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The Importance of Thermodynamics on Process Simulation Modeling Using Aspen Plus in Thermodynamics Instruction 5th International Colloquium on Process Simulation Winnacker-Küchler: Chemische Technik Comprehensive Membrane Science and Engineering Proceedings of the 2nd colloquium on process simulation : computational fluid dynamics coupled with chemical kinetics, combustion & thermodynamics ; held at Helsinki University of Technology, Espoo, Finland, 6 - 8 June 1995 Proceedings of the 4th International Colloquium on process simulation : computational fluid dynamics coupled with chemical kinetics, combustion & thermodynamics ; held at Helsinki University of Technology, Espoo, Finland, 11 - 13 June 1997 Applications in Design and Simulation of Sustainable Chemical Processes Advances in Polymer Reaction Engineering Introductory Chemical Engineering Thermodynamics Distillation Mass transfer and selectivity analysis of a dense membrane contactor for upgrading biogas Chemical Thermodynamics for Process Simulation Chemical Process Design Process Modelling and Simulation with Finite Element Methods Select Thermodynamic Models for Process Simulation Separation Process Principles Process Engineering Integrated Design and Simulation of Chemical Processes Verfahrenstechnik mit EXCEL Kolonnen-Fibel Teach Yourself the Basics of Aspen Plus Fluid Phase Behavior for Conventional and Unconventional Oil and Gas Reservoirs Modeling and Simulation in Chemical Engineering Chemical Thermodynamics for Process Simulation Volume Properties Heat Pumps in Chemical Process Industry Chemical Thermodynamics for Industry Chemische Reaktionstechnik Chemical Engineering Computation with MATLAB® Process Engineering Modelling and Simulation in Thermal and Chemical Engineering Green Extraction of Natural Products VDI-Wärmeatlas Process Analysis and Simulation in Chemical Engineering Computer Methods in Chemical Engineering Proceedings of the colloquium on process simulation : computational fluid dynamics coupled with chemical kinetics, combustion & thermodynamics ; held at Helsinki University of Technology, Espoo, Finland, 3 - 4 August 1994 VDI-Wärmeatlas Technische Chemie Verfahrenstechnik für Ingenieure

Aspen Plus is one of the most popular process simulation software programs used industrially and academically. The book is designed to enable chemical engineers to go through a step-by-step process of learning the basic ideas underlying chemical process simulation, by studying the primary functions of the Aspen Plus software. Because of the major changes Aspen Technology has made in the user's interface in release 8.x, parts of the first edition which is based on release 7.x have become obsolete. However much of the scientific and engineering material has not changed; for example the material describing the distillation modules is completely suitable for self-study however some of the displays have changed. New chapters include Equation-Oriented Simulation, Electrolytes, and an appendix on The NIST Thermo Data Engine as a data source. Each chapter starts with the

equivalent of a classroom lecture followed by workshops which provide experience in the chapter's subject matter. The downloadable files contain solutions, both in Aspen Plus and text formats, to examples imbedded in the text as well as to all the workshops. There are also notes at the end of each chapter designed to aid readers that have difficulty with the workshops.

This book offers a comprehensive coverage of process simulation and flowsheeting, useful for undergraduate students of Chemical Engineering and Process Engineering as theoretical and practical support in Process Design, Process Simulation, Process Engineering, Plant Design, and Process Control courses. The main concepts related to process simulation and application tools are presented and discussed in the framework of typical problems found in engineering design. The topics presented in the chapters are organized in an inductive way, starting from the more simplistic simulations up to some complex problems.

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.

Volumetric properties play an important role in research at the interface of physical chemistry and chemical engineering, but keeping up with the latest developments in the field demands a broad view of the literature. Presenting a collection of concise, focused chapters, this book offers a comprehensive guide to the latest developments in the field and a starting point for more detailed research. The chapters are written by acknowledged experts, covering theory, experimental methods, techniques, and results on all types of liquids and vapours. The editors work at the forefront of thermodynamics in mixtures and solutions and have brought together contributions from all areas related to volume properties, offering a synergy of ideas across the field. Graduates, researchers and anyone working in the field of volumes will find this book to be their key reference.

