Table of Contents

Preface p. xv

- Acknowledgments p. xvii
- About the Author p. xix
- Nomenclature p. xxi
- Chapter 1 Introduction to Separation Process Engineering p. 1
- 1.1 Importance of Separations p. 1
- 1.2 Concept of Equilibrium p. 2
- 1.3 Mass Transfer p. 4
- 1.4 Problem-Solving Methods p. 5
- 1.5 Prerequisite Material p. 7
- 1.6 Other Resources on Separation Process Engineering p. 8
- 1.7 Summary—Objectives p. 9
- References p. 9
- Homework p. 10
- Chapter 2 Flash Distillation p. 12
- 2.1 Basic Method of Flash Distillation p. 12
- 2.2 Form and Sources of Equilibrium Data p. 14
- 2.3 Graphical Representation of Binary VLE p. 16
- 2.4 Binary Flash Distillation p. 21
- 2.5 Multicomponent VLE p. 29
- 2.6 Multicomponent Flash Distillation p. 34
- 2.7 Simultaneous Multicomponent Convergence p. 40
- 2.8 Size Calculation p. 45
- 2.9 Utilizing Existing Flash Drums p. 49
- 2.10 Summary—Objectives p. 50
- References p. 51
- Homework p. 52
- Appendix: Computer Simulation of Flash Distillation p. 59
- Chapter 3 Introduction to Column Distillation p. 65
- 3.1 Developing a Distillation Cascade p. 65
- 3.2 Distillation Equipment p. 72
- 3.3 Specifications p. 74
- 3.4 External Column Balances p. 76
- 3.5 Summary—Objectives p. 81
- References p. 81
- Homework p. 81
- Chapter 4 Column Distillation: Internal Stage-by-Stage Balances p. 86
- 4.1 Internal Balances p. 86
- 4.2 Binary Stage-by-Stage Solution Methods p. 90
- 4.3 Introduction to the McCabe-Thiele Method p. 97
- 4.4 Feed Line p. 101
- 4.5 Complete McCabe-Thiele Method p. 109
- 4.6 Profiles for Binary Distillation p. 112
- 4.7 Open Steam Heating p. 114

- 4.8 General McCabe-Thiele Analysis Procedure p. 118
- 4.9 Other Distillation Column Situations p. 125
- 4.10 Limiting Operating Conditions p. 130
- 4.11 Efficiencies p. 133
- 4.12 Simulation Problems p. 135
- 4.13 New Uses for Old Columns p. 136
- 4.14 Subcooled Reflux and Superheated Boilup p. 138
- 4.15 Comparisons between Analytical and Graphical Methods p. 140
- 4.16 Summary—Objectives p. 142
- References p. 143
- Homework p. 144
- Appendix: Computer Simulations for Binary Distillation p. 157
- Chapter 5 Introduction to Multicomponent Distillation p. 161
- 5.1 Calculational Difficulties p. 161
- 5.2 Profiles for Multicomponent Distillation p. 167
- 5.3 Summary—Objectives p. 172
- References p. 172
- Homework p. 172
- Chapter 6 Exact Calculation Procedures for Multicomponent Distillation p. 176
- 6.1 Introduction to Matrix Solution for Multicomponent Distillation p. 176
- 6.2 Component Mass Balances in Matrix Form p. 178
- 6.6 Energy Balances in Matrix Form p. 191
- 6.3 Initial Guess for Flow Rates p. 181
- 6.4 Bubble-Point Calculations p. 181
- 6.5 ¿-Method of Convergence p. 184
- 6.7 Summary—Objectives p. 194
- References p. 195
- Homework p. 195
- Appendix: Computer Simulations for Multicomponent Column Distillation p. 200
- Chapter 7 p. 205
- 7.1 Total Reflux: Fenske Equation p. 205
- 7.2 Minimum Reflux: Underwood Equations p. 210
- 7.3 Gilliland Correlation for Number of Stages at Finite Reflux Ratio p. 215
- 7.4 Summary—Objectives p. 219
- References p. 219
- Homework p. 220
- Chapter 8 Introduction to Complex Distillation Methods p. 225
- 8.1 Breaking Azeotropes with Other Separators p. 225
- 8.2 Binary Heterogeneous Azeotropic Distillation Processes p. 227
- 8.3 Steam Distillation p. 234
- 8.4 Two-Pressure Distillation Processes p. 238
- 8.5 Complex Ternary Distillation Systems p. 240
- 8.6 Extractive Distillation p. 246
- 8.7 Azeotropic Distillation with Added Solvent p. 251
- 8.8 Distillation with Chemical Reaction p. 254
- 8.9 Summary—Objectives p. 258
- References p. 259