Preface

This textbook has originally been written to support the "Separation Technology" bachelor courses at the University of Twente and has also been used at Eindhoven University of Technology, Delft University of Technology, Hogeschool Rotterdam and other institutions of higher education. Our main objective is to present an overview of the fundamentals underlying the most frequently used industrial separation methods. We focus on their underlying physics principles and the basic computation methods that are required to assess their technical and economic feasibility for a given application. Thus, design calculations are limited to those required for the development of conceptual process schemes. To keep computational time within the limits of our course structure, most examples and exercises of homogeneous mixtures are limited to binary mixtures.

The textbook is organized into three main parts. Separation processes for homogeneous mixtures are treated in the parts on equilibrium-based molecular separations (Chapters 2–5) and rate-controlled molecular separations (Chapters 6–8). Mechanical separation technology presented in Chapters 9–11 provides an overview of the most important techniques for the separation of heterogeneous mixtures. In each chapter, a short overview of the most widely used equipment types is given. Only for gas–liquid contactors, Chapter 4 goes into more detail about their design and operation because they are the most commonly used industrial contactors. Chapter 12 has a unique position as this chapter considers the selection of an appropriate separation process for a given separation task.

We have enriched this third edition, by introducing additional emphasis on sustainability, in line with recent trends in process engineering. Various topics of relevance to a more sustainable process industry have been added to this edition, such as approaches to improve the energy efficiency of the various technologies and green design principles in their selection.

The design of separation processes can only be learned by an active hands-on approach. The most important aspects are the combination of the right material balances with the thermodynamic equilibrium relations and mass transport equations. To support the reader in learning and applying the presented material, we have extended the number of exercises included at the end of each chapter. Short answers are given at the end of this book. **Detailed solutions are given in a separate solution manual that is available at the website** (https://www.degruyter.com/document/isbn/9783111064086/html).

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