

# Excel Spreadsheets Chemical Engineering

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Problem Solving Cases in Microsoft Access and Excel  
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Numerical Calculations for Process Engineering Using Excel VBA  
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Problem Solving in Chemical and Biochemical Engineering with POLYMATH, Excel, and MATLAB,2/e  
Multiple Reactions Galore, Volume I  
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Water Treatment Unit Processes  
Introduction to Software for Chemical Engineers, Second Edition

Excel Spreadsheets Chemical  
Engineering

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MELISSA COLLINS

## PROBLEM SOLVING CASES IN MICROSOFT ACCESS AND EXCEL

CRC Press

While teaching the Numerical Methods for Engineers course over the last 15 years, the author found a need for a new textbook, one that was less elementary, provided applications and problems better suited for chemical engineers, and contained instruction in Visual Basic® for Applications (VBA). This led to six years of developing teaching notes that have been enhanced to create the current textbook, Numerical Methods for Chemical Engineers Using Excel®, VBA, and MATLAB®. Focusing on Excel gives the advantage of it being generally available, since it is present on every computer—PC and Mac—that has Microsoft Office installed. The VBA programming environment comes with Excel and greatly enhances the capabilities of Excel spreadsheets. While there is no perfect programming system, teaching this combination offers knowledge in a widely available program that is commonly used (Excel) as well as a popular academic software package (MATLAB). Chapters cover nonlinear equations, Visual Basic, linear algebra, ordinary differential equations, regression analysis, partial differential equations, and mathematical programming methods. Each chapter contains examples that show in detail how a particular numerical method or programming methodology can be implemented in Excel and/or VBA (or MATLAB in chapter 10). Most of the examples and problems presented in the text are related to chemical and biomolecular engineering and cover a broad range of application areas including thermodynamics, fluid flow, heat transfer, mass transfer, reaction kinetics, reactor design, process design, and process control. The chapters feature "Did You Know" boxes, used to remind readers of Excel features. They also contain end-of-chapter exercises, with solutions provided.

John Wiley & Sons

Rules of Thumb for Chemical Engineers, Fifth Edition, provides solutions, common sense techniques, shortcuts, and calculations to help chemical and process engineers deal with practical on-the-job problems. It discusses physical properties for proprietary materials, pharmaceutical and biopharmaceutical sector heuristics, and process design, along with closed-loop heat transfer systems, heat exchangers, packed columns, and structured packings. Organized into 27 chapters, the book begins with an overview of formulae and data for sizing piping systems for incompressible and compressible flow. It then moves to a discussion of design recommendations for heat exchangers, practical equations for solving fractionation problems, along with design of reactive absorption processes. It also considers different types of pumps and presents narrative as well as tabular comparisons and application notes for various types of fans, blowers, and compressors. The book also walks the reader through the general rules of thumb for vessels, how cooling towers are sized based on parameters such as return temperature and supply temperature, and specifications of refrigeration systems. Other chapters focus on pneumatic conveying, blending and agitation, energy conservation, and process modeling. Chemical engineers faced with fluid flow problems will find this book extremely useful. Rules of Thumb for Chemical Engineers brings together solutions, information and work-arounds that engineers in the process industry need to get their job done. New

material in the Fifth Edition includes physical properties for proprietary materials, six new chapters, including pharmaceutical, biopharmaceutical sector heuristics, process design with simulation software, and guidelines for hazardous materials and processes Now includes SI units throughout alongside

## ADVANCED EXCEL FOR SCIENTIFIC DATA ANALYSIS

CreateSpace

PROBLEM-SOLVING CASES IN MICROSOFT ACCESS AND EXCEL, Twelfth Annual Edition, helps you apply the Access database management system and Excel spreadsheet to effectively analyze and solve real-world business problems. Six individual tutorials build a practical knowledge of each software application's capabilities, while 12 all-new case studies present scenarios and problems common in business. Further, a skill-building integration feature requires readers to use Access and Excel together on cases, making this the most up-to-date, practical guide for these widely used software programs. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

