

## Steam Jet Ejector Performance Using Experimental Tests And

Steam Jet Ejectors for the Process Industries McGraw-Hill Companies

Understanding Process Equipment for Operators and Engineers explains how process equipment functions. As problems often arise in plants that must be solved by unit engineers, this book offers successful solutions and methods for their implementation. The concepts explained are based on Norm Lieberman's personal, hands-on experience. Like you, Norm attended a university and was exposed to technical seminars which did not always provide the needed solutions. In this text, you will learn the functioning of a variety of equipment types, including Fired Heater Draft, Centrifugal Pump Head, Distillation Tray Efficiency, Vacuum Jets, Recip Compressors, Steam Turbines, Thermosyphon Circulation Reboilers and Air Cooler. Includes methods and procedures on how to make field measurements Outlines fire heater principles and operation and how they develop draft Describes distillation column operation and methods to increase their efficiency Includes computer modeling and provides use case examples Energy-its discovery, its availability, its use-concerns all of us in general and the engineers of today and tomorrow in particular. The study of thermodynamics-the science of energy-is a critical element in the education of all types of engineers. Engineering Thermodynamics provides a thorough introduction to the art and science of engineering thermodynamics. It describes in a straightforward fashion the basic tools necessary to obtain quantitative solutions to common engineering applications involving energy and its conversion, conservation, and transfer. This book is directed toward sophomore, junior, and senior students who have studied elementary physics and calculus and who are majoring in mechanical engineering; it serves as a convenient reference for other engineering disciplines as well. The first part of the book is devoted to basic thermodynamic principles, essentially presented in the classic way; the second part applies these principles to many situations, including air conditioning and the interpretation of statistical phenomena.

Frozen foods make up one of the biggest sectors in the food industry. Their popularity with consumers is due primarily to the variety they offer and their ability to retain a high standard of quality. Thorough and authoritative, the Handbook of Frozen Food Processing and Packaging provides the latest information on the art and science of cor

It Is Well Known That The Applications Of Unit Operations Like Heat Transfer, Evaporation, Extraction, Mixing, Filtration And A Host Of Others Are Quite Common In The Pharmaceutical Industry, Be It In The Production Of Synthetic Drugs, Biological And Microbiological Products Or In The Manufacture Of Pharmaceutical Formulations. As Such Anyone Who Is To Look After These Manufacturing Operations Must Be Quite Knowledgeable With The Theoretical And Equipment Aspects Involved In The Relevant Unit Operations. Since A Major Involvement Of The Pharmacy Graduates Lies In The Numerous Manufacturing Operations Mentioned Above, It Is Very Much Necessary That The Subject Is Taught With A Pharmacy Orientation. There Is No Book So Far Which Has Achieved This. The Existing Books On Unit Operations Give Extensive Theory And Also Deal With A Lot Of Equipment Not Employed In The Pharmaceutical Industry. Due To A Lack Of A Pharmacy-Oriented Book In This Area, The Students And The Teachers Are Facing Difficulties In Many Ways. The Present Book Is The First One Of Its Kind On Pharmaceutical Engineering. The Special Features Of This Book Are As Follows: It Includes Theoretical And Equipment Aspects Relevant To The pharmaceutical Industry And That Too To The Extent Needed For Pharmacy Graduates And Examples From Pharmaceutical Industry Are Quoted Extensively; Solutions To A Number Of Simpler Numerical Problems Are Given. At The End Of Each Chapter, A Large Number Of Questions, Both Theoretical And Numerical, Are Given. There Is Therefore No Doubt That The Book Will Be Of Great Use Not Only To The Students But Also To The Teachers In The Subject In India And Abroad As Well.

This volume is based on the proceedings of the 28th International Conference on CAD/CAM, Robotics and Factories of the Future. This book specially focuses on the positive changes made in the field of robotics, CAD/CAM and future outlook for emerging manufacturing units. Some of the important topics discussed in the conference are product development and sustainability, modeling and simulation, automation, robotics and handling systems, supply chain management and logistics, advanced manufacturing processes, human aspects in engineering activities, emerging scenarios in engineering education and training. The contents of this set of proceedings will prove useful to both researchers and practitioners.

