

### Api Standard 520 Part

While there is no "perfect" solution or absolute zero risk, engineering design can significantly reduce risk potential in the CPI. In *Guidelines for Design Solutions to Process Equipment Failures*, industry experts offer their broad experience in identifying numerous solutions to the more common process equipment failures including inherent safer/passive, active, and procedural solutions, in decreasing order of robustness and reliability. The book challenges the engineer to identify opportunities for inherent and passive safety features early, and use a risk-based approach to process safety systems specification. The book is organized into three basic sections: 1) a technique for making risk-based design decisions; 2) potential failure scenarios for 10 major processing equipment categories; and 3) two worked examples showing how the techniques can be applied. The equipment categories covered are: vessels, reactors, mass transfer equipment, fluid transfer equipment, solids-fluid separators, solids handling and processing equipment, and piping and piping components. Special Details: Hardcover book plus 3.5" diskette for use in any word processing program with design solutions for use in PHAs.

This symposium focuses on making the best use of current safety knowledge and avoiding complacency in the chemical and process industries, applying knowledge to emerging industries, and ensuring lessons learned in the old industries are transferred to the new so that the same mistakes are not made again.

Annotation This practical guide fills a gap in the literature on pressure relief design, operation and maintenance, covering the applicability to and reliability of different pressure relief devices in individual situations.

Over the last three decades the process industries have grown very rapidly, with corresponding increases in the quantities of hazardous materials in process, storage or transport. Plants have become larger and are often situated in or close to densely populated areas. Increased hazard of loss of life or property is continually highlighted with incidents such as Flixborough, Bhopal, Chernobyl, Three Mile Island, the Phillips 66 incident, and Piper Alpha to name but a few. The field of Loss Prevention is, and continues to, be of supreme importance to countless companies, municipalities and governments around the world, because of the trend for processing plants to become larger and often be situated in or close to densely populated areas, thus increasing the hazard of loss of life or property. This book is a detailed guidebook to defending against these, and many other, hazards. It could without exaggeration be referred to as the "bible" for the process industries. This is THE standard reference work for chemical and process engineering safety professionals. For years, it has been the most complete collection of information on the theory, practice, design elements, equipment, regulations and laws covering the field of process safety. An entire library of alternative books (and cross-referencing systems) would be needed to replace or improve upon it, but everything of importance to safety professionals, engineers and managers can be found in this all-encompassing reference instead. Frank Lees' world renowned work has been fully revised and expanded by a team of leading chemical and process engineers working under the guidance of one of the world's chief experts in this field. Sam Mannan is professor of chemical engineering at Texas A&M University, and heads the Mary Kay O'Connor Process Safety Center at Texas A&M. He received his MS and

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Ph.D. in chemical engineering from the University of Oklahoma, and joined the chemical engineering department at Texas A&M University as a professor in 1997. He has over 20 years of experience as an engineer, working both in industry and academia. New detail is added to chapters on fire safety, engineering, explosion hazards, analysis and suppression, and new appendices feature more recent disasters. The many thousands of references have been updated along with standards and codes of practice issued by authorities in the US, UK/Europe and internationally. In addition to all this, more regulatory relevance and case studies have been included in this edition. Written in a clear and concise style, *Loss Prevention in the Process Industries* covers traditional areas of personal safety as well as the more technological aspects and thus provides balanced and in-depth coverage of the whole field of safety and loss prevention. - A must-have standard reference for chemical and process engineering safety professionals - The most complete collection of information on the theory, practice, design elements, equipment and laws that pertain to process safety - Only single work to provide everything; principles, practice, codes, standards, data and references needed by those practicing in the field

This book covers the fundamental requirements for air, soil and water pollution control in oil and gas refineries, chemical plants, oil terminals, petrochemical plants, and related facilities. In this concise volume, Dr. Bahadori elucidates design and operational considerations relevant to critical systems such as the waste water treatment units, solid waste disposal, and waste water sewer treatment as well as engineering/technological methods related to soil and air pollutions control. Engineers and technical managers in a range of industries will benefit from detail on a diverse list of topics.

This volume tackles for the first time in decades the world's gas flaring practices, a difficult, hot-button issue of our time, whose consequences are only just beginning to be understood. The book examines both the technical and environmental aspects of gas flaring, highlights different flare designs, and presents real-world case studies illustrating the proper use of gas flaring and how to avoid polluting flaring events. The only guide of its kind, this remarkable book can help professionals in the oil and gas industry take an important step toward reducing worldwide CO<sub>2</sub> emissions.

This definitive guide to valve selection is the result of the author's lifelong study of the design and application of valves. It covers the fundamentals of sealing mechanisms, as well as the sealability of fluids and flow through valves. You will find a complete analysis of valve designs for various industrial flow applications. This fourth edition is thoroughly updated, with revised and expanded chapters on pressure relief valves and rupture discs. This book takes into account U.S. practices and codes as well as emerging European standards. The book is an excellent reference text for practicing engineers and students. It is also of interest to valve manufacturers and authorities who evaluate and establish standards.

