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INDUSTRIAL CHEMICAL PROCESS ANALYSIS AND DESIGN

Elsevier Industrial Chemical Process Analysis and Design uses chemical engineering principles to explain the transformation of basic raw materials into major chemical products. The book discusses traditional processes to create products like nitric acid, sulphuric acid, ammonia, and methanol, as well as more novel products like bioethanol and biodiesel. Historical perspectives show how current chemical processes have developed over years or even decades to improve their yields, from the discovery of the chemical reaction or physico-chemical principle to the industrial process needed to yield commercial quantities. Starting with an introduction to process design, optimization, and safety, Martin then provides stand-alone chapters—in a case study fashion—for commercially important chemical production processes. Computational software tools like MATLAB®, Excel, and Chemcad are used throughout to aid process analysis. Integrates principles of chemical engineering, unit operations, and chemical reactor engineering to understand process synthesis and analysis Combines traditional computation and modern software tools to compare different solutions for the same problem Includes historical perspectives and traces the improving efficiencies of commercially important chemical production processes Features worked examples and end-of-chapter problems with solutions to show the application of concepts discussed in the text

STOICHIOMETRY AND PROCESS CALCULATIONS

PHI Learning Pvt. Ltd. Designed as a textbook for the undergraduate students of

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

PRINCIPLES OF ORGANIC CHEMISTRY

Academic Press Class-tested and thoughtfully designed for student engagement, Principles of Organic Chemistry provides the tools and foundations needed by students in a short course or one-semester class on the subject. This book does not dilute the material or rely on rote memorization. Rather, it focuses on the underlying principles in order to make accessible the science that underpins so much of our day-to-day lives, as well as present further study and practice in medical and scientific fields. This book provides context and structure for learning the fundamental principles of organic chemistry, enabling the reader to proceed from simple to complex examples in a systematic and logical way. Utilizing clear and consistently colored figures, Principles of Organic Chemistry begins by exploring the step-by-step processes (or mechanisms) by which reactions occur to create molecular structures. It then describes some of the many ways these reactions make new compounds, examined by functional groups and corresponding common reaction mechanisms. Throughout, this book includes biochemical and pharmaceutical examples with varying degrees of difficulty, with worked answers and without, as well as advanced topics in later chapters for optional coverage. Incorporates valuable and engaging applications of the content to biological and

industrial uses Includes a wealth of useful figures and problems to support reader comprehension and study Provides a high quality chapter on stereochemistry as well as advanced topics such as synthetic polymers and spectroscopy for class customization

POSTSTRUCTURALISM AT WORK WITH MARGINALISED CHILDREN

CHEMICAL FUNDAMENTALS OF GEOLOGY AND ENVIRONMENTAL GEOSCIENCE

John Wiley & Sons Chemical principles are fundamental to the Earth sciences, and geoscience students increasingly require a firm grasp of basic chemistry to succeed in their studies. The enlarged third edition of this highly regarded textbook introduces the student to such ‘geo-relevant’ chemistry, presented in the same lucid and accessible style as earlier editions, but the new edition has been strengthened in its coverage of environmental geoscience and incorporates a new chapter introducing isotope geochemistry. The book comprises three broad sections. The first (Chapters 1–4) deals with the basic physical chemistry of geological processes. The second (Chapters 5–8) introduces the wave-mechanical view of the atom and explains the various types of chemical bonding that give Earth materials their diverse and distinctive properties. The final chapters (9–11) survey the geologically relevant elements and isotopes, and explain their formation and their abundances in the cosmos and the Earth. The book concludes with an extensive glossary of terms; appendices cover basic maths, explain basic solution chemistry, and list the chemical elements and the symbols, units and constants used in the book.

IONS IN SOLUTION

BASIC PRINCIPLES OF CHEMICAL INTERACTIONS

Ellis Horwood This outline of the principles and chemical interactions in inorganic solution chemistry delivers a course module in an area of considerable complexity.

CHEMICAL ANALYSIS

MODERN INSTRUMENTATION METHODS AND TECHNIQUES

John Wiley & Sons The new edition of the popular introductory analytical chemistry textbook, providing students with a solid foundation in all the major instrumental analysis techniques currently in use The third edition of Chemical Analysis: Modern Instrumentation Methods and Techniques provides an up-to-date overview of the common methods used for qualitative, quantitative, and structural chemical analysis. Assuming no background knowledge in the subject, this student-friendly textbook covers the fundamental principles and practical aspects of more than 20 separation and spectroscopic methods, as well as other important techniques such as elemental analysis, electrochemistry and isotopic labelling methods. Avoiding technical complexity and theoretical depth, clear and accessible chapters explain the basic concepts of each method and its corresponding instrumental techniques—supported by explanatory diagrams, illustrations, and photographs of

commercial instruments. The new edition includes revised coverage of recent developments in supercritical fluid chromatography, capillary electrophoresis, miniaturized sensors, automatic analyzers, digitization and computing power, and more. Offering a well-balanced introduction to a wide range of analytical and instrumentation techniques, this textbook: Provides a detailed overview of analysis methods used in the chemical and agri-food industries, medical analysis laboratories, and environmental sciences Covers various separation methods including chromatography, electrophoresis and electrochromatography Describes UV and infrared spectroscopy, fluorimetry and chemiluminescence, x-ray fluorescence, nuclear magnetic resonance and other common spectrometric methods such atomic or flame emission, atomic absorption and mass spectrometry Includes concise overview chapters on the general aspects of chromatography, sample preparation strategies, and basic statistical parameters Features examples, end-of-chapter problems with solutions, and a companion website featuring PowerPoint slides for instructors Chemical Analysis: Modern Instrumentation Methods and Techniques, Third Edition, is the perfect textbook for undergraduates taking introductory courses in instrumental analytical chemistry, students in chemistry, pharmacy, biochemistry, and environmental science programs looking for information on the techniques and instruments available, and industry technicians working with problems of chemical analysis. Review of Second Edition: “An essential introduction to a wide range of analytical and instrumentation techniques that have been developed and improved in recent years.” --International Journal of Environmental and Analytical Chemistry

