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3-6 Coupled Heat and Mass Transfer; 3-7 Kinetics and Thermodynamics of Elementary Reversible Reactions in the Gas Phase 3-8 Integration of the Nonisothermal PFR Design EquationProblems; 4 Coupled Heat and Mass Transfer in Nonisothermal Liquid-Phase Tubular Reactors with Strongly Exothermic Chemical Reactions; 4-1 Strategies to Control Thermal Runaway; 4-2 Parametric Sensitivity Analysis; 4-3 Endothermic Reactions in a Cocurrent Cooling Fluid; 4-4 Countercurrent Cooling in Tubular Reactors with Exothermic Chemical Reactions; 4-5 Manipulating the Inlet/Outlet Temperature of a Countercurrent Cooling Fluid: Multiple Stationary-State Behavior in Exothermic PFRs; Problems
5 Multiple Stationary States in Continuous Stirred Tank Reactors5-1 Mass Balance; 5-2 Chemical Kinetics; 5-3 Thermal Energy Balance; 5-4 Multiple Stationary States; 5-5 Endothermic Chemical Reactions; Problems; 6 Coupled Heat and Mass Transfer with Chemical Reaction in Batch Reactors; 6-1 Isothermal Analysis of Experimental Rate Data; 6-2 Formalism for Multiple Reactions; 6-3 Adiabatic Operation; 6-4 Nonisothermal Analysis of a Constant-Volume Batch Reactor; Problems; 7 Total Pressure Method of Reaction-Rate Data Analysis
7-1 Elementary Reversible Gas-Phase Reactions in a Constant-Volume Flask7-2 Generalized Linear Least-Squares Analysis for a Second-Order Polynomial with One Independent Variable; Problems; PART II TRANSPORT PHENOMENA: FUNDAMENTALS AND APPLICATIONS; 8 Applications of the Equations of Change in Fluid Dynamics; 8-1 Important Variables; 8-2 Physical Properties in Fluid Dynamics; 8-3 Fundamental Balance in Momentum Transport; 8-4 Equation of Motion; 8-5 Exact Differentials; 8-6 Low-Reynolds-Number Hydrodynamics; 8-7 Potential Flow Theory; Problems; 9 Derivation of the Mass Transfer Equation
9-1 Accumulation Rate Process

Sommario/riassunto

Laurence Belfiore's unique treatment meshes two mainstream subject areas in chemical engineering: transport phenomena and chemical reactor design. Expressly intended as an extension of Bird, Stewart, and Lightfoot's classic Transport Phenomena, and Froment and Bischoff's Chemical Reactor Analysis and Design, Second Edition, Belfiore's unprecedented text explores the synthesis of these two disciplines in a manner the upper undergraduate or graduate reader can readily grasp. Transport Phenomena for Chemical Reactor Design approaches the design of chemical reactors from microscopi