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Autore	Sattler Klaus
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Equilibrium with Adsorption/Desorption and Convective Solid Drying (Adsorption Equilibrium); 1.4.5 Liquid-Solid Phase Equilibrium; 1.4.5.1 Solubility of Solids in Liquid Solvents; 1.4.5.2 Melting Pressure Curve; 1.4.5.3 Decrease in the Freezing Point; 1.4.5.4 State Diagrams of Binary Systems for Solid and Liquid Phase Equilibrium; 1.4.6 Enthalpy of Phase Changes; 1.5 Separation Factor and Relative Volatility; 1.6 Minimum Separation Work; 1.7 Mass Transfer Fundamentals; 1.7.1 Mass Transfer by Molecular Diffusion; 1.7.1.1 Steady-State Diffusion; 1.7.1.2 Unsteady-State Diffusion; 1.7.1.3 Diffusion Coefficient; 1.7.2 Mass Transfer by Convection; 1.7.3 Overall Mass Transfer; 1.7.3.1 Two Film Theory, Mass Transfer Coefficient and Turbulence Theory; 1.8 Steady-State Cocurrent Operation; 1.9 Steady-State Countercurrent Operation; 1.9.1 Theory of Separation Stages; 1.9.2 Method to Determine the Number of Theoretical Separation Stages for a Countercurrent Column; 1.9.3 Calculation for Counterflow Columns; 1.9.3.1 Mass Balances; 1.9.3.2 Phase Equilibrium Relationship; 1.9.3.3 Enthalpy Balances; 1.9.3.4 Stoichiometric Conditions for the Sum of the Concentration at Each Equilibrium Stage; 1.9.4 Kinetic Theory for the Counterflow Separation of a Mixture; 1.9.4.1 Two-Directional Mass Transfer Between Phases; 1.9.4.2 One-Directional Mass Transfer; 1.10 Steady-State Crossflow Operation; 1.11 General Procedure to Design Equipment for the Thermal Separation of Mixtures; 2 Distillation and Partial Condensation; 2.1 Concepts of Simple Distillation, Rectification and Partial Condensation; 2.2 Discontinuously and Continuously Operated Simple Distillation, Flash Distillation; 2.2.1 Discontinuously Operated Simple Distillation; 2.2.2 Continuously Operated Simple Distillation; 2.2.3 Heat Requirement of Simple Distillation Units; 2.2.4 Flash Distillation; 2.3 Carrier Distillation; 2.4 Vacuum and Molecular Distillation; 2.5 Countercurrent Distillation (Rectification)

Sommario/riassunto

This much-needed book presents a clear and very practice-oriented overview of thermal separation processes. An extensive introduction elucidates the physical and physicochemical fundamentals of different unit operations used to separate homogenous mixtures. This is followed by a concise text with numerous explanatory figures and tables referring to process and design, flowsheets, basic engineering and examples of separation process applications. Very helpful guidance in the form of process descriptions, calculation models and operation data is presented in an easy-to-understand manner.