PRINCIPLES AND PROBLEMS IN PHYSICAL CHEMISTRY FOR BIOCHEMISTS

Oxford University Press on Demand What use is physical chemistry to the student of biochemistry and biology? This central question is answered in this book mainly through the use of worked examples and problems. The book starts by introducing the laws of thermodynamics, and then uses these laws to derive the equations relevant to the student in dealing with chemical equilibria (including the binding of small molecules to proteins), properties of solutions, acids and bases, and oxidation-reduction processes. The student is thus shown how a knowledge of thermodynamic qualities makes it possible to predict whether, and how, a reaction will proceed. Thermodynamics, however, gives no information about how fast a reaction will happen. The study of the rates at which processes occur (kinetics) forms the second main theme of the book. This section poses and answers questions such as `how is the rate of a reaction affected by temperature, pH, ionic strength, and the nature of the reactants? These same ideas are then shown to be useful in the study of enzyme-catalysed reactions.

ANALYSIS, SYNTHESIS AND DESIGN OF CHEMICAL PROCESSES

ANALY SYNTH DESIG CHEMI PR_4

Prentice Hall The leading integrated chemical process design guide: Now with extensive new coverage and more process designs More than ever, effective design

is the focal point of sound chemical engineering. Analysis, Synthesis, and Design of Chemical Processes, Fourth Edition, presents design as a creative process that integrates both the big picture and the small details–and knows which to stress when, and why. Realistic from start to finish, this updated edition moves readers beyond classroom exercises into open-ended, real-world process problem solving. The authors introduce integrated techniques for every facet of the discipline, from finance to operations, new plant design to existing process optimization. This fourth edition adds new chapters introducing dynamic process simulation; advanced concepts in steady-state simulation; extensive coverage of thermodynamics packages for modeling processes containing electrolyte solutions and solids; and a concise introduction to logic control. “What You Have Learned” summaries have been added to each chapter, and the text’s organization has been refined for greater clarity. Coverage Includes Conceptualization and analysis: flow diagrams, batch processing, tracing, process conditions, and product design strategies Economic analysis: capital and manufacturing costs, financial calculations, and profitability analysis Synthesis and optimization: principles, PFD synthesis, simulation techniques, top-down and bottom-up optimization, pinch technology, and software-based control Advanced steady-state simulation: goals, models, solution strategies, and sensitivity and optimization studies Dynamic simulation: goals, development, solution methods, algorithms, and solvers Performance analysis: I/O models, tools, performance curves, reactor performance, troubleshooting, and “debottlenecking” Societal impact: ethics, professionalism, health, safety, environmental issues, and green engineering Interpersonal and communication skills: improving teamwork and group effectiveness This title draws on more than fifty years of innovative chemical engineering instruction at West Virginia University and the University of Nevada, Reno. It includes suggested curricula for single-semester and year-long design courses, case studies and practical design projects, current equipment cost data, and extensive preliminary design information that can be used as the starting point for more detailed analyses. About the CD-Rom and Web Site The CD contains the newest version of CAPCOST, a powerful tool for evaluating fixed capital investment, full process economics, and profitability. The heat exchanger network software, HENSAD, is also included. The CD also contains an additional appendix presenting preliminary design information for fifteen key chemical processes, including four new to this edition: shift reaction; acid-gas removal via physical solvent; H2S removal from a gas stream using the Claus process; and coal gasification. The CD also includes six additional projects, plus chapters on outcomes assessment, written and oral communications, and a written report case study. Sixty additional projects and twenty-four more problems are available at www.che.cemr.wvu.edu/publications/projects.

WATER TREATMENT UNIT PROCESSES

PHYSICAL AND CHEMICAL

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.

ION-EXCHANGE MEMBRANE SEPARATION PROCESSES

Elsevier Today, membranes and membrane processes are used as efficient tools for the separation of liquid mixtures or gases in the chemical and biomedical industry, in water desalination and wastewater purification. Despite the fact that various membrane processes, like reverse osmosis, are described in great detail in a number of books, processes involving ion-exchange membranes are only described in a fragmented way in scientific journals and patents; even though large industrial applications, like electrodialysis, have been around for over half a century. Therefore, this book is emphasizing on the most relevant aspects of ion-exchange membranes. This book provides a comprehensive overview of ion-exchange membrane separation processes covering the fundamentals as well as recent developments of the different products and processes and their applications. The audience for this book is heterogeneous, as it includes plant managers and process engineers as well as research scientists and graduate students. The separate chapters are based on different topics. The first chapter describes the relevant

Electromembrane processes in a general overview. The second chapter explains thermodynamic and physicochemical fundamentals. The third chapter gives information about ion-exchange membrane preparation techniques, while the fourth and fifth chapter discusses the processes as unit operations giving examples for the design of specific plants. First work on the principles and applications of electrodialysis and related separation processes Presently no other comprehensive work that can serve as both reference work and text book is available Book is suited for teaching students and as source for detailed information