Water (R718) Turbo Compressor and Ejector Refrigeration/Heat Pump Technology provides the latest information on efficiency improvements, a main topic in recent investigations of thermal energy machines, plants, and systems that include turbo compressors, ejectors, and refrigeration/heat pump systems. This, when coupled with environmental concerns, has led to the application of eco-friendly refrigerants and to a renewed interest in natural refrigerants. Within this context, readers will find valuable information that explores refrigeration and heat pump systems using natural refrigerants, polygeneration systems, the energy efficiency of thermal systems, the utilization of low temperature waste heat, and cleaner production. The book also examines the technical, economic, and environmental reasons of R718 refrigeration/heat pump systems and how they are competitive with traditional systems, serving as a valuable reference for engineers who work in the design and construction of thermal plants and systems, and those who wish to specialize in the use of R718 as a refrigerant in these systems. Describes existing novel R718 turbo compressor and ejector refrigeration/heat pump systems and technologies Provides procedures calculating and optimizing cycles, system components, and system structures Estimates the performance characteristics of the thermal systems Exposes the possibilities for wider applications of R718 systems in the field of refrigeration and heat pumps

Geothermal Power Generation: Developments and Innovation provides an update to the advanced energy technologies that are urgently required to meet the challenges of economic development, climate change mitigation, and energy security. As geothermal resources are considered renewable and can be used to generate baseload electricity while producing very low levels of greenhouse gas emissions, they can play a key role in future energy needs. This book, edited by a highly respected expert, provides a comprehensive overview of the major aspects of geothermal power production. The chapters, contributed by specialists in their respective areas, cover resource discovery, resource characterization, energy conversion systems, and design and economic considerations. The final section provides a range of fascinating case studies from across the world, ranging from Larderello to Indonesia. Users will find this to be an essential text for research and development professionals and engineers in the geothermal energy industry, as well as postgraduate researchers in academia who are working on geothermal energy. Provides readers with a comprehensive and systematic overview of geothermal power generation Presents an update to the advanced energy technologies that are urgently required to meet the challenges of economic development, climate change mitigation, and energy security Edited by a world authority in the field, with chapters contributed by experts in their particular areas Includes comprehensive case studies from across the world, ranging from Larderello to Indonesia

This broad-based book covers the three major areas of Chemical Engineering. Most of the books in the market involve one of the individual areas, namely, Fluid Mechanics, Heat Transfer or Mass Transfer, rather than all the three. This book presents this material in a single source. This avoids the user having to refer to a number of books to obtain information. Most published books covering all the three areas in a single source emphasize theory rather than practical issues. This book is written with emphasis on practice with brief theoretical concepts in the form of questions and answers, not adopting stereo-typed question-answer approach practiced in certain books in the market, bridging the two areas of theory and practice with respect to the core areas of chemical engineering. Most parts of the book are easily understandable by those who are not experts in the field. Fluid Mechanics chapters include basics on non-Newtonian systems which, for instance find importance in polymer and food processing, flow through

pipng, flow measurement, pumps, mixing technology and fluidization and two phase flow. For example it covers types of pumps and valves, membranes and areas of their use, different equipment commonly used in chemical industry and their merits and drawbacks. Heat Transfer chapters cover the basics involved in conduction, convection and radiation, with emphasis on insulation, heat exchangers, evaporators, condensers, reboilers and fired heaters. Design methods, performance, operational issues and maintenance problems are highlighted. Topics such as heat pipes, heat pumps, heat tracing, steam traps, refrigeration, cooling of electronic devices, NOx control find place in the book. Mass transfer chapters cover basics such as diffusion, theories, analogies, mass transfer coefficients and mass transfer with chemical reaction, equipment such as tray and packed columns, column internals including structural packings, design, operational and installation issues, drums and separators are discussed in good detail. Absorption, distillation, extraction and leaching with applications and design methods, including emerging practices involving Divided Wall and Petluk column arrangements, multicomponent separations, supercritical solvent extraction find place in the book.

