existing solutions than to prepare them for the solution of new problems; readers should be prepared to work out the details of some examples rather than expect a complete solution.

The book continues an emphasis on numerical solutions, which are required for most practical problems in chemical reactor design. However, it eschews sophisticated numerical techniques for simplicity's sake, allowing for continued focus on the chemistry and physics of the problems.

Author Nauman says that too many engineers are in the dark when faced with variable physical properties, and tend to assume them away without full knowledge of whether the effects are important. Important or not, Nauman says that real design problems deserve careful assembly of data and a rigorous solution. His book presents simple but effective techniques for dealing with varying physical properties in reactors of all types.

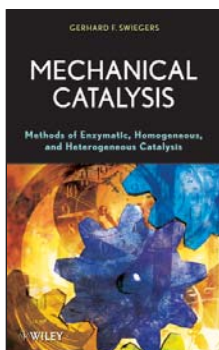
**Inherently Safer Chemical Processes:
A Life Cycle Approach, Second Edition**
Center for Chemical Process Safety, John Wiley & Sons,
Hoboken, NJ, 412 pages, \$90, Jan. 2009,
ISBN: 978-0-471-77892-9



AICHE's Center for Chemical Process Safety (CCPS; www.iche.org/ccps/) published its first inherent safety concept book in 1996. Lessons learned since then, combined with the fact that inherently safer design (ISD) is becoming more widely accepted, prompted CCPS to update the book. This edition builds on the same philosophy as the first edition, but clarifies the concept with recent research, observations of practitioners, additional examples and industry methods, and discussions of security and regulatory issues.

The book begins with the history and basic concepts of inherent safety. It then covers principles and techniques of inherent safety, with chapters devoted to risk management, lifecycle stages, human factors, security, safer-design issues, regulatory issues, and more. The appendix contains practical tools and resources for implementing these approaches. Readers will receive guidance on how to conduct inherent safety studies and how to incorporate inherent safety into an organization's process safety management procedures.

The new edition presents strategies for eliminating or significantly reducing the hazards of chemical processes. It covers: substituting less-harmful chemicals at the development stage; moderating hazards of chemicals in manufacturing processes; safer processing methods in manufacturing; simplifying plants to make them more user-friendly; developing and implementing inherently safer processes and plants; measuring and evaluating inherent safety; evaluating the trade-offs and conflicts among the hazards considered in identifying inherently safer options; and the role of inherent safety in process safety management programs. The book also addresses the limits of inherent safety.



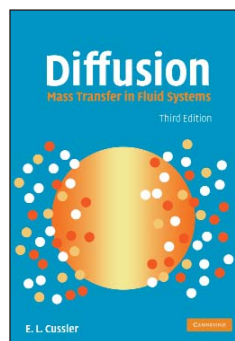
**Mechanical Catalysis:
Methods of Enzymatic,
Homogeneous, and
Heterogeneous Catalysis**
Gerhard F. Swiegers, John Wiley &
Sons, Hoboken, NJ, 352 pages, \$150,
Sept. 2008, ISBN: 978-0-470-26202-3

The field of mechanics — diffusion-controlled chemical reactions that do not involve a thermodynamic equilib-

rium — is currently undergoing a renaissance, with its principles finding application in diverse fields both in and out of the physical sciences. However, it has not yet been seriously applied to the field of catalysis.

This volume examines the principles of mechanics as they apply to chemistry, particularly catalysis. The reader learns that many reactions have a purely mechanical character, in that their rates and pathways are determined by the mechanics of the reactant encounter, rather than the thermodynamics. The book demonstrates the different forms of reaction-limited catalysis — namely time-dependent (mechanical) and energy-dependent (thermodynamic) catalysis — and describes their physical manifestations in heterogeneous and homogenous systems.

**Diffusion: Mass Transfer in
Fluid Systems, Third Edition**
E. L. Cussler, Cambridge University Press, New York, NY,
654 pages, \$80, Feb. 2009, ISBN: 978-0-521-87121-1



Diffusion is a core principle in the understanding of chemical purification and reaction engineering — encompassing phenomena as diverse as the dispersal of pollutants to digestion in the small intestine.

Like its earlier editions, this book's purpose is both scientific and practical. First, it presents a clear description of diffusion, the mixing process caused by molecular motion. Second, it explains mass

transfer, which controls the cost of processes like chemical purification and environmental control.

This third edition extends and clarifies several aspects of diffusion. For example: the Maxwell-Stefan alternative to Fick's equation is treated in more depth; Brownian motion and its relationship to diffusion are explicitly described; diffusion of composites is reviewed. Mass transfer is also better explained, with continued emphasis on dilute mass transfer. The book gives a more complete description of differential diffusion than is available in other introductory sources; this is important because differential diffusion is now more common than staged diffusion, which traditionally receives more-thorough coverage in the literature. It also gives a better description of adsorption than has been available. Another valuable addition: an introduction to mass transfer applied in biology and medicine.

The result is a more readable engineering book, offering better physical insight than conventional books on unit operations. This edition provides both practitioners and students with broad coverage of the theories at play and the interesting challenges in the field, while retaining the author's enthusiastic style.