CHEMICAL ENGINEERING DESIGN

PRINCIPLES, PRACTICE AND ECONOMICS OF PLANT AND PROCESS DESIGN

Elsevier Chemical Engineering Design, Second Edition, deals with the application of chemical engineering principles to the design of chemical processes and equipment. Revised throughout, this edition has been specifically developed for the U.S. market. It provides the latest US codes and standards, including API, ASME and ISA design codes and ANSI standards. It contains new discussions of conceptual plant design, flowsheet development, and revamp design; extended coverage of capital cost estimation, process costing, and economics; and new chapters on equipment selection, reactor design, and solids handling processes. 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, including 1170 lecture slides and a fully worked solutions manual are available to adopting instructors. This text is designed for chemical and biochemical engineering students (senior undergraduate year, plus appropriate for capstone design courses where taken, plus graduates) and lecturers/tutors, and professionals in industry (chemical process, biochemical, pharmaceutical, petrochemical sectors). New to this edition: Revised organization into Part I: Process Design, and Part II: Plant Design. The broad themes of Part I are flowsheet development, economic analysis, safety and environmental impact and optimization. Part II contains chapters on equipment design and selection that can be used as supplements to a lecture course or as essential references for students or practicing engineers working on design projects. New discussion of conceptual plant design, flowsheet development and revamp design Significantly increased coverage of capital cost estimation, process costing and economics New chapters on equipment selection, reactor design and solids handling processes New sections on fermentation, adsorption, membrane separations, ion exchange and chromatography Increased coverage of batch processing, food, pharmaceutical and biological processes All equipment chapters in Part II revised and updated with current information Updated throughout for latest US codes and standards, including API, ASME and ISA design codes and ANSI standards Additional worked examples and homework problems The most complete and up to date coverage of equipment selection 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: 1170 lecture slides plus fully worked solutions manual available to adopting instructors

INTRODUCTION TO DESALINATION

PRINCIPLES, PROCESSES, AND CALCULATIONS

John Wiley & Sons INTRODUCTION TO DESALINATION Explore the principles, methods, and applications of modern desalination processes Introduction to Desalination: Principles, Processes, and Calculations delivers a comprehensive and robust exploration of desalination highlighted with numerous illustrative examples and calculations. The book is divided into three sections, the first of which offers an introduction to the topic that includes chapters covering global water scarcity and the need for “new water.” The second section discusses the desalination process, including evaporation, reverse osmosis, crystallization, hybrid systems, and other potable water processes. The final part covers topics that include water conservation, environmental considerations of desalination, economic impacts of desalination, optimization, ethics, and the future of desalination. The book also includes: A comprehensive introduction to desalination, including discussions of engineering principles, the physical, chemical, and biological properties of water, and water chemistry An extensive engineering analysis of the various desalination processes Practical discussions of miscellaneous desalination topics, including the environmental and economic effects of the technology Perfect for process, chemical, mechanical, environmental, and civil engineers, Introduction to Desalination: Principles, Processes, and Calculations is also a valuable resource for materials scientists, operators, and technicians working in the field.

SOIL CHEMISTRY

Wiley-Interscience Chemical principles; Weathering and soil development; The solid phase; Soil organic matter; Cation retention; Anion and molecular retention; Acid soils; Salt-affected soils; Oxidation and reduction; Important ions.

BIOCHEMICAL ENGINEERING

A TEXTBOOK FOR ENGINEERS, CHEMISTS AND BIOLOGISTS

John Wiley & Sons Completely revised, updated, and enlarged, this second edition now contains a subchapter on biorecognition assays, plus a chapter on bioprocess control added by the new co-author Jun-ichi Horiuchi, who is one of the leading experts in the field. The central theme of the textbook remains the application of chemical engineering principles to biological processes in general, demonstrating how a chemical engineer would address and solve problems. To create a logical and clear structure, the book is divided into three parts. The first deals with the basic concepts and principles of chemical engineering and can be read by those students with no prior knowledge of chemical engineering. The second part focuses on process aspects, such as heat and mass transfer, bioreactors, and separation methods. Finally, the third section describes practical aspects, including medical

device production, downstream operations, and fermenter engineering. More than 40 exemplary solved exercises facilitate understanding of the complex engineering background, while self-study is supported by the inclusion of over 80 exercises at the end of each chapter, which are supplemented by the corresponding solutions. An excellent, comprehensive introduction to the principles of biochemical engineering.

CHEMICAL REACTION KINETICS

CONCEPTS, METHODS AND CASE STUDIES

John Wiley & Sons A practical approach to chemical reaction kinetics—from basic concepts to laboratory methods—featuring numerous real-world examples and case studies This book focuses on fundamental aspects of reaction kinetics with an emphasis on mathematical methods for analyzing experimental data and interpreting results. It describes basic concepts of reaction kinetics, parameters for measuring the progress of chemical reactions, variables that affect reaction rates, and ideal reactor performance. Mathematical methods for determining reaction kinetic parameters are described in detail with the help of real-world examples and fully-worked step-by-step solutions. Both analytical and numerical solutions are exemplified. The book begins with an introduction to the basic concepts of stoichiometry, thermodynamics, and chemical kinetics. This is followed by chapters featuring in-depth discussions of reaction kinetics; methods for studying irreversible reactions with one, two and three components; reversible reactions; and complex reactions. In the concluding chapters the author addresses reaction mechanisms, enzymatic reactions, data reconciliation, parameters, and examples of industrial reaction kinetics. Throughout the book industrial case studies are presented with step-by-step solutions, and further problems are provided at the end of each chapter. Takes a practical approach to chemical reaction kinetics basic concepts and methods Features numerous illustrative case studies based on the author’s extensive experience in the industry Provides essential information for chemical and process engineers, catalysis researchers, and professionals involved in developing kinetic models Functions as a student textbook on the basic principles of chemical kinetics for homogeneous catalysis Describes mathematical methods to determine reaction kinetic parameters with the help of industrial case studies, examples, and step-by-step solutions Chemical Reaction Kinetics is a valuable working resource for academic researchers, scientists, engineers, and catalyst manufacturers interested in kinetic modeling, parameter estimation, catalyst evaluation, process development, reactor modeling, and process simulation. It is also an ideal textbook for undergraduate and graduate-level courses in chemical kinetics, homogeneous catalysis, chemical reaction engineering, and petrochemical engineering, biotechnology.