The fourth edition of Ludwig's Applied Process Design for Chemical and Petrochemical Plants, Volume Three is a core reference for chemical, plant, and process engineers and provides an unrivalled reference on methods, process fundamentals, and supporting design data. New to this edition are expanded chapters on heat transfer plus additional chapters focused on the design of shell and tube heat exchangers, double pipe heat exchangers and air coolers. Heat tracer requirements for pipelines and heat loss from insulated pipelines are covered in this new edition, along with batch heating and cooling of process fluids, process integration, and industrial reactors. The book also looks at the troubleshooting of process equipment and corrosion and metallurgy. Assists engineers in rapidly analyzing problems and finding effective design methods and mechanical specifications Definitive guide to the selection and design of various equipment types, including heat exchanger sizing and compressor sizing, with established design codes Batch heating and cooling of process fluids supported by Excel programs

Diagnose and Troubleshoot Problems in Chemical Process Equipment with This Updated Classic! Chemical engineers and plant operators can rely on the Third Edition of A Working Guide to Process Equipment for the latest diagnostic tips, practical examples, and detailed illustrations for pinpointing trouble and correcting problems in chemical process equipment. This updated classic contains new chapters on Control Valves, Cooling Towers, Waste Heat Boilers, Catalytic Effects, Fundamental Concepts of Process Equipment, and Process Safety. Filled with worked-out calculations, the book examines everything from trays, reboilers, instruments, air coolers, and steam turbines...to fired heaters, refrigeration systems, centrifugal pumps, separators, and compressors. The authors simplify complex issues and explain the technical issues needed to solve all kinds of equipment problems. Comprehensive and clear, the Third Edition of A Working Guide to Process Equipment features: Guidance on diagnosing and troubleshooting process equipment problems Explanations of how theory applies to real-world equipment operations Many useful tips, examples, illustrations, and worked-out calculations New to this edition: Control Valves, Cooling Towers, Waste Heat Boilers, Catalytic Effects, and Process Safety Inside this Renowned Guide to Solving Process Equipment Problems • Trays • Tower Pressure • Distillation Towers • Reboilers • Instruments • Packed Towers • Steam and Condensate Systems • Bubble Point and Dew Point • Steam Strippers • Draw-Off Nozzle Hydraulics • Pumparounds and Tower Heat Flows • Condensers and Tower Pressure Control • Air Coolers • Deaerators and Steam Systems • Vacuum Systems • Steam Turbines • Surface Condensers • Shell-and-Tube Heat Exchangers • Fire Heaters • Refrigeration Systems • Centrifugal Pumps • Separators • Compressors • Safety • Corrosion • Fluid Flow • Computer Modeling and Control • Field Troubleshooting Process Problems

THE FIRST BOOK OF ITS KIND ON DISTILLATION TECHNOLOGY The last half-century of research on distillation has tremendously improved our understanding and design of industrial distillation equipment and systems. High-speed computers have taken over the design, control, and operation of towers. Invention and innovation in tower internals have greatly enhanced tower capacity and efficiency. With all these advances, one would expect the failure rate in distillation towers to be on the decline. In fact, the opposite is the case: the tower failure rate is on the rise and accelerating. Distillation Troubleshooting collects invaluable hands-on experiences acquired in dealing with distillation and absorption malfunctions, making them readily accessible for those engaged in solving today's problems and avoiding tomorrow's. The first book of its kind on the distillation industry, the practical lessons it offers are a must for those seeking the elusive path to trouble-free distillation. Distillation Troubleshooting covers over 1,200 case histories of problems, diagnoses, solutions, and key lessons. Coverage includes: \* Successful and unsuccessful struggles with plugging, fouling, and coking \* Histories and prevention of tray, packing, and internals damage \* Lessons taught by incidents and accidents during shutdowns, commissioning, and abnormal operation \* Troubleshooting distillation simulations to match the real world \* Making packing liquid distributors work \* Plant bottlenecks from intermediate draws, chimney trays, and feed points \* Histories of and key lessons from explosions and fires in distillation towers \* Prevention of flaws that impair reboiler and condenser performance \* Destabilization of tower control systems and how to correct it \* Discoveries from shutdown inspections \* Suppression of foam and accumulation incidents A unique resource for improving the foremost industrial separation process, Distillation Troubleshooting transforms decades of hands-on experiences into a handy reference for professionals and students involved in the operation, design, study, improvement, and management of large-scale distillation.

