

# UNIT OPERATIONS IN CHEMICAL ENGINEERING



# Process Calculations Chemical Engineering In Unit Operations

**Chaplin Tyler**



## **Process Calculations Chemical Engineering In Unit Operations:**

**Unit Operations-i Fluid Flow and Mechanical Operations** , *STOICHIOMETRY AND PROCESS CALCULATIONS, SECOND EDITION* NARAYANAN, K. V., LAKSHMIKUTTY, B., 2016-12-01 Designed as a textbook for the undergraduate students of chemical engineering and related disciplines such as biotechnology polymer technology petrochemical engineering electrochemical engineering environmental engineering and safety engineering the chief objective of the book is to prepare students to make analysis of chemical processes through calculations and to develop systematic problem solving skills in them The text presents the fundamentals of chemical engineering operations and processes in a simple style that helps the students to gain a thorough understanding of chemical process calculations The book deals with the principles of stoichiometry to formulate and solve material and energy balance problems in processes with and without chemical reactions With the help of examples the book explains the construction and use of reference substance plots equilibrium diagrams psychrometric charts steam tables and enthalpy composition diagrams It also elaborates on thermophysics and thermochemistry to acquaint the students with the thermodynamic principles of energy balance calculations The book is supplemented with Solutions Manual for instructors containing detailed solutions of all chapter end unsolved problems **NEW TO THE SECOND EDITION** Incorporates a new chapter on Bypass Recycle and Purge Operations Comprises updations in some sections and presents new sections on Future Avenues and Opportunities in Chemical Engineering Processes in Biological and Energy Systems Contains several new worked out examples in the chapter on Material Balance with Chemical Reaction Includes GATE questions with answers up to the year 2016 in Objective type questions **KEY FEATURES** SI units are used throughout the book All basic chemical engineering operations and processes are introduced and different types of problems are illustrated with worked out examples Stoichiometric principles are extended to solve problems related to bioprocessing environmental engineering etc Exercise problems more than 810 are organised according to the difficulty level and all are provided with answers

**STOICHIOMETRY AND PROCESS CALCULATIONS** K. V. NARAYANAN, B. LAKSHMIKUTTY, 2006-01-01 This textbook is designed for undergraduate courses in chemical engineering and related disciplines such as biotechnology polymer technology petrochemical engineering electrochemical engineering environmental engineering safety engineering and industrial chemistry The chief objective of this text is to prepare students to make analysis of chemical processes through calculations and also to develop in them systematic problem solving skills The students are introduced not only to the application of law of combining proportions to chemical reactions as the word stoichiometry implies but also to formulating and solving material and energy balances in processes with and without chemical reactions The book presents the fundamentals of chemical engineering operations and processes in an accessible style to help the students gain a thorough understanding of chemical process calculations It also covers in detail the background materials such as units and conversions dimensional analysis and dimensionless groups property estimation P V

The behaviour of fluids vapour pressure and phase equilibrium relationships humidity and saturation With the help of examples the book explains the construction and use of reference substance plots equilibrium diagrams psychrometric charts steam tables and enthalpy composition diagrams It also elaborates on thermophysics and thermochemistry to acquaint the students with the thermodynamic principles of energy balance calculations Key Features SI units are used throughout the book Presents a thorough introduction to basic chemical engineering principles Provides many worked out examples and exercise problems with answers Objective type questions included at the end of the book serve as useful review material and also assist the students in preparing for competitive examinations such as GATE

*Unit Operations-II* Ka Gavhane,2014-11  
Introduction Conduction Convection Radiation Heat Exchange Equipments Evaporation Diffusion Distillation Gas Absorption Liquid Liquid Extraction Crystallisation Drying Appendix I Try yourself Appendix II Thermal conductivity data Appendix III Steam tables

Unit Operations Handbook John J. McKetta Jr,2018-12-12 Emphasizes the design control and functioning of various unit operations offering shortcut methods of calculation along with computer and nomographic solution techniques Provides practical sections on conversion to and from SI units and cost indexes for quick updating of all cost information This book is designed for mechanical chemical process design project and materials engineers and continuing education courses in these disciplines

**Transport Processes and Unit Operations** Christie J. Geankoplis,1983 This new third edition provides a modern unified treatment of the basic transport processes of momentum heat and mass transfer as well as a broad treatment of the unit operations of chemical engineering Coverage includes the latest membrane separation processes discussion of bioprocesses comprehensive treatment of the transport processes of momentum heat and mass transfer adsorption processes and more A useful up to date reference for practicing chemical engineers agricultural engineers food scientists environmental engineers biochemical engineers and others who work in the process industries

**Computer Methods in Chemical Engineering** Nayef Ghasem,2021-11-23 While various software packages have become essential for performing unit operations and other kinds of processes in chemical engineering the fundamental theory and methods of calculation must also be understood to effectively test the validity of these packages and verify the results Computer Methods in Chemical Engineering Second Edition presents the most used simulation software along with the theory involved It covers chemical engineering thermodynamics fluid mechanics material and energy balances mass transfer operations reactor design and computer applications in chemical engineering The highly anticipated Second Edition is thoroughly updated to reflect the latest updates in the featured software and has added a focus on real reactors introduces AVEVA Process Simulation software and includes new and updated appendixes Through this book students will learn the following What chemical engineers do The functions and theoretical background of basic chemical engineering unit operations How to simulate chemical processes using software packages How to size chemical process units manually and with software How to fit experimental data How to solve linear and nonlinear algebraic equations as well as ordinary differential equations Along with

exercises and references each chapter contains a theoretical description of process units followed by numerous examples that are solved step by step via hand calculation and computer simulation using Hysys UniSim PRO II Aspen Plus and SuperPro Designer Adhering to the Accreditation Board for Engineering and Technology ABET criteria the book gives chemical engineering students and professionals the tools to solve real problems involving thermodynamics and fluid phase equilibria fluid flow material and energy balances heat exchangers reactor design distillation absorption and liquid extraction This new edition includes many examples simulated by recent software packages In addition fluid package information is introduced in correlation to the numerical problems in book An updated solutions manual and PowerPoint slides are also provided in addition to new video guides and UniSim program files

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Distillation Liquid Liquid Extraction Adsorption and Ion Exchange Leaching Crystallisation Drying Appendix I

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