Applications in Design and Simulation of Sustainable Chemical Processes addresses the challenging applications in designing eco-friendly but efficient chemical processes, including recent advances in chemistry and catalysis that rely on renewable raw materials. Grounded in the fundamental knowledge of chemistry, thermodynamics, chemical reaction engineering and unit operations, this book is an indispensable resource for developing and designing innovating chemical processes by employing computer simulations as an efficient conceptual tool. Targeted to graduate and post graduate students in chemical engineering, as well as to professionals, the book aims to advance their skills in process innovation and conceptual design. The work completes the book Integrated Design and Simulation of Chemical Processes by Elsevier (2014) authored by the same team. Includes comprehensive case studies of innovative processes based on renewable raw materials Outlines Process Systems Engineering approach with emphasis on systematic design methods Employs steady-state and dynamic process simulation as problem analysis and flowsheet creation tool Applies modern concepts, as process integration and intensification, for enhancing the sustainability

Extraction processes are essential steps in numerous industrial applications from perfume over pharmaceutical to fine chemical industry. Nowadays, there are three key aspects in industrial extraction processes: economy and quality, as well as environmental considerations. This book presents a complete picture of current knowledge on green extraction in terms of innovative processes, original methods, alternative solvents and safe products, and provides the necessary theoretical background as well as industrial application examples and environmental impacts. Each chapter is written by experts in the field and the strong focus on green chemistry throughout the book makes this book a unique reference source. This book is intended to be a first step towards a future cooperation in a new extraction of natural products, built to improve both fundamental and green parameters of the techniques and to increase the amount of extracts obtained from renewable resources with a minimum consumption of energy and solvents, and the maximum safety for operators and the environment.

In diesem Lehrbuch werden die Grundlagen im Umgang mit Excel-VBA, von der Erstellung

von Makros über beispielhafte Anwendungen des Solvers bis zur Erstellung von benutzerdefinierten Funktionen, Schritt für Schritt dargestellt. Dabei werden wertvolle Tipps zur Gestaltung und Dokumentation von Excel-Berechnungsblättern gegeben. Auf dieser Basis erfolgt die angeleitete Erstellung von Flash-Berechnungen realer Dampf-Flüssig- und Flüssig-Flüssig-Gleichgewichte. Die wichtigsten Grundoperationen der Thermischen Verfahrenstechnik werden in den nachfolgenden Kapiteln verständlich und strukturiert behandelt: Ausgehend von den Phasengleichgewichten und Erhaltungsgleichungen erfolgt die Herleitung der Berechnungsgleichungen und darauf aufbauend die Erstellung von Excel-Berechnungsblättern zur Lösung der praxisnahen Aufgabenstellungen. Zusätzlich werden u. a. die Auslegung von Anlagen zur Flüssigkeitsförderung und Partikelsysteme behandelt.

A Practical, Up-to-Date Introduction to Applied Thermodynamics, Including Coverage of Process Simulation Models and an Introduction to Biological Systems Introductory Chemical Engineering Thermodynamics, Second Edition, helps readers master the fundamentals of applied thermodynamics as practiced today: with extensive development of molecular perspectives that enables adaptation to fields including biological systems, environmental applications, and nanotechnology. This text is distinctive in making molecular perspectives accessible at the introductory level and connecting properties with practical implications. Features of the second edition include Hierarchical instruction with increasing levels of detail: Content requiring deeper levels of theory is clearly delineated in separate sections and chapters Early introduction to the overall perspective of composite systems like distillation columns, reactive processes, and biological systems Learning objectives, problem-solving strategies for energy balances and phase equilibria, chapter summaries, and "important equations" for every chapter Extensive practical examples, especially coverage of non-ideal mixtures, which include water contamination via hydrocarbons, polymer blending/recycling, oxygenated fuels, hydrogen bonding, osmotic pressure, electrolyte solutions, zwitterions and biological molecules, and other contemporary issues Supporting software in formats for both MATLAB® and spreadsheets Online supplemental sections and resources including instructor slides, ConcepTests, coursecast videos, and other useful resources

Das EINZIGE Großwerk für Prozesse und Produkte aus der Chemischen Technik in deutscher Sprache! Nach nunmehr 20 Jahren erscheint ab 2003 die 5. Auflage jetzt bei Wiley-VCH. Band 1: Methodische Grundlagen Band 2: Neue Technologien Band 3: Anorganische Grundstoffe, Zwischenprodukte Band 4: Energieträger, Organische Grundstoffe Band 5: Organische Zwischenverbindungen, Polymere Band 6A: Metalle Band 6B: Metalle Band 7: Industrieprodukte Band 8: Ernährung, Gesundheit, Konsumgüter Keine Umwege, kein langes Suchen - Greifen Sie gleich zum Winnacker/Küchler!