PRINCIPLES OF MASS TRANSFER

THE DESIGN OF SEPARATION PROCESSES FOR CHEMICAL AND BIOCHEMICAL ENGINEERING

Wiley This textbook teaches the subject of mass transfer fundamentals and their

applications to the design of separation processes. The level of presentation of the concepts is easy to follow by the reader, but with enough depth of coverage to guarantee that students using the book will, at the end of the course, be able to specify preliminary designs of the most common separation process equipment. Reflecting the growth of biochemical applications in the field of chemical engineering, the fourth edition expands biochemical coverage, including transient diffusion, environmental applications, electrophoresis, and bioseparations. Also new to the fourth edition is the integration of Python programs, a rapidly developing programming environment which is freely available and easily adapted to the very demanding computational needs of separation processes design. These Python programs complement the Mathcad programs of the previous edition. On the accompanying instructor's website, the online appendices contain a downloadable library of Python and Mathcad programs for the example problems in each chapter. A complete solution manual for all end-of-chapter problems, both in Mathcad and Python, is also provided.

PRINCIPLES OF PHYSICAL CHEMISTRY

John Wiley & Sons Principles of Physical Chemistry, Second Edition uniquely uses simple physical models as well as rigorous treatments for understanding molecular and supramolecular systems and processes. In this way the presentation assists students in developing an intuitive understanding of the subjects as well as skill in quantitative manipulations. The unifying nature of physical chemistry is emphasized in the book by its organization - beginning with atoms and molecules, and proceeding to molecular assemblies of increasing complexity, ending with the emergence of matter that carries information, i.e. the origin of life, a physicochemical process of unique importance. The aim is to show the broad scope and coherence of physical chemistry.

INTRODUCTION TO CATALYSIS AND INDUSTRIAL CATALYTIC PROCESSES

John Wiley & Sons Introduces major catalytic processes including products from the petroleum, chemical, environmental and alternative energy industries Provides an easy to read description of the fundamentals of catalysis and some of the major catalytic industrial processes used today Offers a rationale for process designs based on kinetics and thermodynamics Alternative energy topics include the hydrogen economy, fuels cells, bio catalytic (enzymes) production of ethanol fuel from corn and biodiesel from vegetable oils Problem sets of included with answers available to faculty who use the book Review: "In less than 300 pages, it serves as an excellent introduction to these subjects whether for advanced students or those seeking to learn more about these subjects on their own time...Particularly useful are the succinct summaries throughout the book...excellent detail in the table of contents, a detailed index, key references at the end of each chapter, and challenging classroom questions..." (GlobalCatalysis.com, May 2016)

OSWAAL NCERT EXEMPLAR PROBLEM-SOLUTIONS, CLASS 12 (3 BOOK SETS) PHYSICS, CHEMISTRY, BIOLOGY (FOR EXAM 2022)

Oswaal Books and Learning Private Limited Chapter wise & Topic wise presentation for ease of learning Quick Review for in depth study Mind maps for clarity of concepts All MCQs with explanation against the correct option Some important questions developed by 'Oswaal Panel' of experts Previous Year's Questions Fully Solved Complete Latest NCERT Textbook & Intext Questions Fully Solved Quick Response (QR Codes) for Quick Revision on your Mobile Phones / Tablets Expert Advice how to score more suggestion and ideas shared

PHARMACEUTICAL SCIENTIST GUIDE TO SOLUTION KINETIC MODELS MATHEMATICAL DESCRIPTION AND APPLICATIONS

Annotation "Thermodynamics and kinetics (i.e., chemical interactions) are extremely important concepts for pharmaceutical scientists to understand since the "drug selection process", that is, the process used by pharmaceutical companies to discover and develop marketable drugs, is totally dependent upon these theories. While both theories are important, kinetic models describing complex chemical and biological processes provide a unifying theory for all phases of the discovery and development of drugs. Unfortunately, in most textbooks the mathematical descriptions necessary to develop a deeper understanding of kinetic models are omitted. This is primarily done such that the underlying chemistry and biochemistry principles are not obscured by the "mathematical maze" that is generated from these models. As a result many chemists and biologists veer rapidly away from thermodynamics and kinetics. For some scientists, this can lead to confusion on how to apply these models to real-life situations. For example, many enzyme kinetic models are formulated as rate equations. Since experimentally measurements typically determine concentrations and rarely determines rates directly, confusion arises on how to apply kinetic models. In this case, either the model is integrated to give a description of the concentration course of the enzyme reaction or the data is differentiated (i.e., the process of determining rates) by measuring tangents to the reaction curves at zero time. The level of mathematical skills required to solve kinetic models is minimal for anyone who has studied college level algebra and calculus. Thus, the objective of this book is to present a brief review of thermodynamics and kinetics followed by a detailed step-by-step approach in developing and solving kinetic models for complex chemical and biological processes. The book focuses on building a solid mathematical foundation of enzyme kinetic models by systematically evolving simple uni- and bi-molecular models to enzyme models. Applications for some of these kinetic models are generated from pharmaceutical examples and a selection of problems is presented at the end of each chapter. This elementary approach has been intentionally selected to keep the book at a self-explanatory level. It is anticipated that the reader will be able to follow the mathematical operations and in the process develop a deeper understanding of kinetic models and an improved ability to interpret kinetic parameters. The book is restricted to solution chemical kinetics and does not deal with the theories of chemical reactions, gas-phase reactions, experimental kinetic methods and so on.