A comprehensive standard work and important resource for both students and professionals in research and industry who need detailed knowledge of the theory and applications. Many numerical examples and numerous illustrations visualize the theoretical issues, backed by many useful tables and charts, plus over 500 illustrations. The Handbook discusses the latest developments in vacuum measurement techniques and leak detection in vacuum systems, as well as the connection of vacuum systems to computerized control systems.

Ron DiPippo, Professor Emeritus at the University of Massachusetts Dartmouth, is a world-regarded geothermal expert. This single resource covers all aspects of the utilization of geothermal energy for power generation from fundamental scientific and engineering principles. The thermodynamic basis for the design of geothermal power plants is at the heart of the book and readers are clearly guided on the process of designing and analysing the key types of geothermal energy conversion systems. Its practical emphasis is enhanced by the use of case studies from real plants that increase the reader's understanding of geothermal energy conversion and provide a unique compilation of hard-to-obtain data and experience. An important new chapter covers Environmental Impact and Abatement Technologies, including gaseous and solid emissions; water, noise and thermal pollutions; land usage; disturbance of natural hydrothermal manifestations, habitats and vegetation; minimisation of CO2 emissions and environmental impact assessment. The book is illustrated with over 240 photographs and drawings. Nine chapters include practice problems, with solutions, which enable the book to be used as a course text. Also includes a definitive worldwide compilation of every geothermal power plant that has operated, unit by unit, plus a concise primer on the applicable thermodynamics. \* Engineering principles are at the heart of the book, with complete coverage of the thermodynamic basis for the design of geothermal power systems \* Practical applications are backed up by an extensive selection of case studies that show how geothermal energy conversion systems have been designed, applied and exploited in practice \* World renowned geothermal expert DiPippo has including a new chapter on Environmental Impact and Abatement Technology in this new edition A complete guide to getting the best from steam jet ejectors. Table of Contents--How to Use This Book; Introduction to Ejectors: What is an ejector? Steam Jet Air Ejector Performance: Basic Behavior of a Typical Ejector Stage; Stages; Engineering Calculations; Condensers; Condenser Drainlegs and Hotwells; Pressure Control; Freezing Effects Below 5 Torr; Installation;

Operation and Testing; Specifying and Buying Steam Jet Ejectors: Specifying and Buying Ejectors; Other Types of Ejectors: Special Applications: Specialized Ejectors; Utility Ejectors; Special Situations; Appendices; Glossary; Useful Tables; Example Calculations; Practice Problems; Basic Technical Data; Physical Properties of Common Gases and Liquids; Example Procurement Specs and Forms for Steam Jet Air Ejectors. Index. 90 illustrations.

Industrial desalination of sea and brackish water is becoming an essential part in providing sustainable sources of fresh water for a larger number of communities around the world.

Desalination is a main source of fresh water in the Gulf countries, a number of the Caribbean and Mediterranean Islands, and several municipalities in a large number of countries. As the industry expands there is a pressing need to have a clear and well-written textbook that focuses on desalination fundamentals and other industrial aspects. This book focuses on the processes widely used in industry, which include multistage flash desalination and reverse osmosis. Also, other desalination processes with attractive features and high potential are featured. It includes a large number of solved examples, which are explained in simple and careful matter that allow the reader to follow and understand the development. The data used in the development of the examples and case studies are extracted from existing desalination plants. This title also includes comparisons of model predictions against results reported in literature as well as available experimental and industrial data. Several industries include similar unit operation processes, i.e., evaporators, condensers, flashing units, membrane separation, and chemical treatment. Examples of such industries include wastewater treatment, food, petroleum, petrochemical, power generation, and pulp and paper. Process fundamentals and design procedures of such unit processes follow the same procedures given in this textbook.