Advances in Polymer Reaction Engineering, Volume 56 in the Advances in Chemical Engineering series is aimed at reporting the latest advances in the field of polymer

synthesis. Chapters in this new release include Polymer reaction engineering and composition control in free radical copolymers, Reactor control and on-line process monitoring in free radical emulsion polymerization, Exploiting pulsed laser polymerization to retrieve intrinsic kinetic parameters in radical polymerization, 3D printing in chemical engineering, Renewable source monomers in waterborne polymer dispersions, Importance of models and digitalization in Polymer Reaction Engineering, Recent Advances in Modelling of Radical Polymerization, and more. Covers recent advances in the control and monitoring of polymerization processes and in reactor configurations Provides modelling of polymerization reactions and up-to-date approaches to estimate reaction rate constants Includes authoritative opinions from experts in academia and industry

The selection of the most adequate thermodynamic model in a process simulation is an issue that most process engineer has to face sooner or later. This book, conceived as a practical guide, aims at providing adequate answers by analysing the questions to be looked at. The analysis (first chapter) yields three keys that are further discussed in three different chapters. (1) A good understanding of the properties required in the process, and their method of calculation is the first key. The second chapter provides to that end in a synthetic manner the most important equations that are derived from the fundamental principles of thermodynamics. (2) An adequate description of the mixture, which is a combination of models and parameters, is the second key. The third chapter makes the link between components and models, both from a numerical (parameterisation) and physical (molecular interactions) point of view. Finally, (3) a correct view of the phase behaviour and trends in regard of the process conditions is the third key. The fourth chapter illustrates the phase behaviour and makes model recommendations for the most significant industrial systems. A decision tree is provided at the end of this chapter. In the last chapter, the key questions are reviewed for a number of typical processes. This book is intended for process engineers, who are not specialists of thermodynamics but are confronted with this kind of problems and need a reference book, as well as process engineering students who will find an original approach to thermodynamics, complementary of traditional lectures

The main object of this advanced textbook is modelling and simulation of energetic processes by bond graphs. But even without knowledge of this powerful method, it can be used to a certain extent as an introduction to simulation in thermodynamics.

This book presents a systematic description and case studies of chemical engineering modelling and simulation based on the MATLAB/FEMLAB tools, in support of selected topics in undergraduate and postgraduate programmes that require numerical solution of complex balance equations (ordinary differential equations, partial differential equations, nonlinear equations, integro-differential equations). These systems arise naturally in analysis of transport phenomena, process systems, chemical reactions and chemical thermodynamics, and particle rate processes. Templates are given for modelling both state-

of-the-art research topics (e.g. microfluidic networks, film drying, multiphase flow, population balance equations) and case studies of commonplace design calculations -- mixed phase reactor design, heat transfer, flowsheet analysis of unit operations, flash distillations, etc. The great strength of this book is that it makes modelling and simulating in the MATLAB/FEMLAB environment approachable to both the novice and the expert modeller.

Der Stofftransport in einem dichten Membrankontaktor wurde detailliert untersucht. Dabei wurden sowohl Untersuchungen mit reinem CO₂ als auch mit einer Mischung, bestehend aus CO₂ und CH₄, durchgeführt, um den transmembranen Fluss abhängig von der Lösemittelmenge, dem Druckniveau des Kontaktors und der transmembranen Druckdifferenz zu bestimmen. Zwei unterschiedliche Membranen, eine PDMS-beschichtete und eine Teflon-AF-beschichtete Komposit-Gaspermeations-Flachmembran (PolyactiveTM von HZG) wurden in dem Membrankontaktor getestet. Neben dem Einsatz von Wasser als Lösungsmittel wurden auch Versuche mit Glycamal, einem physikalischen Solvent, durchgeführt. Der Stofftransport wurde mithilfe eines rigorosen Stofftransportmodells bestimmt. Mit diesem Modell war es möglich, den Stoffübergangskoeffizienten der Membran und den flüssigseitigen Stoffübergangskoeffizienten abhängig von der Lösemittelmenge, dem Druckniveau des Kontaktors und der transmembranen Druckdifferenz zu bestimmen. Dabei konnte gezeigt werden, dass sowohl der Stofftransportwiderstand der Membran, als auch der der flüssigseitigen Grenzschicht entscheidend zu dem Gesamt-Stofftransport des Kontaktors beitragen, der wiederum maßgeblich den Membranfluss und die Selektivität bestimmt. Es konnte gezeigt werden, dass ein höheres Druckniveau und eine erhöhte transmembrane Druckdifferenz sowohl die Permeanz, als auch die Selektivität des Kontaktors erhöhen.