There are many excellent chemical kinetic textbooks available for those interested in these topics. The solution chemical kinetics materials for the book were obtained from literature papers and several books on physical chemistry and enzyme kinetics. The ideas from these sources have been hopefully reinterpreted in a style that is well matched to those pharmaceutical scientists that do not have a comprehensive knowledge of kinetic models and the mathematical skills to solve them. Chapter 1 presents a general overview to thermodynamic and kinetic principals and theory. In Section i, an overview to the scope of the book is presented. A brief review of mathematical fundamentals used in the book (Section ii) and kinetic and thermodynamic principals are present (Section iii and iv). A glossary of symbols and abbreviation used throughout the book is presented in Section v. Chapter 2 describes the basic theory of first-order kinetic models. These types of mathematical models are used for irreversible (Section I) and reversible (Section II) rearrangement reactions and some examples are presented to illustrate their applications to drug discovery. Chapter 3 describes second-order irreversible (Section III) and reversible (Section IV) dimerization reactions while Chapter 4 describes second-order irreversible (Section V) and reversible.

CHEMICAL ENGINEERING VOLUME 2

Elsevier Chemical Engineering Volume 2 covers the properties of particulate systems, including the character of individual particles and their behaviour in fluids. Sedimentation of particles, both singly and at high concentrations, flow in packed and fluidised beads and filtration are then examined. The latter part of the book deals with separation processes, such as distillation and gas absorption, which illustrate applications of the fundamental principles of mass transfer introduced in Chemical Engineering Volume 1. In conclusion, several techniques of growing importance - adsorption, ion exchange, chromatographic and membrane separations, and process intensification - are described. A logical progression of chemical engineering concepts, volume 2 builds on fundamental principles contained in Chemical Engineering volume 1 and these volumes are fully cross-referenced Reflects the growth in complexity and stature of chemical engineering over the last few years Supported with further reading at the end of each chapter and graded problems at the end of the book

CHEMICAL THERMODYNAMICS: ADVANCED APPLICATIONS

ADVANCED APPLICATIONS

Elsevier This book is an excellent companion to Chemical Thermodynamics: Principles and Applications. Together they make a complete reference set for the practicing scientist. This volume extends the range of topics and applications to ones that are not usually covered in a beginning thermodynamics text. In a sense, the book covers a "middle ground" between the basic principles developed in a beginning thermodynamics textbook, and the very specialized applications that are a part of an ongoing research project. As such, it could prove invaluable to the practicing scientist who needs to apply thermodynamic relationships to aid in the

understanding of the chemical process under consideration. The writing style in this volume remains informal, but more technical than in Principles and Applications. It starts with Chapter 11, which summarizes the thermodynamic relationships developed in this earlier volume. For those who want or need more detail, references are given to the sections in Principles and Applications where one could go to learn more about the development, limitations, and conditions where these equations apply. This is the only place where Advanced Applications ties back to the previous volume. Chapter 11 can serve as a review of the fundamental thermodynamic equations that are necessary for the more sophisticated applications described in the remainder of this book. This may be all that is necessary for the practicing scientist who has been away from the field for some time and needs some review. The remainder of this book applies thermodynamics to the description of a variety of problems. The topics covered are those that are probably of the most fundamental and broadest interest. Throughout the book, examples of "real" systems are used as much as possible. This is in contrast to many books where "generic" examples are used almost exclusively. A complete set of references to all sources of data and to supplementary reading sources is included. Problems are given at the end of each chapter. This makes the book ideally suited for use as a textbook in an advanced topics course in chemical thermodynamics. An excellent review of thermodynamic principles and mathematical relationships along with references to the relevant sections in Principles and Applications where these equations are developed Applications of thermodynamics in a wide variety of chemical processes, including phase equilibria, chemical equilibrium, properties of mixtures, and surface chemistry Case-study approach to demonstrate the application of thermodynamics to biochemical, geochemical, and industrial processes Applications at the "cutting edge" of thermodynamics Examples and problems to assist in learning Includes a complete set of references to all literature sources

DELIVERY AND MIXING IN THE SUBSURFACE

PROCESSES AND DESIGN PRINCIPLES FOR IN SITU REMEDIATION

Springer Science & Business Media This volume is meant to provide the practitioner with information on the natural mixing processes occurring in aquifers as well as to describe basic strategies that can be implemented to enhance mixing in particular cases. For example, when it comes to mixing miscible liquids, one can speed up mixing in the formation by manipulating the flow such as through the use of recirculation wells. Furthermore, much of the mixing can be achieved partially within recirculation wells themselves, where contaminated water is admixed with additives, volatile products may be removed through a vapor mass exchanger, etc. Thus, adding mixing wells can significantly increase the performance of the delivery and mixing system and speed up the process of remediation.

FUNDAMENTALS OF WATER TREATMENT UNIT PROCESSES

PHYSICAL, CHEMICAL, AND BIOLOGICAL

CRC Press Carefully designed to balance coverage of theoretical and practical

principles, Fundamentals of Water Treatment Unit Processes delineates the principles that support practice, using the unit processes approach as the organizing concept. The author covers principles common to any kind of water treatment, for example, drinking water, municipal wastewater, industrial water treatment, industrial waste water treatment, and hazardous wastes. Since technologies change but principles remain constant, the book identifies strands of theory rather than discusses the latest technologies, giving students a clear understanding of basic principles they can take forward in their studies. Reviewing the historical development of the field and highlighting key concepts for each unit process, each chapter follows a general format that consists of process description, history, theory, practice, problems, references, and a glossary. This organizational style facilitates finding sections of immediate interest without having to page through an excessive amount of material. Pedagogical Features End-of-chapter glossaries provide a ready reference and add terms pertinent to topic but beyond the scope of the chapter Sidebars sprinkled throughout the chapters present the lore and history of a topic, enlarging students' perspective Example problems emphasize tradeoffs and scenarios rather than single answers and involve spreadsheets Reference material includes several appendices and a quick-reference spreadsheet Solutions manual includes spreadsheets for problems Supporting material is available for download Understanding how the field arrived at its present state of the art places the technology in a more logical context and gives students a strong foundation in basic principles. This book does more than build technical proficiency, it adds insight and understanding to the broader aspects of water treatment unit processes.