**Rules of Thumb for Chemical Engineers** Numerical Methods for Chemical Engineers Using Excel, VBA, and MATLAB  
PROBLEM-SOLVING CASES IN MICROSOFT ACCESS AND EXCEL, Tenth Annual Edition helps students apply the Access database management system and Excel spreadsheet to effectively analyze and solve real-world, business problems. Six individual tutorials in the text build a practical knowledge of each software application's capabilities, while twelve all-new case studies present scenarios and problems common in business. Further, a skill-building integration feature requires students to use Access and Excel together on cases, making this the most up-to-date, practical guide for these widely used software programs. Instructor support materials can be found in the Instructor Downloads section of [www.cengage.com/coursestechnology](http://www.cengage.com/coursestechnology), and are accessible by Single-Sign On (SSO) username and password. Designed to facilitate classroom instruction, these resources include six new Hall of Fame cases, along with new solution files, syllabus, and Student Data Files. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

## ENGINEERING WITH EXCEL

Cengage Learning

Learn to fully harness the power of Microsoft Excel(r) to perform scientific and engineering calculations With this text as your guide, you can significantly enhance Microsoft Excel's(r) capabilities to execute the calculations needed to solve a variety of chemical, biochemical, physical, engineering, biological, and medicinal problems. The text begins with two chapters that introduce you to Excel's Visual Basic for Applications (VBA) programming language, which allows you to expand Excel's(r) capabilities, although you can still use the text without learning VBA. Following the author's step-by-step instructions, here are just a few of the calculations you learn to perform: \* Use worksheet functions to work with matrices \* Find roots of equations and solve systems of simultaneous equations \* Solve ordinary differential equations and partial differential equations \* Perform linear and non-linear regression \* Use random numbers and the Monte Carlo method This text is loaded with examples ranging from very basic to highly sophisticated solutions. More than 100 end-of-chapter problems help you test and put your knowledge to practice solving real-world problems. Answers and explanatory notes for most of the problems are provided in an

appendix. The CD-ROM that accompanies this text provides several useful features: \* All the spreadsheets, charts, and VBA code needed to perform the examples from the text \* Solutions to most of the end-of-chapter problems \* An add-in workbook with more than twenty custom functions This text does not require any background in programming, so it is suitable for both undergraduate and graduate courses. Moreover, practitioners in science and engineering will find that this guide saves hours of time by enabling them to perform most of their calculations with one familiar spreadsheet package.

## Continuous Process Dynamics, Stability, Control and Automation

Gulf Professional Publishing  
The field of chemical engineering is undergoing a global "renaissance," with new processes, equipment, and sources changing literally every day. It is a dynamic, important area of study and the basis for some of the most lucrative and integral fields of science. Introduction to Chemical Engineering offers a comprehensive overview of the concept, principles and applications of chemical engineering. It explains the distinct chemical engineering knowledge which gave rise to a general-purpose technology and broadest engineering field. The book serves as a conduit between college education and the real-world chemical engineering practice. It answers many questions students and young engineers often ask which include: How is what I studied in the classroom being applied in the industrial setting? What steps do I need to take to become a professional chemical engineer? What are the career diversities in chemical engineering and the engineering knowledge required? How is chemical engineering design done in real-world? What are the chemical engineering computer tools and their applications? What are the prospects, present and future challenges of chemical engineering? And so on. It also provides the information new chemical engineering hires would need to excel and cross the critical novice engineer stage of their career. It is expected that this book will enhance students understanding and performance in the field and the development of the profession worldwide. Whether a new-hire engineer or a veteran in the field, this is a must—have volume for any chemical engineer's library.