This comprehensive work shows how to design and develop innovative, optimal and sustainable chemical processes by applying the principles of process systems engineering, leading to integrated sustainable processes with 'green' attributes. Generic systematic methods are employed, supported by intensive use of computer simulation as a powerful tool for mastering the complexity of physical models. New to the second edition are chapters on product design and batch processes with applications in specialty chemicals, process intensification methods for designing compact equipment with high energetic efficiency, plantwide control for managing the key factors affecting the plant dynamics and operation, health, safety and environment issues, as well as sustainability analysis for achieving high environmental performance. All chapters are completely rewritten or have been revised. This new edition is suitable as teaching material for Chemical Process and Product Design courses for graduate MSc students, being compatible with academic requirements world-wide. The inclusion of the newest design methods will be of great value to professional chemical engineers. Systematic approach to developing innovative and sustainable chemical processes Presents generic principles of process simulation for analysis, creation and assessment Emphasis on sustainable

development for the future of process industries

Comprehensive Membrane Science and Engineering, Second Edition is an interdisciplinary and innovative reference work on membrane science and technology. Written by leading researchers and industry professionals from a range of backgrounds, chapters elaborate on recent and future developments in the field of membrane science and explore how the field has advanced since the previous edition published in 2010. Chapters are written by academics and practitioners across a variety of fields, including chemistry, chemical engineering, material science, physics, biology and food science. Each volume covers a wide spectrum of applications and advanced technologies, such as new membrane materials (e.g. thermally rearranged polymers, polymers of intrinsic microporosity and new hydrophobic fluoropolymer) and processes (e.g. reverse electrodialysis, membrane contractors, membrane crystallization, membrane condenser, membrane dryers and membrane emulsifiers) that have only recently proved their full potential for industrial application. This work covers the latest advances in membrane science, linking fundamental research with real-life practical applications using specially selected case studies of medium and large-scale membrane operations to demonstrate successes and failures with a look to future developments in the field. Contains comprehensive, cutting-edge coverage, helping readers understand the latest theory Offers readers a variety of perspectives on how membrane science and engineering research can be best applied in practice across a range of industries Provides the theory behind the limits, advantages, future developments and failure expectations of local membrane operations in emerging countries

Geschrieben von Spezialisten aus Industrie und Wissenschaft, ermöglicht das Standardwerk die Auslegung technischer Apparate und Anlagen, z. B. in der Verfahrens- und der Energietechnik. Dafür werden Daten bereitgestellt, Berechnungsmethoden eingehend erläutert und Konstruktionen vorgestellt. Die 11. deutsche Auflage enthält zahlreiche neue Beiträge, die Kapitel wurden komplett überarbeitet und dem Stand der Technik angepasst. Seit über 50 Jahren ein unentbehrliches Arbeitsmittel für Ingenieure, die sich mit Fragen der Wärmeübertragung beschäftigen.

This practical how-to-do book deals with the design of sustainable chemical processes by means of systematic methods aided by computer simulation. Ample case studies illustrate generic creative issues, as well as the efficient use of simulation techniques, with each one standing for an important issue taken from practice. The didactic approach guides readers from basic knowledge to mastering complex flow-sheets, starting with chemistry and thermodynamics, via process synthesis, efficient use of energy and waste minimization, right up to plant-wide control and process dynamics. The simulation results are compared with flow-sheets and performance indices of actual industrial licensed processes, while the complete input data for all the case studies is also provided, allowing readers to reproduce

the results with their own simulators. For everyone interested in the design of innovative chemical processes.

Das Lehr- und Übungsbuch behandelt das Grundwissen der Verfahrenstechnik in seiner Gesamtheit - aktuell und gestrafft. Es baut auf den Kenntnissen der Grundlagenfächer auf und vermittelt eine kompakte, verständliche und an den Bedürfnissen der Praxis ausgerichtete Gesamtdarstellung der Verfahrenstechnik; Spezialkenntnisse werden nicht vorausgesetzt. Es sind alle Kernbereiche der Verfahrenstechnik - Chemische Reaktionstechnik, Mechanische und Thermische Grundoperationen sowie in einigen Abschnitten auch biotechnische Verfahren - in ihren Grundzügen übersichtlich dargestellt. Das Gesamtkonzept beinhaltet die Verknüpfung der verschiedenen Teilgebiete und spannt den Bogen von den Grundlagen der Verfahrenstechnik bis zur Anwendung bei praktischen Problemlösungen. Daher eignet es sich als Einstiegslehrbuch für Studierende der Chemie und Biotechnologie, des Maschinenbaus und der Verfahrenstechnik an Universitäten, Technischen Hochschulen und Fachhochschulen. Das Buch soll aber auch den in der Industrie tätigen Chemikern und Ingenieuren sowie Lehrern an Gymnasien und Berufsschulen einen schnellen Einstieg in die für sie neuen Teilgebiete ermöglichen. Neu in der 4. Auflage ist ein Kapitel zur Extraktion. Bei diesem physikalischen Stofftrennverfahren wird mithilfe eines Extraktionsmittels eine Komponente aus einem festen oder flüssigen Stoffgemisch gelöst. Auf plus.hanser-fachbuch.de finden Sie zu diesem Titel kostenloses digitales Zusatzmaterial: zahlreiche Aufgaben mit Lösungen, Kontrollfragen, eine Vielzahl von Beispielen und eine Stoffdatensammlung zur Verfahrenstechnik.