Well test planning is one of the most important phrases in the life cycle of a well, if done improperly it could cost millions. Now there is a reference to ensure you get it right the first time. Written by a Consultant Completions & Well Test Engineer with decades of experience, *Well Test Planning and Operations* provides a road map to guide the reader through the maze of governmental regulations, industry codes, local standards and practices. This book describes how to plan a fit-for-purpose and fault free well test,

and to produce the documents required for regulatory compliance. Given the level of activity in the oil and gas industry and the shortage of experienced personnel, this book will appeal to many specialists sitting in drilling, completion or exploration departments around the world who find themselves in the business of planning a well test, and yet who may lack expertise in that specialty. Nardone provides a roadmap to guide the planner through this complex subject, showing how to write the necessary documentation and to coordinate the many different tasks and activities, which constitute well test planning. Taking the reader from the basis for design through the well Test program to well test reports and finally to the all-important learning to ensure continuous improvement. Identification and prioritization of well test objectives Confirmation of well test requirements Preparation of detailed well test programs Selection and qualification of test equipment Onsite (onshore and offshore) engineering support and test supervision Detailed well test interpretation Definition of Extended Well Test (EWT) requirements

This book describes the current state of the art in cryogenic safety best practice, helping the reader to work with cryogenic systems and materials safely. It brings together information from previous texts, industrial and laboratory safety polices, and recent research papers. Case studies, example problems, and an extensive list of references are included to add to the utility of the text. It describes the unique safety hazards posed by cryogenics in all its guises, including issues associated with the extreme cold of cryogenics, the flammability of some cryogenic fluids, the displacement of oxygen by inert gases boiling off from cryogenic fluids, and the high pressures that can be formed during the volume expansion that occurs when a cryogenic fluid becomes a room temperature gas. A further chapter considers the challenges arising from the behavior of materials at cryogenic temperatures. Many materials are inappropriate for use in cryogenics and can fail, resulting in hazardous conditions. Despite these hazards, work at cryogenic temperatures can be performed safely. The book also discusses broader safety issues such as hazard analysis, establishment of a safe work culture and lessons learned from cryogenic safety in accelerator labs. This book is designed to be useful to everyone affected by cryogenic hazards regardless of their expertise in cryogenics.

Publisher's Note: Products purchased from Third Party sellers are not guaranteed by the publisher for quality, authenticity, or access to any online entitlements included with the product. Boilers, storage tanks, and water heaters require relief devices to prevent overpressure that may cause serious injuries to personnel. This book explains in simple language the codes that govern their maintenance and continued operations Within the boiler, piping and pressure vessel industry, pressure relief devices are considered one of the most important safety components. These Devices are literally the last line of defense against catastrophic failure or even lose of life. Written in plain language, this fifth book in the ASME Simplified series addresses the various codes and recommended standards of practice for the maintenance and continued operations of pressure relief valves as specified by the American Society of Mechanical Engineers and the American Petroleum Institute. Covered in this book are: preventive maintenance procedures, methods for evaluation of mechanical components and accepted methods for cleaning, adjusting and lubricating various components to assure continued operation and speed performance as well as procedures for recording and evaluating these items.

Part I: Process design -- Introduction to design -- Process flowsheet development -- Utilities and energy efficient design -- Process simulation -- Instrumentation and process control -- Materials of construction -- Capital cost estimating -- Estimating revenues and production costs -- Economic evaluation of projects -- Safety and loss prevention -- General site considerations -- Optimization in design -- Part II: Plant design -- Equipment selection, specification and

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design -- Design of pressure vessels -- Design of reactors and mixers -- Separation of fluids -- Separation columns (distillation, absorption and extraction) -- Specification and design of solids-handling equipment -- Heat transfer equipment -- Transport and storage of fluids.

Unsurpassed in its coverage, usability, and authority since its first publication in 1969, the three-volume Instrument Engineers' Handbook continues to be the premier reference for instrument engineers around the world. It helps users select and implement hundreds of measurement and control instruments and analytical devices and design the most cost-effective process control systems that optimize production and maximize safety. Now entering its fourth edition, Volume 1: Process Measurement and Analysis is fully updated with increased emphasis on installation and maintenance consideration. Its coverage is now fully globalized with product descriptions from manufacturers around the world. Béla G. Lipták speaks on Post-Oil Energy Technology on the AT&T Tech Channel.

Gives insight into eliminating specific classes of hazards, while providing real case histories with valuable messages. There are practical sections on mechanical integrity, management of change, and incident investigation programs, along with a long list of helpful resources. New chapter in this edition covers accidents involving compressors, hoses and pumps. Stay up to date on all the latest OSHA requirements, including the OSHA required Management of Change, Mechanical Integrity and Incident Investigation regulations Learn how to eliminate hazards in the design, operation and maintenance of chemical process plants and petroleum refineries World-renowned expert in process safety, Roy Sanders, shows you how to reduce risks in your plant Learn from the mistakes of others, so that your plant doesn't suffer the same fate Save lives, reduce loss, by following the principles outlined in this must-have text for process safety. There is no other book like it!

