LINE SIZE & PRESSURE DROP CALCULATION

CLIENT:						DATE:			
PROJECT:						BY:			
LOCATION:						REV:			
				32					

INPUT

			D	E	F	G	H	I	J
9	Line Number		1	2	3	4	5	6	7
10	Drawing Ref		1	2	3	4	5	6	7
11	from						d/c	E-214	P-2306
12	to		CO2 service	CASE - II			E-114	v-206	Unloading arm
14	Nominal or Internal diameter (N/I)		N	N	N	N	N	N	N
15	Diameter	[in]	2	4	4	10	0.75	1.5	18
16	Schedule (X for Standard) (Note 3)		X	X	X	X	X	X	X
17	Pipe roughness (X to default)	(Note 1) [in]	X	X	X	X	X	X	X
18	Phase (L, G, or M)		L	L	G	G	L	L	L
19	Liquid Flowrate	[kg/h]	6000	9864			185.2	185	1472000
20	Gas Flowrate	[kg/h]	0	0	692.7910746	692.7910746	0	0	0
21	Temperature	[°C]	40	32	32	32	150	150	80
22	Pressure	[barg]	10.00	0.00	4.50	4.50	3.1	2.5	0.1
23	Molecular Weight		71		28	28	133.5	133.5	0
24	Liquid Density	[kg/m3]	1560	986.4	0	0	926	926	920
25	Gas Density (X to calculate)	[kg/m3]	0	0	4.873	4.873	X	X	X
26	Cp/Cv (X to default 1)		0	0	X	X	X	1.2	1.2
27	Gas Compressibility Factor Z (X to default 1)		0	0	X	X	X	X	X
28	Gas Visc. (X to default 0.025)	[cP]	0	0	X	X	X	X	X
29	Liquid / Mixed Phase Viscosity	[cP]	0.393	641.160			1.6	2	0
30	Liquid Surface Tension	[dynes/cm]					20.2	0	0
	FORMAL PROCESS DATA ANALYSIS		LIQUID OK	LIQUID OK	GAS OK	GAS OK	LIQUID OK	LIQUID OK	Mixing Liquid

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Camilla Rothe

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Numerical Methods for Chemical Engineers Using Excel, VBA, and MATLAB Victor J. Law,2013-03-05 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 *Chemical Process Engineering Volume 1* Rahmat Sotudeh-Gharebagh,A. Kayode Coker,2022-03-25 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 do 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 *Practical Numerical Methods for Chemical Engineers* Richard A. Davis,2014-10-02 This NEW 3rd edition builds on the popular success of prior editions to expand the breadth of Practical Numerical Methods with more VBA macros that boost Excel s power for modeling and analysis Engineers scientists will find enhanced coverage of computational tools applicable to a wider variety of problems in their own disciplines Excel is the de facto computational tool used by practicing engineers scientists Use this book to become proficient with VBA programming customize your workbooks with time saving enhancements powerful numerical techniques Topics include an introduction to modeling Excel VBA programming root finding for systems of linear nonlinear equations eigenproblems derivative approximation optimization experimental uncertainty analysis least squares regression model validation interpolation integration ordinary partial differential equations A companion web site has digital files for downloading 200 illustrations examples the refined PNM3Suite workbook with 100 VBA user defined functions macros user forms for advanced numerical

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also a valuable reference for other engineers consultants technicians and scientists concerned about various aspects of industrial design The text can be considered as complementary 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 Microsoft Excel spreadsheets and UniSim simulation software Written by two of the industry 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   Excel for Scientists and Engineers E. Joseph Billo,2007-03-16 Learn to fully harness the power of Microsoft Excel to perform scientific and engineering calculations With this text as your guide you can significantly enhance Microsoft Excel s 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 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   Spreadsheets in Science and Engineering Gordon Filby,2013-12-18 Spreadsheets in Science and Engineering shows scientists and engineers at all levels how to analyze validate and calculate data and how the analytical and graphic capabilities of spreadsheet programs ExcelR can solve these tasks in their daily work The examples on the CD ROM accompanying the book include material of undergraduate to current research level in disciplines ranging from chemistry and chemical engineering to molecular biology and geology   Petroleum Refining Design and Applications