## NUMERICAL METHODS FOR CHEMICAL ENGINEERS USING EXCEL, VBA, AND MATLAB

CRC Press

The unit process approach, common in the field of chemical engineering, was introduced about 1962 to the field of environmental engineering. An understanding of unit processes is the foundation for continued learning and for designing treatment systems. The time is ripe for a new textbook that delineates the role of unit process principles in environmental engineering. Suitable for a two-semester course, Water Treatment Unit Processes: Physical and Chemical provides the grounding in the underlying principles of each unit process that students need in order to link theory to practice. Bridging the gap between scientific principles and engineering practice, the book covers approaches that are common to all unit processes as well as principles that characterize each unit process. Integrating theory into algorithms for practice, Professor Hendricks emphasizes the fundamentals, using simple explanations and avoiding models that are too complex mathematically, allowing students to assimilate principles without getting sidelined by excess calculations. Applications of unit processes principles are illustrated by example problems in each chapter. Student problems are provided at the end of each chapter; the solutions

manual can be downloaded from the CRC Press Web site. Excel spreadsheets are integrated into the text as tables designated by a "CD" prefix. Certain spreadsheets illustrate the idea of "scenarios" that emphasize the idea that design solutions depend upon assumptions and the interactions between design variables. The spreadsheets can be downloaded from the CRC web site. The book has been designed so that each unit process topic is self-contained, with sidebars and examples throughout the text. Each chapter has subheadings, so that students can scan the pages and identify important topics with little effort. Problems, references, and a glossary are found at the end of each chapter. Most chapters contain downloadable Excel spreadsheets integrated into the text and appendices with additional information. Appendices at the end of the book provide useful reference material on various topics that support the text. This design allows students at different levels to easily navigate through the book and professors to assign pertinent sections in the order they prefer. The book gives your students an understanding of the broader aspects of one of the core areas of the environmental engineering curriculum and knowledge important for the design of treatment systems.

#### *Chemical Process Engineering Volume 2* Springer

Step-by-step instructions enable chemical engineers to masterkey software programs and solve complex problems Today, both students and professionals in chemical engineering must solve increasingly complex problems dealing with refineries, fuel cells, microreactors, and pharmaceutical plants, to name a few. With this book as their guide, readers learn to solve these problems using their computers and Excel, MATLAB, Aspen Plus, and COMSOL Multiphysics. Moreover, they learn how to check their solutions and validate their results to make sure they have solved the problems correctly. Now in its Second Edition, *Introduction to Chemical Engineering Computing* is based on the author's firsthand teaching experience. As a result, the emphasis is on problem solving. Simple introductions help readers become conversant with each program and then tackle a broad range of problems in chemical engineering, including: Equations of state Chemical reaction equilibria Mass balances with recycle streams Thermodynamics and simulation of mass transfer equipment Process simulation Fluid flow in two and three dimensions All the chapters contain clear instructions, figures, and examples to guide readers through all the programs and types of chemical engineering problems. Problems at the end of each chapter, ranging from simple to difficult, allow readers to gradually build their skills, whether they solve the problems themselves or in teams. In addition, the book's accompanying website lists the core principles learned from each problem, both from a chemical engineering and a computational perspective. Covering a broad range of disciplines and problems within chemical engineering, *Introduction to Chemical Engineering Computing* is recommended for both undergraduate and graduate students as well as practicing engineers who want to know how to choose the right computer software program and tackle almost any chemical engineering problem.

#### **Numerical Calculations for Process Engineering Using Excel VBA** Elsevier

Written by two of the most prolific and respected chemical engineers in the world, this groundbreaking two-volume set is the "new standard" in the industry, offering engineers and students alike the most up-to-date, comprehensive, and state-of-the-art coverage of processes and best practices in the field today. This first new volume in a two-volume set explores and describes integrating new tools for engineering education and practice for better utilization of the existing knowledge on process design. Useful not only for students, professors, scientists and practitioners, especially process, chemical, mechanical and metallurgical engineers, it is also a valuable reference for other engineers, consultants, technicians and scientists concerned about various aspects of industrial design. The text can be considered as a complementary text to process design for senior and graduate students as well as a hands-on reference work or refresher for engineers at entry level. The contents of the book can also be taught in intensive workshops in the oil, gas, petrochemical, biochemical and process industries. The book provides a detailed description and hands-on experience on process design in chemical engineering, and it is an integrated text that focuses on practical design with new tools, such as Excel spreadsheets and UniSim simulation software. Written by two industry and university's most trustworthy and well-known authors, this book is the new standard in chemical, biochemical, pharmaceutical, petrochemical and petroleum refining. Covering design, analysis, simulation, integration, and, perhaps most importantly, the practical application of Microsoft Excel-UniSim software, this is the most comprehensive and up-to-date coverage of all of the latest developments in the industry. It is a must-have for any engineer or student's library.

