Course Name
SEPARATION PROCESS

Chapter
Introduction

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Course synopsis

- This course aims to introduce the principles of typical unit operations involved in chemical and petrochemical industry such as drying of process material, adsorption and fixed-bed separation, membrane separation, mechanical-physical separation and crystallization. At the end of this course, it is expected that the students will understand theories, principles, calculations and basic design parameters associated with every unit operation

Course Outcomes

By the end of semester, students should be able to:

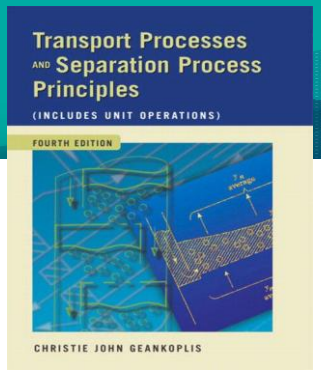
- CO1 - Explain, discuss and interpret the concept of unit operations i.e drying, adsorption, fixed bed separation crystallization, membrane separation and mechanical-physical separation

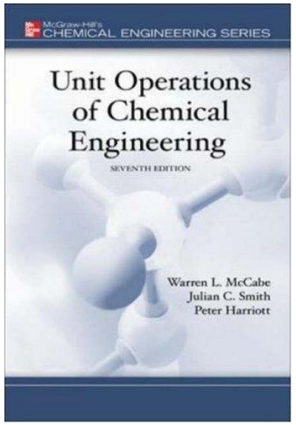
- CO2 - Analyze problems related to unit operation in chemical related processes.

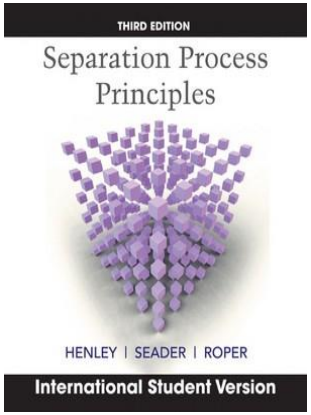
- CO3 - Analyze basic design parameters associated with certain unit operations.

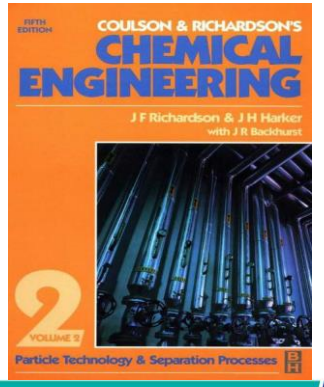
References

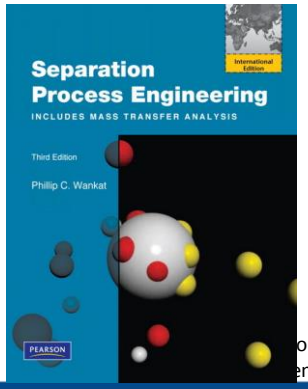
1. Transport Processes and Separation Process Principles: (includes Unit Operations)-Christie J. Geankoplis-Prentice Hall Professional Technical Reference, 2003
2. Unit Operations of Chemical Engineering (7th edition)(McGraw Hill Chemical Engineering Series); Warren McCabe, Julian Smith, Peter Harriott
3. Coulson and Richardson's Chemical Engineering: Particle technology and separation processes, Volume 2- John Metcalfe Coulson, John Francis Richardson, John Hadlett Harker, J. R. Backhurst; Butterworth-Heinemann, Sep 24, 2002
4. Separation Process Principles - Seader, J. D. / Henley, Ernest J.- 3. Edition March 2011- John Wiley & Sons
5. Separation Process Engineering: Includes Mass Transfer Analysis: 3rd Edition; Phillip Wankat: Nov 2011, Pearson











Course Content Planning

Chap	Topic
1	**Drying of Process Material** • Equipment for drying • Equilibrium moisture content of materials • Calculations methods for constant-rate drying period • Calculation methods for falling-rate drying period • Drying in falling-rate period by diffusion and capillary flow • Unsteady-state thermal processing and sterilization of biological materials
2	**Adsorption and Fixed-Bed Separation** • Batch adsorption • Introduction to adsorption processes • Design of fixed-bed adsorption columns • Ion exchange processes chromatography

Course Content Planning

Chap	Topic
3	**Membrane Separation Process** •Introduction and Types of Membrane Separation Processes •Membrane transport theory •Membrane for Liquid separation process(RO, UF,MF) •Membrane for gas separation (Pure gas, Mixed gas, pervaporation) •Other membrane processes (dialysis,ion exchange membrane, membrane contactor, membrane distillation)

Course Content Planning

Chap	Topic
4	**Crystallization** • Type of crystals and equipment in crystallization • Yield, heat and material balance in crystallization • Nucleation and rate of crystal growth • Model for mixed suspension-mixed product removal crystallizer.
5	**Mechanical-Physical Separation Processes** • Introduction and classification of mechanical-physical separation processes • Filtration in solid-liquid separation • Settling and sedimentation in particles-fluid separation • Centrifugal separation processes • Mechanical size reduction

Credit to the authors:
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