

Part Three

Other Topics

This third and final part of the book provides an overview of six topics that deserve coverage in a book concerned with mass transfer. The motivation for their inclusion in this text should be readily apparent. Five of the six chapters deal with topics that the Accreditation Board for Engineering and Technology (ABET) have recently indicated should be included in any engineering curriculum. Topics covered include:

- 1 Other and Novel Separation Processes (Chapter 17)
- 2 Economics and Finance (Chapter 18)
- 3 Numerical Methods (Chapter 19)
- 4 Open-Ended Problems (Chapter 20)
- 5 Ethics (Chapter 21)
- 6 Environmental Management and Safety Issues (Chapter 22)

Some introductory details on these topics are provided below.

Chapter 17 reviews other mass-transfer processes not presented in Part II, including some novel ones. Topics include: freeze crystallization, ion exchange, liquid ion exchange, resin adsorption, evaporation, foam fractionation, dissociation extraction, electrophoresis, and vibrating screens.

Chapter 18 is concerned with economics and finance. Economics and finance ultimately dictate many of the decisions made by practicing engineers and their companies. For example, a company may decide that because of the rising price of the feedstock to a distillation column, they will explore the possibility of producing the raw material from a cheaper raw material. A decision will then be based on whether it makes sense economically in the short- and long-term. Furthermore, economic evaluations are a major part of process and plant design.

Chapter 19 is concerned with numerical methods. This subject was taught in the past as a means of providing engineers and scientists with ways to solve complicated mathematical expressions that they could not otherwise solve. However, with the advent of computers, these solutions are now readily obtained. A brief overview of numerical methods is given to provide the practicing engineer with some insight into what many of the currently used software packages (MathCad, Mathematica, MatLab, etc.) are actually doing.

Chapter 20 introduces the reader to open-ended questions. Engineers, at their very essence, are problem solvers. Most problems in real life do not come fully defined with a prescribed methodology to obtain the solution. Thus, engineers need to unleash their creativity in order to obtain a solution. Open-ended questions are exercises in using brain power—and like any muscle, you use it or you lose it.

Chapter 21 is concerned with ethics. For engineers, the question of ethics typically boils down to the struggle between the responsibility to ensure public health and safety and the responsibility to the employers, clients, and shareholders of the company. The case study approach is employed to make the reader think about ethical questions, to reflect on their past decisions, and to project forward to their future decisions a higher degree of thought and insight in determining when one is faced with an ethical dilemma.

The final chapter is concerned with environmental management and safety issues. This chapter contains a broad discussion of environmental issues facing today's engineers and presents some of the more recent technology to deal with the issues at hand. Since practicing engineers have an obligation to make safety a priority (accidents do happen), the chapter also deals with ways to ensure both employee and public safety, determination of the severity of accidents, and determining the causes and potential causes of accidents.