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Nota di contenuto	Membrane Reactors: Distributing Reactants to Improve Selectivity and Yield; Contents; Preface; List of Contributors; 1: Basic Problems of Chemical Reaction Engineering and Potential of Membrane Reactors; 1.1 Challenges in Chemical Reaction Engineering; 1.2 Concepts of Membrane Reactors; 1.3 Available Membranes; 1.4 Illustration of the Selectivity Problem; 1.5 Reaction Rate, Conversion, Selectivity and Yield; 1.5.1 Reaction Rates; 1.5.2 Conversion; 1.5.3 Mass Balance of a Plug Flow Tubular Reactor; 1.5.4 Selectivity and Yield; 1.6 Distributed Dosing in Packed-Bed and Membrane Reactors 1.6.1 Adjusting Local Concentrations to Enhance Selectivities1.6.2 Optimization of Dosing Profiles; 1.7 Kinetic Compatibility in Membrane Reactors; 1.8 Current Status of Membrane Reactors of the Distributor Type; Notation used in this Chapter; Greek Symbols; Superscripts and Subscripts; Abbreviations; References; 2: Modeling of Membrane Reactors; 2.1 Introduction; 2.2 Momentum, Mass and Heat Balances; 2.3 Transport Kinetics; 2.3.1 Fluid-Filled Regions; 2.3.1.1 Molecular Transport of Momentum; 2.3.1.2 Heat Conduction; 2.3.1.3 Molecular Diffusion; 2.3.2 Porous Domains

2.3.2.1 Molecular Diffusion2.3.2.2 K nudsen Diffusion; 2.3.2.3 Viscous Flow; 2.3.2.4 Models for Description of Gas Phase Transport in Porous Media; 2.4 Reduced Models; 2.5 Solvability, Discretization Methods and Fast Solution; 2.6 Implementation in FLUENT, MooNMD, COMSOL and ProM oT; 2.6.1 Application of FLUENT; 2.6.2 Application of MooNMD; 2.6.3 Application of ProM oT; 2.7 Conclusion; Notation used in this Chapter; Latin Notation; Greek Notation; Super- and Subscripts; References; 3: Catalysis and Reaction Kinetics of a Model Reaction; 3.1 Introduction
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3.4.3.3 Parameter Estimation3.4.4 Suggested Simplified Model; Special Notation not Mentioned in Chapter 2; Latin Notation; Greek Notation; References; 4: Transport Phenomena in Porous Membranes and Membrane Reactors; 4.1 Introduction; 4.2 Aspects of Discretizing Convection-Diffusion Equations; 4.3 Velocity Fields in Membrane Reactors; 4.4 Determination of Transport Coefficients and Validation of Models; 4.4.1 Mass Transport Parameters of Multilayer Ceramic Membranes-Precursors Available; 4.4.1.1 Task and Tools; 4.4.1.2 Identification by Single Gas Permeation
4.4.1.3 Validation by Isobaric Diffusion and by Transient Diffusion

Sommario/riassunto

This authoritative work represents a broad treatment of the field, including the basic principles of membrane reactors, a comparative study of these and conventional fixed-bed reactors or multi-tube reactors, modeling, industrial applications, and emerging applications -- all based on case studies and model reactions with a stringent mathematical framework. The significant progress made over the last few years in this inherently hot multidisciplinary field is summarized in a competent manner, such that the novice can grasp the elementary concepts, while professionals can familiarize themse