CHEMICAL PRINCIPLES

Cengage Learning This fully updated Seventh Edition of CHEMICAL PRINCIPLES provides a unique organization and a rigorous but understandable introduction to chemistry that emphasizes conceptual understanding and the importance of models. Known for helping students develop a qualitative, conceptual foundation that gets them thinking like chemists, this market-leading text is designed for students with solid mathematical preparation. The Seventh Edition features a new section on Learning to Solve Problems that discusses how to solve problems in a flexible, creative way based on understanding the fundamental ideas of chemistry and asking and answering key questions. The book is also enhanced by new visual problems, new student learning aids, new Chemical Insights boxes, and more. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

CHEMICAL PRINCIPLES

Houghton Mifflin College Division Designed for students with solid mathematical preparation and prior exposure to chemistry, this market-leading text emphasizes a qualitative understanding of chemical concepts. The unique organization of the text supports this approach: early chapters cover equilibria and acid-base chemistry, while later chapters address atomic theory and bonding. The comprehensive technology program reinforces the approach of text and provides superior support

for instructors and students. Students benefit from resources such as interactive online homework in Eduspace, called ChemWork. Throughout the text, examples with worked-out solutions follow a thoughtful, step-by-step approach to problem solving that emphasizes answer verification. Models and applications help students see the real-world implications of chemical processes. The Media Integration Guide for Instructors includes several user-friendly supplements designed to help instructors make class preparation, presentation, and course management more efficient and effective: HM ClassPrep/HM Testing CD-ROM with images, customizable test bank, and instructor\'s guide; HM ClassPresent CD-ROM with animations organized by topic; instructor web site access; and information about Eduspace (powered by Blackboard). Media Guide for Students includes information and access to multimedia tools that help students build their conceptual understanding of chemical principles: SMARTHINKING live online tutoring, student web site with animations, and Student CD-ROM. The guide also includes information about Eduspace (powered by Blackboard). Eduspace is Houghton Mifflin\'s online learning tool. Powered by Blackboard, Eduspace is a customizable, powerful and interactive platform that provides instructors with text-specific online courses and content. This Zumdahl Chemical Principles course features test bank material for exams, algorithmic homework with hints and access to ACE quiz content for independent practice. For the instructor, we also provide presentation slides, photos, illustrations, interactive tables and video clips.

STUDY GUIDE FOR CHEMICAL PRINCIPLES, FOURTH EDITION, BY DICKERSON, GRAY, DARENSBOURG, AND DARENSBOURG

CONDUCT OF OPERATIONS AND OPERATIONAL DISCIPLINE

FOR IMPROVING PROCESS SAFETY IN INDUSTRY

John Wiley & Sons Process safety management (PSM) systems are only as effective as the day-to-day ability of the organization to rigorously execute system requirements correctly every time. The failure of just one person in completing a job task correctly just one time can unfortunately lead to serious injuries and potentially catastrophic incidents. In fact, the design, implementation, and daily execution of PSM systems are all dependent on workers at all levels in the organization doing their job tasks correctly every time. High levels of Operational Discipline, therefore, help ensure strong PSM performance and overall operational excellence. This book details management practices which help ensure rigor in executing process safety programs in order to prevent major accidents.

EXPERIMENTAL METHODS AND INSTRUMENTATION FOR CHEMICAL ENGINEERS

Elsevier Experimental Methods and Instrumentation for Chemical Engineers, Second Edition, touches many aspects of engineering practice, research, and statistics. The principles of unit operations, transport phenomena, and plant design constitute the focus of chemical engineering in the latter years of the curricula. Experimental methods and instrumentation is the precursor to these subjects. This resource

integrates these concepts with statistics and uncertainty analysis to define what is necessary to measure and to control, how precisely and how often. The completely updated second edition is divided into several themes related to data: metrology, notions of statistics, and design of experiments. The book then covers basic principles of sensing devices, with a brand new chapter covering force and mass, followed by pressure, temperature, flow rate, and physico-chemical properties. It continues with chapters that describe how to measure gas and liquid concentrations, how to characterize solids, and finally a new chapter on spectroscopic techniques such as UV/Vis, IR, XRD, XPS, NMR, and XAS. Throughout the book, the author integrates the concepts of uncertainty, along with a historical context and practical examples. A problem solutions manual is available from the author upon request. Includes the basics for 1st and 2nd year chemical engineers, providing a foundation for unit operations and transport phenomena Features many practical examples Offers exercises for students at the end of each chapter Includes up-to-date detailed drawings and photos of equipment

THE GREENHOUSE GAS PROTOCOL

A CORPORATE ACCOUNTING AND REPORTING STANDARD

World Resources Inst The GHG Protocol Corporate Accounting and Reporting Standard helps companies and other organizations to identify, calculate, and report GHG emissions. It is designed to set the standard for accurate, complete, consistent, relevant and transparent accounting and reporting of GHG emissions.

