

1931, it is realized that Warren L. McCabe has provided textbook guidance to chemical engineers in a continuous and ongoing manner for more than half a century. The latest edition of this book constitutes a fitting memorial to his outstanding contributions to the profession. □

## PROCESS REACTOR DESIGN

by Ning Hsing Chen

Allyn and Bacon, Inc., Publishers,  
Boston, MA (1983) 545 pages

### Reviewed by

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Textbooks on chemical engineering kinetics and reactor design have changed significantly in the past three decades as the Hougen and Watson approach shifted to a Levenspiel approach. This evolutionary change continues in this book by introducing numerical methods and computer solutions to complex chemical reactor design equations and problems. We expect that future texts in this area will follow this trend and use many of the more modern ideas and techniques presented in this book to solve industrial reactor design problems.

The text is suitable for a first undergraduate course in reactor design. The content is divided into eleven chapters with mathematical techniques reviewed briefly in the ten appendices. The author uses the molar extent of reaction (reaction coordinate method) as a bookkeeping and computational tool throughout the text. This method is introduced in the first two chapters on Fundamentals and Process Thermodynamics and is used extensively in the evaluation of kinetic data presented in Chapter 3.

After introducing the basic transport equations in Chapter 4, the author covers homogeneous systems by devoting a chapter to each of the four ideal reactors. In each chapter, isothermal, nonisothermal and multiple reactions are covered for each ideal reactor type. This is a particularly refreshing and logical presentation of the material.

The last three chapters cover heterogeneous reactor systems, nonideal reactors and design considerations. The heterogeneous reactor chapter covers each heterogeneous system including catalytic and fluidized bed reactors. Although this chapter is not written in great detail, it provides a good overview of these systems and a fairly good presentation of the design equations and mathematical techniques needed for modeling these systems. The nonideal chapter is very brief and barely covers problems typically encountered in

industrial applications. The material in this chapter must be externally supplemented to provide coverage of nonideal systems.

The final chapter covers some of the major design and economic considerations in reactor sizing. This chapter also compares combination reactor systems and looks at selectivity and productivity.

In general, the material throughout the book is presented using vigorous mathematical development followed by numerous numerical example problems. Fourteen short computer programs are included in the text and are used frequently to solve the more complex problems. Some background in computer programming would be helpful to the student using this text but a solid mathematics background is absolutely required. Notation is straightforward and is consistent throughout the text. The end-of-chapter problems cover the material well and are suitable for homework, but the total number of these problems is fairly limited. The book is well written and the English is good, but at times a more general description would be more helpful than the step-by-step mathematical development.

In summary, this book is a useful teaching and reference text on modern reactor design. □

## ChE books received

*Microcomputers in the Process Industry*, E. R. Robinson. John Wiley & Sons, Inc., Somerset, NJ 08873; 349 pages, \$78.95, (1985).

*Instrumentation and Control for the Process Industries*, John Borer; Elsevier Applied Science Publishers, 52 Vanderbilt Avenue, New York 10017; 301 pages (1985).

*Industrial Environmental Control: Pulp and Paper Industry*, Allan M. Springer; John Wiley & Sons, Inc., Somerset, NJ 08873; 430 pages, \$75 (1986).

*Heat Transfer of a Cylinder in Crossflow*, by A. Zukauskas and J. Ziugzda, Edited by G. F. Hewitt; Hemisphere Publishing Co., 79 Madison Ave., New York 10016; 208 pages, \$59.50 (1985).

*Radiation Heat Transfer Notes*, by D. K. Edwards; Hemisphere Publishing Co., 370 pages (1981).

*Industrial Hygiene Aspects of Plant Operations*, Volume 3, Edited by L. V. Cralley, L. J. Cralley, K. J. Caplan; Macmillan Publishing Company, 866 Third Ave., New York 10022; 785 pages, \$65.00 (1985).

*Reagents for Organic Synthesis*, Vol. 12, by Mary Fieser; Wiley Interscience, Somerset, NJ 08873; 643 pages, \$47.50 (1986).

*Basic Corrosion and Oxidation*, Second Edition, by John M. West; Halstead Press, Somerset, NJ 08873; 264 pages, \$44.95 (1986).

*Modern Control Techniques for the Processing Industries*, by T. H. Tsai, J. W. Lane, C. S. Lin; Marcel Dekker, Inc., 270 Madison Avenue, New York, NY 10016; 296 pages, \$59.75 (1986).

*Quality Management Handbook*, edited by Loren Walsh, Ralph Wurster, Raymond J. Kimber; Marcel Dekker, Inc., 270 Madison Avenue, New York 10016; 1016 pages, \$75.00 (1986).