A step-by-step guide for students (and faculty) on the use of Aspen in teaching thermodynamics • Easily-accessible modern computational techniques opening up new vistas in teaching thermodynamics A range of applications of Aspen Plus in the prediction and calculation of thermodynamic properties and phase behavior using the state-of-the art methods • Encourages students to develop engineering insight by doing repetitive calculations with changes in parameters and/or models • Calculations and application examples in a step-by-step manner designed for out-of-classroom self-study • Makes it possible to easily integrate Aspen Plus into thermodynamics courses without using in-class time • Stresses the application of thermodynamics to real problems

VORWORT ZUR 2. AUFLAGE VORWORT ZUR 1. AUFLAGE TEIL I: Einführung in die Technische Chemie CHEMISCHE PROZESSE UND CHEMISCHE INDUSTRIE Besonderheiten chemischer Prozesse Chemie und Umwelt Chemiewirtschaft Struktur von Chemieunternehmen Bedeutung von Forschung und Entwicklung für die chemische Industrie Entwicklungstendenzen und Zukunftsaussichten der chemischen Industrie CHARAKTERISIERUNG CHEMISCHER PRODUKTIONSVERFAHREN Laborverfahren und technische Verfahren Gliederung chemischer Produktionsverfahren Darstellung

chemischer Verfahren und Anlagen durch Fließschemata KATALYSE ALS
SCHLUSSSELTECHNOLOGIE DER CHEMISCHEN INDUSTRIE Was ist Katalyse? Arten von
Katalysatoren Besondere Anwendungsformen in homogener und heterogener Katalyse
TEIL II: Chemische Reaktionstechnik GRUNDLAGEN DER CHEMISCHEN
REAKTIONSTECHNIK Grundbegriffe und Grundphänomene Chemische Thermodynamik
Stoff- und Wärmetransportvorgänge KINETIK CHEMISCHER REAKTIONEN Mikrokinetik
chemischer Reaktionen Ermittlung der Kinetik chemischer Reaktionen Makrokinetik
chemischer Reaktionen - Zusammenwirken von chemischer Reaktion und
Transportvorgängen CHEMISCHE REAKTOREN UND DEREN REAKTIONSTECHNISCHE
MODELLIERUNG Allgemeine Stoff- und Energiebilanzen Absatzweise betriebene
Ruhrkesselreaktoren Halbkontinuierlich betriebene Ruhrkesselreaktoren Kontinuierlich
betriebener idealer Ruhrkesselreaktor Ideale Strömungsrohrreaktoren Kombination idealer
Reaktoren Reale homogene und quasihomogene Reaktoren Reale Mehrphasenreaktoren
AUSWAHL UND AUSLEGUNG CHEMISCHER REAKTOREN Reaktorauswahl und
reaktionstechnische Optimierung Thermische Prozesssicherheit Mikrostrukturierte
Reaktoren TEIL III: Grundoperationen THERMODYNAMISCHE GRUNDLAGEN FÜR DIE
BERECHNUNG VON PHASENGLEICHGEWICHTEN Phasengleichgewichtsbeziehung Dampf-
Flüssig-Gleichgewicht Vorausberechnung von Phasengleichgewichten
Konzentrationsabhängigkeit des Trennfaktors binärer Systeme Flüssig-Flüssig-
Gleichgewicht Gaslöslichkeit Fest-Flüssig-Gleichgewicht Phasengleichgewicht für die
überkritische Extraktion Adsorptionsgleichgewichte Osmotischer Druck AUSLEGUNG
THERMISCHER TRENNVERFAHREN Konzept der idealen Trennstufe Realisierung mehrerer
Trennstufen Kontinuierliche Rektifikation Trennung azeotroper und eng siedender
Systeme Reaktive Rektifikation Zahl der Kolonnen und mögliche Trennsequenzen
Diskontinuierliche Rektifikation Auslegung von Rektifikationskolonnen Absorption Flüssig-
Flüssig-Extraktion Fest-Flüssig-Extraktion Extraktion mit überkritischen Fluiden
Kristallisation Adsorption Entfernung der Restfeuchten, Entwassern und Trocknen
Membrantrennverfahren MECHANISCHE GRUNDOPERATIONEN Strömungslehre -
Fluidodynamik in Reaktoren, Kolonnen und Rohrleitungen Erzeugen von Förderströmen -
Pumpen, Komprimieren, Evakuieren Mischen fluider Phasen Mechanische Trennverfahren
Verarbeiten von Feststoffen TEIL IV: Verfahrensentwicklung GESICHTSPUNKTE DER
VERFAHRENSAUSWAHL Das Konzept der Nachhaltigkeit Stoffliche Gesichtspunkte
(Rohstoffauswahl und Syntheseroute) Energieaufwand Sicherheit Umweltschutz im Sinne
der Nachhaltigkeit Betriebsweise VERFAHRENSGRUNDLAGEN Ausgangssituation und
Ablauf Verfahrensinformationen Stoff- und Energiebilanzen Versuchsanlagen Auswertung
und Optimierung WIRTSCHAFTLICHKEIT VON VERFAHREN UND
PRODUKTIONSANLAGEN Erlöse, Kosten und Gewinn Herstellkosten Kapazitätsauslastung
und Wirtschaftlichkeit Wirtschaftlichkeit von Projekten PLANUNG UND BAU VON
ANLAGEN Projektablauf Projektorganisation Genehmigungsverfahren für Chemieanlagen
Anlagenplanung Projektentwicklung TEIL V: Chemische Prozesse ORGANISCHE
ROHSTOFFE Erdöl Erdgas Kohle Nachwachsende Rohstoffe ORGANISCHE
GRUNDCHEMIKALIEN Alkane Alkene Aromaten Acetylen Synthesegas ORGANISCHE