Vacuum technology has enormous impact on human life in many aspects and fields, such as metallurgy, material development and production, food and electronic industry, microelectronics, device fabrication, physics, materials science, space science, engineering, chemistry, technology of low temperature, pharmaceutical industry, and biology. All decorative coatings used in jewelries and various daily products—including shiny decorative papers, the surface finish of watches, and light fixtures—are made using vacuum technological processes. Vacuum analytical techniques and vacuum technologies are pillars of the technological processes, material synthesis, deposition, and material analyses—all of which are used in the development of novel materials, increasing the value of industrial products, controlling the technological processes, and ensuring the high product quality. Based on physical models and calculated examples, the book provides a deeper look inside the vacuum physics and technology.

Encompassing both practical applications and recent research developments, this book takes the reader from fundamental physics, through cutting-edge new designs of ejectors for refrigeration. The authors' unique vision marries successful design, system optimization, and operation experience with insights on the application of cutting-edge Computational Fluid Dynamics (CFD) models. This robust treatment leads the way forward in developing improved ejector technologies. The book covers ejectors used for heat powered refrigeration and for expansion work recovery in compression refrigerators, with special emphasis on two-phase flows of "natural" fluids within the ejector, i.e. steam and carbon dioxide. It features worked examples, detailed research results, and analysis tools.

Consumer demand for a year-round supply of seasonal produce and ready-made meals remains the driving force behind innovation in frozen food technology. Now in its second edition, Handbook of Frozen Food Processing and Packaging explores the art and science of frozen foods and assembles essential data and references relied upon by scientists in univ

The main advantages of solar energy are inexhaustibility and wide accessibility, as well as the relative environmental friendliness of its transformation into other forms of energy. The widespread use of solar energy requires the creation of functionally complete systems which convert solar energy into an element of a given technological process. The collection "Engineering of Solar Energy Systems" consists of papers published by Trans Tech Publications Inc. from 2010 to 2014 inclusive and covers a wide range of advanced achievements in the field of creating and designing systems for technological use of solar energy. The compiled scientific papers are presented in eight chapters: Chapter 1: Solar Systems for Heating, Cooling and Ventilation Chapter 2: Solar Energy in Environmental Treatment and Water Desalination Chapter 3: Solar Hydrogen Production Chapter 4: Systems for Electricity Supply Based on Solar Energy Chapter 5: Design of Components and Equipment for Solar Systems Chapter 6: Mechatronics, Control and Automation in Solar Energetics Chapter 7: Integration of Solar Technologies in the Architecture of Buildings Chapter 8: Engineering Management in Solar Energetics, which cover many aspects of scientific and engineering activities.

This expanded edition introduces new design methods and is packed with examples, design charts, tables, and performance diagrams to add to the practical understanding of how selected equipment can be expected to perform in the process situation. A major addition is the comprehensive chapter on process safety design considerations, ranging from new devices and components to updated venting requirements for low-pressure storage tanks to the latest NFPA methods for sizing rupture disks and bursting panels, and more. \*Completely revised and updated throughout \*The definitive guide for process engineers and designers \*Covers a complete range of basic day-to-day operation topics

The book discusses instrumentation and control in modern fossil fuel power plants, with an emphasis on selecting the most appropriate systems subject to constraints engineers have for their projects. It provides all the plant process and design details, including specification sheets and standards currently followed in the plant. Among the unique features of the book are the inclusion of control loop strategies and BMS/FSSS step by step logic, coverage of analytical instruments and technologies for pollution and energy savings, and coverage of the trends toward field bus systems and integration of subsystems into one network with the help of embedded controllers and OPC interfaces. The book includes comprehensive listings of operating values and ranges of parameters for temperature, pressure, flow, level, etc of a typical 250/500 MW thermal power plant. Appropriate for project engineers as well as instrumentation/control engineers, the book also includes tables, charts, and figures from real-life projects around the world. Covers systems in use in a wide range of power plants: conventional thermal power plants, combined/cogen plants, supercritical plants, and once through boilers Presents practical design aspects and current trends in instrumentation Discusses why and how to change control strategies when systems are updated/changed Provides instrumentation selection techniques based on operating parameters.

