

Preface

Today, we are witnessing important new developments that go beyond traditional chemical engineering. Engineers and industrial researchers are working on novel equipment and techniques that potentially could transform our concept of chemical plants and lead to compact, safe, energy-efficient, and environment-friendly sustainable processes. These developments share a common focus on “process intensification,” an approach that has been around for quite some time but has truly emerged only in the past few years as a special and interesting discipline of chemical engineering.

Process intensification can be defined as: “Any engineering development that leads to a substantially smaller, cleaner, safer, and more energy-efficient technology.” The application of this concept in process system engineering is most often characterized by a significant reduction in plant volume, production costs, waste generation, and also getting improvements, even in orders of magnitude, on process performance and efficiency including the reduction of environmental pollution problems. In recent years, process intensification has attracted considerable academic interest as a potential means for process improvement and to meet the increasing demands for a sustainable production. A variety of intensified operations developed in academia and industry creates a large number of options to potentially improve the process. However, the task for identifying the set of feasible solutions for process intensification in which the optimal can be found may take considerable resources. Hence, a synthesis tool to systematically achieve the process intensification would potentially assist in the generation and evaluation of process options.

Currently, several process design tools with a clear focus on specific process intensification tasks exist. Therefore, this book covers current topics for the design, optimization, and control in the context of process intensification. This book was motivated by the desire we and others have had to show the evolution and advances in this area. Chapters of this book cover a variety of concepts and aspects, involving a variety of processes as case of study and examples, related to process intensification in chemical engineering.

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Guanajuato, Mexico
Aguascalientes, Mexico

Juan Gabriel Segovia-Hernández
Adrián Bonilla-Petriciolet



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Design Optimization and Control

Segovia-Hernández, J.G.; Bonilla-Petriciolet, A. (Eds.)

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