#### **INTRODUCTION TO CHEMICAL ENGINEERING**

John Wiley & Sons

A Practical Approach to Chemical Engineering for Non-Chemical Engineers is aimed at people who are dealing with chemical engineers or those who are involved in chemical processing

plants. The book demystifies complicated chemical engineering concepts through daily life examples and analogies. It contains many illustrations and tables that facilitate quick and in-depth understanding of the concepts handled in the book. By studying this book, practicing engineers (non-chemical), professionals, technicians and other skilled workers will gain a deeper understanding of what chemical engineers say and ask for. The book is also useful for engineering students who plan to get into chemical engineering and want to know more on the topic and any related jargon. Provides numerous graphs, images, sketches, tables, help better understanding of concepts in a visual way Describes complicated chemical engineering concepts by daily life examples and analogies, rather than by formula Includes a virtual tour of an imaginary process plant Explains the majority of units in chemical engineering

#### **Guidelines for Integrating Process Safety into Engineering Projects** Momentum Press

Provides a modern presentation that eliminates the seven limitations of past and present engineering economics texts: Contains the 12-FACTOR Calculator, an Excel spreadsheet designed by author to provide the values of the 12 factors of engineering economics for arbitrary values of  $i$ ,  $g$  ( ), and  $N$  Contains the ANNUAL and PRESENT WORTH COMPARISON Calculators with Component Replacements for comparing equipment purchase quotations Defines quasi-simple investments and presents a Step-by-Step procedure for calculating their IRRs and balances Presents a classification of the four common non-simple investments and provides Step-by-Step procedures for calculating their IRRs and balances Compares the different profitability measures for the same investment: pretax IRR, aftertax IRR, aftertax sensitivity analysis, net present value, accounting rate of return, benefit-cost ratio, and payback period **Problem Solving in Chemical and Biochemical Engineering with POLYMATH, Excel, and MATLAB, 2/e** CRC Press Written by a highly regarded author with industrial and academic experience, this new edition of an established bestselling book provides practical guidance for students, researchers, and those in chemical engineering. The book includes a new section on sustainable energy, with sections on carbon capture and sequestration, as a result of increasing environmental awareness; and a companion website that includes problems, worked solutions, and Excel spreadsheets to enable students to carry out complex calculations.

#### **Multiple Reactions Galore, Volume I** CRC Press

**SPREADSHEET APPLICATIONS IN CHEMISTRY USING MICROSOFT® EXCEL®** Find step-by-step tutorials on scientific data processing in the latest versions of Microsoft® Excel® The Second Edition of *Spreadsheet Applications in Chemistry Using Microsoft® Excel®* delivers a comprehensive and up-to-date exploration of the application of scientific data processing in Microsoft® Excel®. Written to incorporate the latest updates and changes found in Excel® 2021, as well as later versions, this practical textbook is tutorial-focused and offers simple, step-by-step instructions for scientific data processing tasks commonly used by undergraduate students. Readers will also benefit from an online repository of experimental datasets that can be used to work through the tutorials to gain familiarity with data processing and visualization in Excel®. This latest edition incorporates new and revised content to use to learn the basics of Excel® for scientific data processing and now includes statistical analysis and regression analysis using Excel® add-ins, accounts for differences in navigation and utility between Windows and MacOS versions of the software, and integrates with an online dataset repository for the tutorial exercises. *Spreadsheet Applications in Chemistry Using Microsoft® Excel®* also includes: A thorough introduction to Microsoft® Excel® workbook and worksheet basics, including Excel® toolbar navigation, entering and manipulating formulas and functions and charting experimental chemical data Comprehensive explorations of statistical functions and regression analysis Generating calibration plots from instrumental data Visualizing concepts in physical chemistry Perfect for undergraduate and graduate students of analytical and physical chemistry, *Spreadsheet Applications in Chemistry Using Microsoft® Excel®* is also an ideal resource for students and practitioners of physics, engineering, and biology.