Spec sheets are included for each type of instrument. Consistent with current professional practice in North America, Europe, and India

One-dimensional analysis was used to design a staged steam ejector system. The system gives experimental results that are within the predicted performance envelope. The differences between the experimental results and theoretical predictions are critically examined. It was concluded (1) that the design of spray condensers between the ejector stages has an important influence on the overall performance of the system, (2) that the best system performance was obtained when the ejectors were operated at equal primary flow rates, and (3) that the effect of the Mach number of the secondary flow in the region of the ejector steam jet can have a great influence on ejector performance.

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

The role that combustion plays in the world's energy systems will continue to evolve with the changes in technological demands. For example, the challenges that we face today are more focused on the conservation of energy and addressing environmental concerns, which together necessitate cleaner and more efficient combustion processes using a range of fuel sources. This book includes contributions to highlight the recent progress in theory and experiments, development, and demonstration of technologies and systems involving combustion processes, for the production, storage, use, and conservation of energy.

Energy is one of the most important topics of our time, and renewable energy has been a long and still-unfolding story that has taken decades to bring us to where we are today. Even after so much progress, engineers and scientists are always still developing new and innovative techniques, processes, equipment, and materials to further the science and fulfill the mission of generating cleaner, renewable energy for the world's consumption. This new groundbreaking series, Advances in Renewable Energy, covers these topics across the spectrum, including solar, wind, and other renewable energy sources. This first volume in the series focuses on solar energy, probably the fastest-growing and developing area of renewable energy. With new materials and processes constantly coming online, it is important for engineers and scientists to stay abreast of the state-of-the-art in the field, and this volume does just that. Covering not just the basics of the technology and technological advances, the contributors delve into the financial aspects of solar energy systems as well. They look at total costs, not just initial costs, but the costs of maintenance, as well. Covering nearly every aspect of solar energy systems and the latest advances in the field, this is a must-have volume for any engineer, scientist, student, or educator working in or studying solar energy.

An introduction to CFD fundamentals and using commercial CFD software to solve engineering problems, designed for the wide variety of engineering students new to CFD, and for practicing engineers learning CFD for the first time. Combining an appropriate level of mathematical background, worked examples, computer screen shots, and step by step processes, this book walks the reader through modeling and computing, as well as interpreting CFD results. The first book in the field aimed at CFD users rather than developers. New to this edition: A more comprehensive coverage of CFD techniques including discretisation via finite element and spectral element as well as finite difference and finite volume methods and multigrid method. Coverage of different approaches to CFD grid generation in order to closely match how CFD meshing is being used in industry. Additional coverage of high-pressure fluid dynamics and meshless approach to provide a broader overview of the application areas where CFD can be used. 20% new content

This book presents selected papers from the 11th International Symposium on Heating, Ventilation and Air Conditioning (ISHVAC 2019), with a focus on HVAC techniques for improving indoor environment quality and the energy efficiency of heating and cooling systems. Presenting inspiration for implementing more efficient and safer HVAC systems, the book is a valuable resource for academic researchers, engineers in industry, and government regulators.

Development of a new chemical plant or process from concept evaluation to profitable reality is often an enormously complex problem. Generally, a plant-design project moves to completion through a series of stages which may include inception, preliminary evaluation of economics and market, data development for a final design, final economic evaluation, detailed engineering design, procurement, erection, startup, and production. The general term plant design includes all of the engineering aspects involved in the development of either a new, modified, or expanded industrial plant. In this context, individuals involved in such work will be making economic evaluations of new processes, designing individual pieces of equipment for the proposed new ventures, or developing a plant layout for coordination of the overall operation. Because of the many design duties encountered, the engineer involved is many times referred to as a design engineer. If the latter specializes in the economic aspects of the design, the individual may be referred to as a cost engineer. On the other hand, if he or she emphasizes the actual design of the equipment and facilities necessary for carrying out the process, the individual may be referred to as a process design engineer. The material presented in this book is intended to aid the latter in developing rapid chemical designs without becoming unduly involved in the often complicated theoretical underpinnings of these useful notes, charts, tables, and equations.

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