

26.8A: Introduction to Multicomponent Distillation

Why?

- Most "real" industrial distillation processes need to separate more than two components

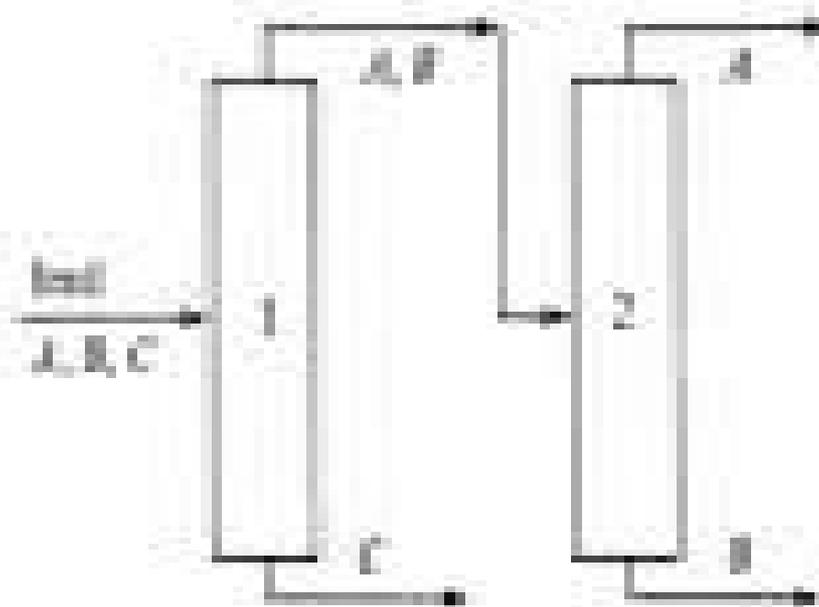
Example

How is it different from binary?

- Mass balance for each component

How many distillation towers are needed?

Example: n components \rightarrow $n-1$ towers



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**Pravin G Ingole, Chaudhery Mustansar
Hussain**

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Separation Process Engineering Phillip C. Wankat, 2022-10-24 The Definitive Learner Friendly Guide to Chemical Engineering Separations Extensively Updated Including a New Chapter on Melt Crystallization Efficient separation processes are crucial to addressing many societal problems from developing new medicines to improving energy efficiency and reducing emissions Separation Process Engineering Fifth Edition is the most comprehensive accessible guide to modern separation processes and the fundamentals of mass transfer In this completely updated edition Phillip C Wankat teaches each key concept through detailed realistic examples using actual data with up to date simulation practice spreadsheet based exercises and references Wankat thoroughly covers each separation process including flash column and batch distillation exact calculations and shortcut methods for multicomponent distillation staged and packed column design absorption stripping and more His extensive discussions of mass transfer and diffusion enable faculty to teach separations and mass transfer in a single course And detailed material on liquid liquid extraction adsorption chromatography and ion exchange prepares students for advanced work New and updated content includes melt crystallization steam distillation residue curve analysis batch washing the Shanks system for percolation leaching eutectic systems forward osmosis microfiltration and hybrid separations A full chapter discusses economics and energy conservation including updated equipment costs Over 300 new and updated homework problems are presented all extensively tested in undergraduate courses at Purdue University New chapter on melt crystallization solid liquid phase equilibrium suspension static and falling film layer approaches and 34 questions and problems New binary VLE equations and updated content on simultaneous solutions New coverage of safety and fire hazards New material on steam distillation simple multi component batch distillation and residue curve analysis Expanded discussion of tray efficiencies packed column design and energy reduction in distillation New coverage of two hybrid extraction with distillation and the Kremser equation in fractional extraction Added sections on deicing with eutectic systems eutectic freeze concentration and scale up New sections on forward osmosis and microfiltration Expanded advanced content on adsorption and ion exchange including updated instructions for eight detailed Aspen Chromatography labs Discussion of membrane separations including gas permeation reverse osmosis ultrafiltration pervaporation and applications Thirteen up to date Aspen Plus process simulation labs adaptable to any simulator This guide reflects an up to date understanding of how modern students learn designed organized and written to be exceptionally clear and easy to use It presents detailed examples in a clear standard format using real data to solve actual engineering problems preparing students for their future careers

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volumes this series offers a seamless blend of foundational knowledge and advanced applications to address the evolving needs of academia and industry Volume 1 lays a strong foundation with topics such as material and energy balances thermodynamics phase equilibrium fluid mechanics transport phenomena and essential separation processes such as distillation and membrane technologies This volume builds on these principles delving into reaction engineering reactor modeling with MATLAB and ASPEN PLUS material properties process intensification and nanotechnology It also addresses critical global challenges emphasizing green chemistry waste minimization resource recovery and workplace safety Together these volumes provide a holistic understanding of chemical engineering equipping readers with the tools to innovate and lead in a dynamic and sustainable future

Advances in Separation Sciences Pravin G Ingole, Chaudhery Mustansar Hussain, 2024-11-30 *Advances in Separation Sciences Sustainable Processes and Technologies* discusses the different separation technologies and their applications in a variety of industrial processes The book lists the pros and cons of the various processes for specialized application and outlines selection criteria to provide readers with the knowledge they need to develop processes and technologies themselves Divided into eight parts chapters cover sustainable perspectives and developments theory and mechanisms of various separation processes advances in sample preparation techniques advances in chromatography advances in membrane technology advances in microfluidics green and sustainable separation sciences and challenges and commercialization In depth and step by step descriptions of the various processes and technologies explanations of their inclusion in modern industry and scales for both experimental and theoretical models are also included Includes new research findings and relates them to industrial applications Identifies new research needs and opportunities Includes both mechanisms and applications Provides fundamental knowledge of separation processes through theories and problems Includes challenges and solutions for the commercialization of separation processes

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Principles and Modern Applications of Mass Transfer

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