ZWISCHENPRODUKTE Sauerstoffhaltige Verbindungen Stickstoffhaltige Verbindungen
Halogenhaltige Verbindungen ANORGANISCHE GRUND- UND MASSENPRODUKTE A

The only textbook that applies thermodynamics to real-world process engineering problems This must-read for advanced students and professionals alike is the first book to demonstrate how chemical thermodynamics work in the real world by applying them to actual engineering examples. It also discusses the advantages and disadvantages of the particular models and procedures, and explains the most important models that are applied in process industry. All the topics are illustrated with examples that are closely related to practical process simulation problems. At the end of each chapter, additional calculation examples are given to enable readers to extend their comprehension. Chemical Thermodynamics for Process Simulation instructs on the behavior of fluids for pure fluids, describing the main types of equations of state and their abilities. It discusses the various quantities of interest in process simulation, their correlation, and prediction in detail. Chapters look at the important terms for the description of the thermodynamics of mixtures; the most important models and routes for phase equilibrium calculation; models which are applicable to a wide variety of non-electrolyte systems; membrane processes; polymer thermodynamics; enthalpy of reaction; chemical equilibria, and more. -Explains thermodynamic fundamentals used in process simulation with solved examples -Includes new chapters about modern measurement techniques, retrograde condensation, and simultaneous description of chemical equilibrium -Comprises numerous solved examples, which simplify the understanding of the often complex calculation procedures, and discusses advantages and disadvantages of models and procedures -Includes estimation methods for thermophysical properties and phase equilibria thermodynamics of alternative separation processes -Supplemented with MathCAD-sheets and DDBST programs for readers to reproduce the examples Chemical Thermodynamics for Process Simulation is an ideal resource for those working in the fields of process development, process synthesis, or process optimization, and an excellent book for students in the engineering sciences.

This book presents a theoretical analysis of the modern methods used for modeling various chemical engineering processes. Currently, the two primary problems in the chemical industry are the optimal design of new devices and the optimal control of active processes. Both of these problems are often solved by developing new methods of modeling. These methods for modeling specific processes may be different, but in all cases, they bring the mathematical description closer to the real processes by using appropriate experimental data. In this book, the authors detail a new approach for the modeling of chemical processes in column apparatuses. Further, they describe the types of neural networks that have been shown to be effective in solving important chemical engineering problems. Readers are also presented with mathematical models of integrated bioethanol supply chains (IBSC) that achieve improved economic and environmental sustainability. The integration of energy and mass processes is one of the most powerful

tools for creating sustainable and energy efficient production systems. This book defines the main approaches for the thermal integration of periodic processes, direct and indirect, and the recent integration of small-scale solar thermal dryers with phase change materials as energy accumulators. An exciting overview of new approaches for the modeling of chemical engineering processes, this book serves as a guide for the important innovations being made in theoretical chemical engineering.