<u>Handbook, Volume 3</u> A. Kayode Coker,2022-06-21 PETROLEUM REFINING The third volume of a multi volume set of the most comprehensive and up to date coverage of the advances of petroleum refining designs and applications written by one of the world s most well known process engineers this is a must have for any chemical process or petroleum engineer This volume 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 process equipment such as vessels for the separation of two phase and three phase fluids using Excel spreadsheets and extensive process safety investigations of refinery incidents distillation distillation sequencing and dividing wall columns It also covers multicomponent distillation packed towers liquid liquid extraction using UniSim design software and process safety incidents involving these equipment items and pertinent industrial case studies 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 Includes extensive Excel spreadsheets for the design of process vessels for mechanical separation of two phase and three phase fluids 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   <u>Petroleum Refining Design and Applications Handbook, Volume 4</u> A. Kayode Coker,2023-02-01 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 Tmin 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 *Petroleum Refining Design and Applications Handbook, Volume 2* A. Kayode Coker,2021-03-09 A must read for any practicing engineer or student in this area There is a renaissance that is occurring in chemical and process engineering and it is crucial for today s scientists engineers technicians and operators to stay current This book offers 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 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 **Numerical Calculations for Process Engineering Using Excel VBA** Chi M. Phan,2023-12-01 Numerical Calculations for Process Engineering Using Excel VBA provides numerical treatment of process engineering problems with VBA programming and Excel spreadsheets The problems are solving material and energy balances optimising reactors and modelling multiple factor processes The book includes both basic and advanced codes for numerical calculations The basic methods are presented in different variations tailored to particular applications Some macros are combined with each other to solve engineering problems Examples include combining the bisection method and binary search to optimise an implicit correlation combining golden section search with Euler s method to optimise a reactor and combining bisection code and Euler s method to solve steady state heat distribution The text also

includes nonconventional examples such as harmony search and network analysis The examples include solutions to common engineering problems such as adiabatic flame temperature plug flow reactor conversion batch reactor heat diffusion and pinch analysis of heat exchanger networks The VBA code is presented with mathematical equations and flowcharts enabling the audience to adopt the solutions to different problems The book contains many demonstrations of numerical techniques to guide users It also includes useful summaries of VBA commands functions and Excel predefined functions accessible in VBA While the book is developed primarily for undergraduate students the book is a helpful resource for postgraduate students and engineers   **Chemical Engineering Design** Gavin Towler,Ray Sinnott,2008 Product Description Chemical Engineering Design is a complete course text for students of chemical engineering Written for the Senior Design Course and also suitable for introduction to chemical engineering courses it covers the basics of unit operations and the latest aspects of process design equipment selection plant and operating economics safety and loss prevention It is a textbook that students will want to keep through their undergraduate education and on into their professional lives Provides students with a text of unmatched relevance for the Senior Design Course and Introductory Chemical Engineering Courses Teaches commercial engineering tools for simulation and costing Comprehensive coverage of unit operations design and economics Strong emphasis on HS 108 realistic commercial design projects from diverse industries A rigorous pedagogy assists learning with detailed worked examples end of chapter exercises plus supporting data and Excel spreadsheet calculations plus over 150 Patent References for downloading from the companion website Extensive instructor resources include lecture slides image bank and solutions manual for adopting instructors For further information http textbooks elsevier com   *A Step by Step Approach to the Modeling of Chemical Engineering Processes* Liliane Maria Ferrareso Lona,2017-12-15 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   *Chemical Process Engineering Volume 1* Rahmat Sotudeh-Gharebagh,A. Kayode Coker,2022-05-03 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 do 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   *Chemical Engineering Progress* ,2009   *Separation Processes* Wittaya Teppaitoon,2017-02-28   **Chemical Engineering** ,2007   **Introduction to Supercritical Fluids** Richard Smith,Hiroshi Inomata,Cor Peters,2013-12-08 This text provides an introduction to supercritical fluids with easy to use Excel spreadsheets suitable for both specialized discipline chemistry or chemical engineering student and mixed discipline engineering economic student classes Each chapter contains worked examples tip boxes and end of the chapter problems and projects Part I covers web based chemical information resources applications and simplified theory presented in a way that allows students of all disciplines to delve into the properties of supercritical fluids and to design energy extraction and materials formation systems for real world processes that use supercritical water or supercritical carbon dioxide Part II takes a practical approach and addresses the thermodynamic framework equations of state fluid phase equilibria heat and mass transfer chemical equilibria and reaction kinetics of supercritical fluids Spreadsheets are arranged as Visual Basic for Applications VBA functions and macros that are completely source code accessible for students who have interest in developing their own programs Programming is not required to solve problems or to complete projects in the text Property worksheets spreadsheets that are easy to use in learning environments Worked examples with Excel VBA Worksheet functions allow users to design their own processes Fluid phase equilibria and chemical equilibria worksheets allow users to change conditions study new solutes co

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