

Foreword

Batch distillation process is around us for many centuries. It is perhaps the oldest technology for separating/purifying liquid mixtures and is the most frequently used separation method in batch processes. In batch distillation, the main concerns (issues) for the researchers and process engineers in the last four decades were: (i) the design of alternative and suitable column configurations, (ii) the development of mathematical models in line with the development of numerical methods, (iii) the formulation and solution of dynamic optimisation problems for optimal design, operation and control, (iv) the development of off-cut recycling strategies, (v) the use of batch distillation in reactive and extractive mode and most recently (vi) the use of artificial neural networks in dynamic modelling, optimisation and control.

Although there are several books on distillation in general where batch distillation is only briefly introduced, there is only one book currently available in the market that is solely dedicated to Batch Distillation. It addresses some of the issues mentioned above using short-cut methods, simplified models and Maximum Principle based optimisation techniques and therefore is a good book to start with for the undergraduate students and for the practitioners in process engineering whose interests lie in the basics of batch distillation and in the preliminary design of batch distillation columns and operations.

In the last 25 years, with continuous development of faster computers and sophisticated numerical methods, there have been many published work that have used detailed mathematical models with rigorous physical property calculations and advanced optimisation techniques to address all the issues mentioned above. These have been the motivating factors to write this book in which excellent and important contributions of many researchers around the globe and those by the author and co-workers are accommodated.

This book is structured in 12 chapters highlighting the major developments in the last 25 years. Moreover, in comparison to the materials in the existing book on batch distillation and the materials available in other distillation books, the new materials included in this book are:

- State Task Network (STN) representation of operating sequence for binary and multicomponent batch distillation
- Simple to detailed mathematical models for conventional and unconventional batch distillation processes
- Maximum Principle to sophisticated SQP based nonlinear optimisation techniques
- Short-cut to rigorous methods for optimal design and operation
- Binary to multi-component off-cut recovery and optimal recycling strategies.

- Modelling and optimisation of batch reactive and extractive distillation processes
- Inverted, middle vessel and multivessel batch distillation column operations
- Use of continuous distillation columns for batch distillation
- Neural Network based hybrid dynamic modelling and optimisation methods for conventional and unconventional column configurations

I certainly believe that this book will be beneficial and will be a good reference book for the undergraduate and postgraduate students, academic researchers, batch processing industries, industrial operators, chemists and engineers for many years to come.

Dr. Iqbal M. Mujtaba
Senior Lecturer in Chemical Engineering
School of Engineering, Design and Technology
University of Bradford, Bradford BD7 1DP, UK
Email: I.M.Mujtaba@bradford.ac.uk
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