ADSORPTION, ION EXCHANGE AND CATALYSIS

DESIGN OF OPERATIONS AND ENVIRONMENTAL APPLICATIONS

Elsevier Adsorption, Ion Exchange and Catalysis is essentially a mixture of environmental science and chemical reactor engineering. More specifically, three important heterogeneous processes, namely, adsorption, ion exchange and catalysis, are analysed, from fundamental kinetics to reactor design with emphasis on their environmental applications. In Chapter 1, the subject of air and water pollution is dealt with. Data about pollutants and emission sources are given and the treatment methods are shortly presented. In Chapter 2, the very basics and historical development of adsorption, ion exchange and catalysis are presented as well as their environmental applications. Chapter 3 is devoted to heterogeneous processes and reactor analysis. All types of reactors are described in depth and reactor modelling, hydraulics and mass/heat transfer phenomena are examined for each type of reactor. Chapters 4 and 5 are dedicated to adsorption & ion exchange and catalysis, respectively. The basic principles are presented including kinetics, equilibrium, mass/heat transfer phenomena as well as the analytical solutions of the reactor models presented in Chapter 3. In the sixth chapter, the subject of scale up is approached. The two Annexes at the end of the book contain physical properties of substances of environmental interest as well as unit conversion tables. Finally, nearly all the examples contained are based on real experimental data found in literature with environmental interest. Most of the examples consider all aspects of

operation design – kinetics, hydraulics and mass transfer. * Provides basic knowledge of major environmental problems and connects them to chemical engineering

SOL-GEL SCIENCE

THE PHYSICS AND CHEMISTRY OF SOL-GEL PROCESSING

Academic Press Sol-Gel Science: The Physics and Chemistry of Sol-Gel Processing presents the physical and chemical principles of the sol-gel process. The book emphasizes the science behind sol-gel processing with a chapter devoted to applications. The first chapter introduces basic terminology, provides a brief historical sketch, and identifies some excellent texts for background reading. Chapters 2 and 3 discuss the mechanisms of hydrolysis and condensation for nonsilicate and silicate systems. Chapter 4 deals with stabilization and gelation of sols. Chapter 5 reviews theories of gelation and examines the predicted and observed changes in the properties of a sol in the vicinity of the gel point. Chapter 6 describes the changes in structure and properties that occur during aging of a gel in its pore liquor (or some other liquid). The discussion of drying is divided into two parts, with the theory concentrated in Chapter 7 and the phenomenology in Chapter 8. The structure of dried gels is explored in Chapter 9. Chapter 10 shows the possibility of using the gel as a substrate for chemical reactions or of modifying the bulk composition of the resulting ceramic by performing a surface reaction (such as nitridation) on the gel. Chapter 11 reviews the theory and practice of sintering, describing the mechanisms that govern densification of amorphous and crystalline materials, and showing the advantages of avoiding crystallization before sintering is complete. The properties of gel-derived and conventional ceramics are discussed in Chapter 12. The preparation of films is such an important aspect of sol-gel technology that the fundamentals of film formation are treated at length in Chapter 13. Films and other applications are briefly reviewed in Chapter 14. Materials scientists and researchers in the field of sol-gel processing will find the book invaluable.

METHODS ON PHYSICO CHEMICAL ANALYSIS OF FRUITS

Daya Books Analysis of human consumable fruits become necessary to the students and researchers of fruit science, horticulture, food technology, plant biochemistry, botany, applied botany, forestry, ayurved, pharmaceutics and some other disciplines. Necessity of such analysis is also felt in fruit preservation factories or training centres and to the agricultural marketing personnels in making grading of fruits. It needs pointing out in this context that to assess the quality and nutritive status or compositional features of a fruit, not only the chemical constituents but many physical components of it also become necessary to be determined. There are in fact, a number of books available which have presented the analytical procedure of plant materials and some of these have considered fruit analysis also as a part. These titles have though presented much details and put up several procedure for a component, methodology to assess physical components of fruits has hardly

received adequate attention. Therefore, a practical manual on fruit analysis that would exclusively deal on procedural detail of both physical and chemical components of fruits cannot be set at defiance, especially as a number of characteristic features, specific to any species or variety of a fruit sometimes need to be critically considered in a fruit analytical procedure. Keeping the above facts in view, the present title has been attempted. Many of the physical methods of analysis have in fact, been devised by the principal author in his teaching and research career over three decades. The title has before entering into chemical analytical part discussed some fundamental aspects of such analysis and the procedure appeared to be much convenient in estimating a component chemically has been presented. Contents Preface, General Precautions to Work in the Laboratory & Field, Chapter 1 Collection of Fruit Samples; Selection of Fruits, Methods of Plucking, Sorting, Surface Cleaning, Bringing to Analytical Laboratory, Chapter 2: Making Representative Sample of Intact Fruits, Chapter 3: Determination of Constituents by Physical Methods; Weight, Volume, Specific Gravity, Overall Length, Maximum Width, Shape, Firmness, Peel Colour, Peel Smoothness, Peel Wax, Peel Thickness, Peel Oil-gland, Colour of Edible Parts, Pulp Firmness, Central Cavity, Edible Matter Content, Juice Content, Flavour, Seed Content, Acceptance to Consumers, Chapter 4: Making Representative Sample of Fruit Tissue for Chemical Analysis; Chapter 5: Preparatory Aspects for Chemical Analysis; Solution, Indicator, Buffer Solution, Drying of Analytical Sample, Ashing of Analytical Sample, Removal of Pigments, Chapter 6: Determination of Chemical Constituents; Carbohydrate, Reducing Sugar, Total Sugar, Non-reducing Sugar, Starch, Total Pectic Substances, Crude Fibre, Total Soluble Solids (with a refractometer), Total Titratable Acidity, Vitamin C, Total Free-Amino Acids, Separation and Detection of Free-Amino Acds (by thin layer chromatography), Protein, Lipid (Ether-extractive), Phenolic Compounds, Tannin, Nitrogen (Micro-Kjeldahl Method), Phosphorus, Potassium, Calcium, Iron, Chlorophyll, Total Anthocyanin, Ethylene Evolution, Carbon Dioxide Evolution, Chapter 7: Determination of Activity of Enzymes; Assay of Enzyme Activity, a-Amylase, b-Amylase, Pectin Methyl Esterase, Polygalacturonase, Cellulase, Invertase, b-Galactosidase, Protease, Lipase, Ascorbic Acid Oxidase, Polyphenol Oxidase, Peroxidase, Appendices: Appendix I: Botanical Names of Fruits Referred to in the Text, Appendix II: Conversion Factors, Appendix III: Proximate Principles of Some Fruits, Bibliography, Subject Index.