#### **Excel for Scientists and Engineers** Butterworth-Heinemann Numerical Methods for Chemical Engineers Using Excel, VBA, and MATLAB

#### *Engineering Economics for the 21st Century* CRC Press

In this day and age, the chemical process engineer strives to make products at a lower cost, with less pollution, while using a variety of raw materials. When a new product or process is found to be successful, more plants are built either by retrofit or existing similar plants, or by construction of large plants. Engineers involved in the scaling of new plants will need a solid understanding of the issues involved in multiple reactions, which can happen in a series, in parallel, and can be reversible. Computer software can be used to provide detailed treatments of these reactions and readers of *Multiple Reactions Galore* will learn how to treat intermediate products during a complex reaction scheme. This two-volume set discusses the engineering design issues involved when multiple reactions occur in the considered

process. Design issues such as product distribution, economic analysis and profitability as well as the sensitivity of important quantities such as yield, selectivity to rate constant ratios, will be presented in detail. The author explains how to use Excel spreadsheets to seek numerical solutions when closed form analytical solutions are not possible. The author also explores the importance of by-product and by-product yield, which is often overlooked in traditional reaction engineering textbooks.

**Chemical Process Engineering Volume 1** John Wiley & Sons **PETROLEUM REFINING** This fourth volume in the Petroleum Refining set, this book continues the most up-to-date and comprehensive coverage of the most significant and recent changes to petroleum refining, presenting the state-of-the-art to the engineer, scientist, or student. This book provides the design of heat exchanger equipment, crude oil fouling in pre-heat train exchangers, crude oil fouling models, fouling mitigation and monitoring, prevention and control of liquid and gas side fouling, using the Excel spreadsheet and UniSim design software for the design of shell and tube heat exchangers, double pipe heat exchangers, air-cooled exchangers, heat loss tracing for process piping, pinch analysis for hot and cold utility targets and process safety incidents involving these equipment items and pertinent industrial case studies. Use of UniSim Design (UniSim STE) software is illustrated in further elucidation of the design of shell and tube heat exchangers, condensers, and UniSim ExchangerNet R470 for the design of heat exchanger networks using pinch analysis. This is important for determining minimum cold and hot utility requirements, composite curves of hot and cold streams, the grand composite curve, the heat exchanger network, and the relationship between operating cost index target and the capital cost index target against  $\Delta T_{min}$ . Useful as a textbook, this is also an excellent, handy go-to reference for the veteran engineer, a volume no chemical or process engineering library should be without. Written by one of the world's foremost authorities, this book sets the standard for the industry and is an integral part of the petroleum refining renaissance. It is truly a must-have for any practicing engineer or student in this area. This groundbreaking new volume: Assists engineers in rapidly analyzing problems and finding effective design methods and select mechanical specifications Provides improved design manuals to methods and proven fundamentals of process design with related data and charts Covers a complete range of basic day-to-day petroleum refining operations topics with new materials on significant industry changes Extensive Excel spreadsheets for the design of process vessels for mechanical separation of two-phase and three-phase fluids, double-pipe heat exchanger, air-cooled exchanger, pinch analysis for hot and cold utility targets. Provides UniSim ®-based case studies for enabling simulation of key processes outlined in the book Helps achieve optimum operations and process conditions and shows how to translate design fundamentals into mechanical equipment specifications Has a related website that includes computer applications along with spreadsheets and concise applied process design flow charts and process data sheets Provides various case studies of process safety incidents in refineries and means of mitigating these from investigations by the US Chemical Safety Board Includes a vast Glossary of Petroleum and Technical Terminology **Water Treatment Unit Processes** Oxford University Press, USA This extensive book thoroughly covering the application of Excel to Engineering, includes many engineering-oriented examples and problems from a variety of disciplines. Covers Excel from the basics to its relation to financial calculation; matrix math; statistics; data fitting and interpolation; iterative methods; programming; integration & differentiation; and working with other programs. This book is suitable as a complete engineering reference to excel for those who want to learn to apply Excel to engineering problems.