This textbook provides a comprehensive introduction to chemical process engineering, linking the fundamental theory and concepts to the industrial day-to-day practice. It bridges the gap between chemical sciences and the practical chemical industry. It enables the reader to integrate fundamental knowledge of the basic disciplines, to understand the most important chemical processes, and to apply this knowledge to the practice in the industry.

Dieses Werk ist ein bewährter Lehrbuch-Klassiker im Bereich der Technischen Chemie. Als vollständige Einführung in das Fachgebiet der Chemischen Reaktionstechnik unterstützt es in idealer Weise sowohl das akademische Studium als auch die industrielle Praxis. Das vorliegende Lehrbuch ist für Ingenieure wie für Chemiker gleichermaßen geeignet. Seit vielen Jahren wird das Lehrbuch vom Unterrichtsausschuss für Technische Chemie der DECHEMA empfohlen. Mit der Neuauflage erfolgte eine vollständige Überarbeitung und Ergänzung. Die Gliederung und Struktur des Lehrbuchs wurde stringenter gestaltet und eine Vielzahl neuer Beispiele ergänzt.

Separation Process Principles with Applications Using Process Simulator, 4th Edition is the most comprehensive and up-to-date treatment of the major separation operations in the chemical industry. The 4th edition focuses on using process simulators to design separation processes and prepares readers for professional practice. Completely rewritten to enhance clarity, this fourth edition provides engineers with a strong understanding of the field. With the help of an additional co-author, the text presents new information on bioseparations throughout the chapters. A new chapter on mechanical separations covers settling, filtration and centrifugation including mechanical separations in biotechnology and cell lysis. Boxes help highlight fundamental equations. Numerous new examples and exercises are integrated throughout as well.

Chemical Thermodynamics for Industry presents the latest developments in applied thermodynamics and highlights the role of thermodynamics in the chemical industry. Written by leading experts in the field, Chemical Thermodynamics for Industry covers the latest developments in traditional areas such as calorimetry, microcalorimetry, transport properties, crystallization, adsorption, electrolyte systems and transport fuels, It highlights newly established areas such as multiphase modeling, reactive distillation, non-equilibrium thermodynamics and spectro-calorimetry. It also explores new ways of treating old technologies as well as new and potentially important areas such as ionic liquids, new

materials, ab-initia quantum chemistry, nano-particles, polymer recycling, clathrates and the economic value of applied thermodynamics. This book is aimed not only at those working in a specific area of chemical thermodynamics but also at the general chemist, the prospective researcher and those involved in funding chemical research.

This book provides a comprehensive introduction to chemical process engineering, linking the fundamental theory and concepts to the industrial practice. This 2nd Edition contains new chapters on biological wastewater treatment, dynamic simulation, and PID discussion. It enables the reader to integrate fundamental knowledge of the basic disciplines, to understand key chemical processes, and to apply this knowledge to the practice in industry.

Die Berechnung und Auslegung von Kolonnen zum Destillieren, Absorbieren und Strippen wird mit vielen Beispielen und Fließbildern aus der Praxis sehr anschaulich dargestellt. Es wird gezeigt, wie man die Zahl der benötigten theoretischen Trennstufen ermittelt und wie man diese Anforderungen in die Praxis umsetzt. Auch die Berechnung von Gleichgewichten, Siede- und Taupunkten sowie Fläschentrennungen für ideale und nicht ideale Stoffgemische wird mit vielen Beispielen erläutert. Dieses Handbuch für die tägliche Praxis im Anlagenbau ist auch hervorragend geeignet als Anleitung für Bachelor- und Masterstudenten.

Most problems encountered in chemical engineering are sophisticated and interdisciplinary. Thus, it is important for today's engineering students, researchers, and professionals to be proficient in the use of software tools for problem solving. MATLAB® is one such tool that is distinguished by the ability to perform calculations in vector-matrix form, a large library of built-in functions, strong structural language, and a rich set of graphical visualization tools. Furthermore, MATLAB integrates computations, visualization and programming in an intuitive, user-friendly environment. Chemical Engineering Computation with MATLAB® presents basic to advanced levels of problem-solving techniques using MATLAB as the computation environment. The book provides examples and problems extracted from core chemical engineering subject areas and presents a basic instruction in the use of MATLAB for problem solving. It provides many examples and exercises and extensive problem-solving instruction and solutions for various problems. Solutions are developed using fundamental principles to construct mathematical models and an equation-oriented approach is used to generate numerical results. A wealth of examples demonstrate the implementation of various problem-solving approaches and methodologies for problem formulation, problem solving, analysis, and presentation, as well as visualization and documentation of results. This book also provides aid with advanced problems that are often encountered in graduate research and industrial operations, such as nonlinear regression, parameter estimation in differential systems, two-point boundary value problems and partial differential equations and optimization.

