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Nota di contenuto	Reactive Distillation Status and Future Directions; Contents; Preface; List of Contributors; Part I Industrial Applications; 1 Industrial Applications of Reactive Distillation; 1.1 Introduction; 1.2 Etherification: MTBE, ETBE, and TAME; 1.3 Dimerization, Oligomerization, and Condensation; 1.4 Esterification: Methyl Acetate and Other Esters; 1.5 Hydrolysis of Esters; 1.6 Hydration; 1.7 Hydrogenation/Hydrodesulfurization/Hydrocracking; 1.7.1 Benzene to Cyclohexane; 1.7.2 Selective Hydrogenation of C(4) Stream; 1.7.3 Hydrogenation of Pentadiene; 1.7.4 C(4) Acetylene Conversion 1.7.5 Hydrodesulfurization, Hydrodenitrogenation, and Hydrocracking1.7.6 Miscellaneous Hydrogenations; 1.8 Chlorination; 1.9 Acetalization/Ketalization; 1.10 Recovery and Purification of Chemicals; 1.11 Difficult Separations; 1.12 Chemical Heat Pumps; 1.13 RD with Supercritical Fluids; 1.14 Conclusions; 2 Reactive Distillation

Process Development in the Chemical Process Industries; 2.1 Introduction; 2.2 Process Synthesis; 2.3 Process Design and Optimization; 2.4 Limitations of the Methods for Synthesis and Design: the Scale-Up Problem; 2.5 Choice of Equipment
2.6 Some Remarks on the Role of Catalysis 2.7 Conclusions; 2.8 Acknowledgments; 2.9 Notation; 3 Application of Reactive Distillation and Strategies in Process Design; 3.1 Introduction; 3.2 Challenges in Process Design for Reactive Distillation; 3.2.1 Feasibility Analysis; 3.2.2 Catalyst and Hardware Selection; 3.2.3 Column Scale-Up; 3.3 MTBE Decomposition via Reactive Distillation; 3.3.1 Conceptual Design; 3.3.2 Model Development; 3.3.2.1 Catalyst Selection and Reaction Kinetics; 3.3.2.2 Phase Equilibrium Model; 3.3.2.3 Steady-State Simulation; 3.3.3 Lab-Scale Experiments
3.3.4 Pilot-Plant Experiments 3.4 Conclusions; Part II Physicochemical Fundamentals; 4 Thermodynamics of Reactive Separations; 4.1 Introduction; 4.2 Process Models for Reactive Distillation; 4.2.1 Outline; 4.2.2 Case Study: Methyl Acetate; 4.3 Equilibrium Thermodynamics of Reacting Multiphase Mixtures; 4.4 Fluid Property Models for Reactive Distillation; 4.4.1 Outline; 4.4.2 Examples; 4.4.2.1 Hexyl Acetate: Sensitivity Analysis; 4.4.2.2 Methyl Acetate: Prediction of Polynary Vapor-Liquid Equilibria; 4.4.2.3 Butyl Acetate: Thermodynamic Consistency
4.4.2.4 Ethyl Acetate: Consequences of Inconsistency 4.4.2.5 Formaldehyde + Water + Methanol: Intrinsically Reactive Complex Mixture; 4.5 Experimental Studies of Phase Equilibria in Reacting Systems; 4.5.1 Outline; 4.5.2 Reactive Vapor-Liquid Equilibria; 4.5.2.1 Batch Experiments; 4.5.2.2 Flow Experiments; 4.5.2.3 Recirculation Experiments; 4.6 Conclusions; 4.7 Acknowledgments; 4.8 Notation; 5 Importance of Reaction Kinetics for Catalytic Distillation Processes; 5.1 Introduction; 5.2 Reactive Ideal Binary Mixtures; 5.2.1 Reaction-Distillation Process with External Recycling
5.2.1.1 (,)-Analysis

Sommario/riassunto

In a reactive distillation column, both the chemical conversion and the distillative separation of the product mixture are carried out simultaneously. Through this integrative strategy, chemical equilibrium limitations can be overcome, higher selectivities can be achieved and heat of reaction can be directly used for distillation. Increased process efficiency and reduction of investments and operational costs are the direct results of this approach. Highly renowned international experts from both industry and academia review the state-of-the-art and the future directions in application,