LECTURES IN METEOROLOGY

Springer Lectures in Meteorology is a comprehensive reference book for meteorologists and environmental scientists to look up material on the thermodynamics, dynamics and chemistry of the troposphere. The lectures demonstrate how to derive/develop equations – an essential tool for model development. All chapters present applications of the material including numerical models. The lectures are written in modular form, i.e. they can be used at the undergraduate level for classes covered by the chapters or at the graduate level as a comprehensive, intensive course. The student/instructor can address chapters 2 (thermodynamics) and 4 (radiation) in any order. They can also switch the order of

chapter 5 (chemistry) and 6 (dynamics). Chapter 7 (climatology and climate) requires an understanding of all chapters. Chapter 3 (cloud physics) needs basics from chapter 2 to understand the cloud microphysical processes. The governing conservation equations for trace constituents, dry air, water substances, total mass, energy, entropy and momentum are presented, including simplifications and their application in models. A brief introduction to atmospheric boundary layer processes is presented as well. Basic principles of climatology discussed include analysis methods, atmospheric waves and their analytical solutions, tropical and extra-tropical cyclones, classical and non-classical mesoscale circulations, and the global circulation. The atmospheric chemistry section encompasses photolytic and gas-phase processes, aqueous chemistry, aerosol processes, fundamentals of biogeochemical cycles and the ozone layer. Solar and terrestrial radiation; major absorber; radiation balance; radiative equilibrium; radiative-convective equilibrium; and basics of molecular, aerosol and cloud adsorption and scattering and their use in remote sensing are also presented.

ENVIRONMENTAL CHEMISTRY

CHEMICAL PRINCIPLES FOR ENVIRONMENTAL PROCESSES

Prentice Hall Precipitation and stabilization. Ion exchange. Coagulation. Oxidation and reduction. Corrosion. Aeration and stripping.

NUCLEAR SCIENCE ABSTRACTS

KENT AND RIEGEL'S HANDBOOK OF INDUSTRIAL CHEMISTRY AND BIOTECHNOLOGY

Springer Science & Business Media This substantially revised and updated classic reference offers a valuable overview and myriad details on current chemical processes, products, and practices. No other source offers as much data on the chemistry, engineering, economics, and infrastructure of the industry. The two volume Handbook serves a spectrum of individuals, from those who are directly involved in the chemical industry to others in related industries and activities. Industrial processes and products can be much enhanced through observing the tenets and applying the methodologies found in the book’s new chapters.

GUIDELINES FOR INTEGRATING PROCESS SAFETY MANAGEMENT, ENVIRONMENT, SAFETY, HEALTH, AND QUALITY

Wiley-AIChE Over the years, companies have developed independent systems for managing process safety, environment, health, safety, and quality. Many aspects of these management systems are similar. Integrating EHS management systems can yield economies and improved system effectiveness. This book explains how integration reduces cost of delivery through a reduction in the number of management program steps and avoidance of redundancy; how it results in more effective programs, since the best practices can be combined into a single process; and how this integration brings a faster, and more cost effective response to new

demands.

TRANSITION METAL NITRIDES AND THEIR SOLID SOLUTIONS

A FIRST-PRINCIPLES APPROACH WITH CLUSTER EXPANSION COMPUTATIONAL PREDICTIVE MODELS

This dissertation is a computational exploration of transition metal nitrides, a group of materials that have myriad applications in the hard coatings industry. We aim to explore their structural, mechanical, electronic and thermodynamic properties and their solid solutions, discovering trends and correlations of their bonding nature and cause of superior stability and hardness. Here are the major work and results: 1. We performed first-principles calculations with density functional theory on six cubic structural prototypes, zincblende, rocksalt, cesium-chloride, NbO, fluorite and pyrite. We observed a few compounds with Vickers hardness higher than 20 GPa, such as rocksalt-structure ScN, TiN, cesium-chloride-structure VN, NbOstructure CrN, MoN, WN, and pyrite-structure MnN2, PtN2 (Chapter 4, Chapter 5 and Chapter 6). 2. We established an anti-correlation between metallic compounds' total electronic density of states at the Fermi energy level, an indicator of metallicity and their shear-related mechanical properties, such as elastic constant C44, shear modulus, Pugh's ratio and Vickers hardness (Chapter 4, Chapter 5 and Chapter 6). 3. Beyond single-cation phases, we further studied the phase equilibria of three ceramic quasibinary systems, Ti1-xZrxN, Ti1-xHfxN and Zr1-xHfxN. We analyzed the asymmetry of composition-dependent formation energy curves through two energetically partially canceling processes. We concluded that the absence of experimental observations of phase separation, as predicted by our calculations in Ti1-xZrxN and Ti1-xHfxN is probably due to a combined effect of insufficient under cooling, inadequate atomic diffusivity, and the initial energy barrier for chemical exchange with constrained lattices (Chapter 8). 4. We also showed that mixing nitrides of same group transition metals does not lead to hardness increase from an electronic origin, but through solution hardening mechanism, a plastic phenomenon difficult to catch with first-principles modeling methods (Chapter 8). As demonstrated in this dissertation, the toolset surrounding density functional theory has evolved to a level of maturity, capable of handling more dimensions in the material property space. They are rapidly being developed and perfected, and great research opportunities are emerging.