Der VDI-Wärmeatlas ist nach wie vor ein unentbehrliches Arbeitsmittel für jeden Praktiker, der sich mit Fragen zur Wärme- und Stoffübertragung beschäftigt. Für die tägliche Arbeit mit Tabellen und Stoffwerten ist das Ringbuch mit dem Vorteil des Herausnehmens der Blätter und deren beliebiger Neuordnung eine bequeme Variante. Das Werk ermöglicht sowohl die technisch als auch wirtschaftlich optimale Auslegung verfahrenstechnischer Apparate und Anlagen. Für diese 10. Auflage wurden alle Beiträge einem umfassenden fachlichen Prüfverfahren unterzogen, das dem Nutzer ein Höchstmaß an Sicherheit bietet, dass die Daten, Berechnungsverfahren und Aussagen dem neuesten Stand des Wissens entsprechen. Um Redundanzen zu minimieren, wurde zum Teil neu strukturiert. Zahlreiche Aktualisierungen und Ergänzungen wurden aufgenommen, einige Beiträge sind völlig neu (v.a. in den Teilen D: Stoffwerte und Zustandsgrößen und L: Druckverlust).

As the chemical process industry is among the most energy demanding sectors, chemical engineers are endeavoring to contribute towards sustainable future. Due to the limitation of fossil fuels, the need for energy independence, as well as the environmental problem of the greenhouse gas effect, there is a large increasing interest in the research and development of chemical processes that require less capital investment and reduced operating costs and lead to high eco-efficiency. The use of heat pumps is a hot topic due to many advantages, such as low energy requirements as well as an increasing number of industrial applications. Therefore, in the current book, authors are focusing on use of heat pumps in the chemical industry, providing an overview of heat pump technology as applied in the chemical process industry, covering both theoretical and practical aspects: working principle, applied thermodynamics, theoretical background, numerical examples and case studies, as well as practical applications. The worked-out examples have been included to instruct students, engineers and process designers about how to design various heat pumps used in the industry. Reader friendly resources namely relevant equations, diagrams, figures and references that reflect the current and upcoming heat pump technologies, will be of great help to all readers from the chemical and petrochemical industry, biorefineries and other related areas.

Distillation Principles and Practice Second Edition covers all the main aspects of distillation including the thermodynamics of vapor/liquid equilibrium, the principles of distillation, the synthesis of distillation processes, the design of the equipment, and the control of process operation. Most textbooks deal in detail with the principles and laws of distilling binary mixtures. When it comes to multi-component mixtures, they refer to computer software nowadays available. One of the special features of the second edition is a clear and easy understandable presentation of the principles and laws of ternary distillation. The right understanding of ternary distillation is the link to a better

understanding of multi-component distillation. Ternary distillation is the basis for a conceptual process design, for separating azeotropic mixtures by using an entrainer, and for reactive distillation, which is a rapidly developing field of distillation. Another special feature of the book is the design of distillation equipment, i.e. tray columns and packed columns. In practice, empirical know-how is preferably used in many companies, often in form of empirical equations, which are not even dimensionally correct. The objective of the proposed book is the derivation of the relevant equations for column design based on first principles. The field of column design is permanently developing with respect to the type of equipment used and the know-how of two-phase flow and interfacial mass transfer.

Fluid Phase Behavior for Conventional and Unconventional Oil and Gas Reservoirs delivers information on the role of PVT (pressure-volume-temperature) tests/data in various aspects, in particular reserve estimation, reservoir modeling, flow assurance, and enhanced oil recovery for both conventional and unconventional reservoirs. This must-have reference also prepares engineers on the importance of PVT tests, how to evaluate the data, develop an effective management plan for flow assurance, and gain perspective of flow characterization, with a particular focus on shale oil, shale gas, gas hydrates, and tight oil making. This book is a critical resource for today's reservoir engineer, helping them effectively manage and maximize a company's oil and gas reservoir assets. Provides tactics on reservoir phase behavior and dynamics with new information on shale oil and gas hydrates Helps readers Improve on the effect of salt concentration and application to CO₂-Acid Gas Disposal with content on water-hydrocarbon systems Provides practical experience with PVT and tuning of EOS with additional online excel spreadsheet examples

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