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Nota di contenuto	Chemical Synthesis Using Supercritical Fluids; Preface; Contents; Contents; List of Contributors; 1 Introduction; 1.1 Supercritical Fluids as Media for Chemical Reactions; 1.1.1 What is a Supercritical Fluid (SCF)?; 1.1.2 Practical Aspects of Reactions in Supercritical Fluids (SFRs); 1.1.3 Motivation for Use of SCFs in Modern Chemical Synthesis; 1.1.4 A Brief History of Chemical Synthesis in SCFs; 1.1.4.1 Discovery of SCFs and their Use as Solvents; 1.1.4.2 Early Examples of Chemical Reactions in SCFs; 1.1.4.3 Industrial Use of SCFs as Reaction Media; References 1.2 Phase Behavior and Solubility1.2.1 Basic Physical Properties of Supercritical Fluids; 1.2.2 Phase Behavior in High Pressure Systems; 1.2.2.1 Types of Binary Phase Diagrams; 1.2.2.2 Asymmetric Binary Mixtures; 1.2.3 Factors Affecting Solubility in Supercritical Fluids;

1.2.3.1 SCF Solvent; 1.2.3.2 Chemical Functionality of the Solute; 1.2.3.3 Temperature and Pressure Effects; References; 1.3 Physical Properties as Related to Chemical Reactions; 1.3.1 Behavior of Diffusion Coefficients; 1.3.2 Diffusional Effects on Reactions; 1.3.3 Transition-state Theory Applied to SCFs 1.3.4 Density Dependence of Two Competing Reactions 1.3.5 Solvation Effects on Reactions; 1.3.6 Conclusions; References; 2 Experimental Techniques; 2.1 High-pressure Reaction Equipment Design; 2.1.1 Introduction; 2.1.2 Basic Equipment and Components; 2.1.2.1 Design of Thick-Walled Vessels; 2.1.2.2 Closures and Connectors; 2.1.2.3 Tubing and Fittings; 2.1.2.4 Valves; 2.1.2.5 Compressors and Pumps; 2.1.2.6 Stirring and Mixing; 2.1.2.7 Optical Windows; 2.1.3 High Pressure Systems; 2.1.3.1 Single-batch High-pressure Reactors; 2.1.3.2 View Cells; 2.1.3.3 Systems for Continuous Processing 2.1.4 Summary References; 2.2 Extraction and Related Separation Techniques; 2.2.1 General Aspects of Supercritical Fluids as Mass Separating Agents; 2.2.2 Extraction from Solids; 2.2.2.1 Basic Process Design; 2.2.2.2 Process Parameters; 2.2.2.3 Modeling the Extraction; 2.2.2.4 Solids in Multiple Stages and Countercurrent Operation in SFE; 2.2.2.5 Continuous Extraction of Contaminated Soil with Supercritical Water; 2.2.3 Countercurrent Multistage Extraction; 2.2.3.1 Basic Process Design; 2.2.3.2 Phase Equilibria; 2.2.3.3 Separation Analysis with Respect to Theoretical Stages 2.2.3.4 Multicomponent Process Simulation 2.2.3.5 Determination of the Height (Length) of a Theoretical Stage; 2.2.3.6 Determination of Column Diameter; 2.2.4 Chromatographic Separation with Supercritical Fluids; 2.2.4.1 Design of SFC Apparatus; 2.2.4.2 Methods for Scale-up of Chromatography; 2.2.5 Conclusion; References; 2.3 Precipitation and Crystallization Techniques; 2.3.1 Introduction; 2.3.2 Thermodynamics and Phase Equilibria; 2.3.2.1 CSS, PGSS and RESS; 2.3.2.2 GASP; 2.3.3 Process Basics and Reference Schemes; 2.3.3.1 Crystallization from a Supercritical Solution (CSS) 2.3.3.2 Formation of Particles from Gas Saturated Solution (PGSS)

## Sommario/riassunto

For 'better solutions' - this practical guide describes how to take advantage of supercritical fluids in chemical synthesis. Well-established in extractions and materials processing, supercritical fluids are becoming increasingly popular as media for modern chemical syntheses. Historically, the application of compressed gases has been restricted mainly to the production of bulk chemicals. In the last decade, however, research has turned to exploiting the unique properties of supercritical fluids for the synthesis of fine chemicals and specialized materials. Now that the necessary equipment is