Phase Equilibrium Engineering, Vol 3. Supercritical Fluid Science and Technology

Description: Traditionally, the teaching of phase equilibria emphasizes the relationships between the thermodynamic variables of each phase in equilibrium rather than its engineering applications. This book changes the focus from the use of thermodynamics relationships to compute phase equilibria to the design and control of the phase conditions that a process needs.

Phase Equilibrium Engineering presents a systematic study and application of phase equilibrium tools to the development of chemical processes. The thermodynamic modeling of mixtures for process development, synthesis, simulation, design and optimization is analyzed. The relation between the mixture molecular properties, the selection of the thermodynamic model and the process technology that could be applied are discussed. A classification of mixtures, separation process, thermodynamic models and technologies is presented to guide the engineer in the world of separation processes. The phase condition required for a given reacting system is studied at subcritical and supercritical conditions.

The four cardinal points of phase equilibrium engineering are: the chemical plant or process, the laboratory, the modeling of phase equilibria and the simulator. The harmonization of all these components to obtain a better design or operation is the ultimate goal of phase equilibrium engineering.

Methodologies are discussed using relevant industrial examples

The molecular nature and composition of the process mixture is given a key role in process decisions

Phase equilibrium diagrams are used as a drawing board for process implementation

Contents: Ch.1: Phase equilibrium and process development
Ch.2: Intermolecular forces, classes of molecules and separation processes
Ch.3: Phase equilibrium diagrams
Ch.4: Physical properties and thermodynamic models
Ch.5: A general approach to phase diagrams for binary systems
Ch.6: Phase equilibrium engineering principles
Ch.7: Phase equilibrium engineering in distillation
Ch.8: Separation of strongly non ideal mixtures
Ch.9: Green processes and high pressure solvents
Ch.10: High pressure fractionation and extraction of natural oils
Ch.11: Supercritical reactors
Ch.12. Phase equilibrium engineering in conceptual process design

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