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Readings; Problems; 2 Multiple Reactions in Batch Reactors; 2.1 Multiple and Nonelementary Reactions; 2.1.1 Reaction Mechanisms; 2.1.2 Byproducts; 2.2 Component Reaction Rates for Multiple Reactions; 2.3 Multiple Reactions in Batch Reactors; 2.4 Numerical Solutions to Sets of First-Order ODEs; 2.5 Analytically Tractable Examples; 2.5.1 The nth-Order Reaction
2.5.2 Consecutive First-Order Reactions, A B C · · ·2.5.3 Quasi-Steady Hypothesis; 2.5.4 Autocatalytic Reactions; 2.6 Variable-Volume Batch Reactors; 2.6.1 Systems with Constant Mass; 2.6.2 Fed-Batch Reactors; 2.7 Scaleup of Batch Reactions; 2.8 Stoichiometry and Reaction Coordinates; 2.8.1 Matrix Formulation of Reaction Rates; 2.8.2 Stoichiometry of Single Reactions; 2.8.3 Stoichiometry of Multiple Reactions; Suggested Further Readings; Problems; Appendix 2.1 Numerical Solution of Ordinary Differential Equations; 3 Isothermal Piston Flow Reactors; 3.1 Piston Flow with Constant Mass Flow
3.1.1 Gas Phase Reactions3.1.2 Liquid Phase Reactions; 3.2 Scaleup Relationships for Tubular Reactors; 3.2.1 Scaling Factors; 3.2.2 Scaling Factors for Tubular Reactors; 3.3 Scaleup Strategies for Tubular Reactors; 3.3.1 Scaling in Parallel and Partial Parallel; 3.3.2 Scaling in Series for Constant-Density Fluids; 3.3.3 Scaling in Series for Gas Flows; 3.3.4 Scaling with Geometric Similarity; 3.3.5 Scaling with Constant Pressure Drop; 3.4 Scaling Down; 3.5 Transpired-Wall Reactors; Suggested Further Readings; Problems; 4 Stirred Tanks and Reactor Combinations
4.1 Continuous Flow Stirred Tank Reactors4.2 Method of False Transients; 4.3 CSTRs with Variable Density; 4.3.1 Liquid Phase CSTRs; 4.3.2 Computational Scheme for Variable-Density CSTRs; 4.3.3 Gas Phase CSTRs; 4.4 Scaling Factors for Liquid Phase Stirred Tanks; 4.5 Combinations of Reactors; 4.5.1 Series and Parallel Connections; 4.5.2 Tanks in Series; 4.5.3 Recycle Loops; 4.5.4 Maximum Production Rate; 4.6 Imperfect Mixing; Suggested Further Readings; Problems; Appendix 4.1 Solution of Nonlinear Algebraic Equations; 5 Thermal Effects and Energy Balances
5.1 Temperature Dependence of Reaction Rates

Sommario/riassunto

The classic reference, now expanded and updatedChemical Reactor Design, Optimization, and Scaleup is the authoritative sourcebook on chemical reactors. This new Second Edition consolidates the latest information on current optimization and scaleup methodologies, numerical methods, and biochemical and polymer reactions. It provides the comprehensive tools and information to help readers design and specify chemical reactors confidently, with state-of-the-art skills. This authoritative guide: Covers the fundamentals and principles of chemical reactor design, along with adva

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