#### **Introduction to Software for Chemical Engineers, Second Edition** Butterworth-Heinemann

This is a modern first course on process control, instruments, process dynamics and stability. MS Excel spreadsheets are used in order to obtain solutions to non-linear equations when needed and closed form analytical solutions are obtained using Laplace transforms and other methods. The solutions are presented in 210 figures and the book has 1319 equations. With an industrial controls market size of about 150 billion dollars and a chemical process industry market size of three trillion dollars, the practitioners can use this book to master techniques of P, proportional, PI, Proportional Integral, PD, Proportional Derivative feedback control, feedforward control, hybrid control, adaptive control, internal model control, ratio control, filtered real proportional integral derivative control, ANNs, artificial neural networks, SPC, and statistical process control. Control block diagrams are developed using MS Paint. Flavor for what is a continuous process is given using 18 process flow diagrams. Be it a feedback control of temperature in a mixing tank or a neural network design for a distillation column, the details and the big picture are both given. Pioneers who made this area possible include people such as Maxwell, Galileo, Sherwood, Levenspiel, Kalman, Laplace, Fermat, Damkohler, Newton, Fourier, Fick, Michaelis, Menten, Monod, Staudinger, Ziegler, Natta, Flory, Peclet, Bode, Nyquist, Biot, Bessel, Bernoulli (both father and

son!), Euler, Stokes, Mach, Reynolds, Prandtl, Nusselt, Weiner, Hopf, Clapeyron, Clausius, Lorenz, and Kreb, who are mentioned where their theories were used in the analysis.

*A Step by Step Approach to the Modeling of Chemical Engineering Processes* Elsevier

This complete revision of *Applied Process Design for Chemical and Petrochemical Plants*, Volume 1 builds upon Ernest E. Ludwig's classic text to further enhance its use as a chemical engineering process design manual of methods and proven fundamentals. This new edition includes important supplemental mechanical and related data, nomographs and charts. Also included within are improved techniques and fundamental methodologies, to guide the engineer in designing process equipment and applying chemical processes to properly detailed equipment. All three volumes of *Applied Process Design for Chemical and Petrochemical Plants* serve the practicing engineer by providing organized design procedures, details on the equipment suitable for application selection, and charts in readily usable form. Process engineers, designers, and operators will find more chemical petrochemical plant design data in: Volume 2, Third Edition, which covers distillation and packed towers as well

as material on azeotropes and ideal/non-ideal systems. Volume 3, Third Edition, which covers heat transfer, refrigeration systems, compression surge drums, and mechanical drivers. A. Kayode Coker, is Chairman of Chemical & Process Engineering Technology department at Jubail Industrial College in Saudi Arabia. He's both a chartered scientist and a chartered chemical engineer for more than 15 years. and an author of Fortran Programs for Chemical Process Design, Analysis and Simulation, Gulf Publishing Co., and *Modeling of Chemical Kinetics and Reactor Design*, Butterworth-Heinemann. Provides improved design manuals for methods and proven fundamentals of process design with related data and charts Covers a complete range of basic day-to-day petrochemical operation topics with new material on significant industry changes since 1995.

*Chemical Equilibria* John Wiley & Sons

This book treats modeling and simulation in a simple way, that builds on the existing knowledge and intuition of students. They will learn how to build a model and solve it using Excel. Most chemical engineering students feel a shiver down the spine when they see a set of complex mathematical equations generated

from the modeling of a chemical engineering system. This is because they usually do not understand how to achieve this mathematical model, or they do not know how to solve the equations system without spending a lot of time and effort. Trying to understand how to generate a set of mathematical equations to represent a physical system (to model) and solve these equations (to simulate) is not a simple task. A model, most of the time, takes into account all phenomena studied during a Chemical Engineering course. In the same way, there is a multitude of numerical methods that can be used to solve the same set of equations generated from the modeling, and many different computational languages can be adopted to implement the numerical methods. As a consequence of this comprehensiveness and combinatorial explosion of possibilities, most books that deal with this subject are very extensive and embracing, making need for a lot of time and effort to go through this subject. It is expected that with this book the chemical engineering student and the future chemical engineer feel motivated to solve different practical problems involving chemical processes, knowing they can do that in an easy and fast way, with no need of expensive software.

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