Hydraulic fracturing, commonly referred to as "fracking," is a technique used by the oil and gas industry to mine hydrocarbons trapped deep beneath the Earth's surface. The principles underlying the technology are not new. Fracking was first applied at the commercial level in the United States as early as 1947, and over the decades it has been applied in various countries including Canada, the UK, and Russia. The author worked with engineering teams as early as the mid-1970s in evaluating ways to improve oil recovery from this practice. By and large fracking was not an economically competitive process and had limited applications until the early 2000s. Several factors altered the importance of this technology, among them being significant technological innovations in drilling practices with impressive high tech tools for exploration, well construction and integrity, and recovery along with discoveries of massive natural gas reserves in the United States and other parts of the world. These factors have catapulted the application of the technology to what is best described as the gold rush of the 21st century, with exploration and natural gas plays proceeding at a pace that seemingly is unrivaled by any historical industrial endeavor. But this level of activity has invoked widespread criticism from concerned citizens and environmental groups in almost every nation across the Globe. This outstanding new volume offers the industry a handbook of environmental management practices that can mitigate risks to the environment and, through best practices and current technologies, to conform to the current standards and regulations that are in place to provide the world with the energy it needs while avoiding environmental damage. For the new hire, veteran engineer, and student alike, this is a one-of-a-kind volume, a must-have for anyone working in hydraulic fracturing.

The proposed book will be divided into three parts. The chapters in Part I provide an overview of certain aspect of process retrofitting. The focus of Part II is on computational techniques for solving process retrofit problems. Finally, Part III addresses retrofit applications from diverse process industries. Some chapters in the book are contributed by practitioners whereas others are from academia. Hence, the book includes both new developments from research and also practical considerations. Many chapters include examples with realistic data. All these feature

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make the book useful to industrial engineers, researchers and students.

Chemical Engineering Design is one of the best-known and most widely adopted texts available for students of chemical engineering. It completely covers the standard chemical engineering final year design course, and is widely used as a graduate text. The hallmarks of this renowned book have always been its scope, practical emphasis and closeness to the curriculum. That it is written by practicing chemical engineers makes it particularly popular with students who appreciate its relevance and clarity. Building on this position of strength the fifth edition covers the latest aspects of process design, operations, safety, loss prevention and equipment selection, and much more. Comprehensive in coverage, exhaustive in detail, and supported by extensive problem sets at the end of each chapter, this is a book that students will want to keep to hand as they enter their professional life. The leading chemical engineering design text with over 25 years of established market leadership to back it up; an essential resource for the compulsory design project all chemical engineering students take in their final year A complete and trusted teaching and learning package: the book offers a broader scope, better curriculum coverage, more extensive ancillaries and a more student-friendly approach, at a better price, than any of its competitors Endorsed by the Institution of Chemical Engineers, guaranteeing wide exposure to the academic and professional market in chemical and process engineering.

This book has been written to address many of the developments since the 1st Edition which have improved how companies survey and select new sites, evaluate acquisitions, or expand their existing facilities. This book updates the appendices containing both the recommended separation distances and the checklists to help the teams obtain the information they need when locating the facility within a community, when arranging the processes within the facility, and when arranging the equipment within the process units.

Software tools are a great aid to process engineers, but too much dependence on such tools can often lead to inappropriate and suboptimal designs. Reliance on software is also a hindrance without a firm understanding of the principles underlying its operation, since users are still responsible for devising the design.

In Process Engineering

Surface Production Operations: Facility Piping and Pipeline Systems, Volume III is a hands-on manual for applying mechanical and physical principles to all phases of facility piping and pipeline system design, construction, and operation. For over twenty years this now classic series has taken the guesswork out of the design, selection, specification, installation, operation, testing, and troubleshooting of surface production equipment. The third volume presents readers with a "hands-on" manual for applying mechanical and physical principles to all phases of facility piping and pipeline system design, construction, and operation. Packed with charts, tables, and diagrams, this authoritative book provides practicing engineer and senior field personnel with a quick but rigorous exposition of piping and pipeline theory, fundamentals, and application. Included is expert advice for determining phase states and their impact on the operating conditions of facility piping and pipeline systems; determining pressure drop and wall thickness; and optimizing line size for gas, liquid, and two-phase lines. Also included are a guide to applying international design codes and standards, and

guidance on how to select the appropriate ANSI/API pressure-temperature ratings for pipe flanges, valves, and fittings. Covers new and existing piping systems including concepts for expansion, supports, manifolds, pigging, and insulation requirements Presents design principles for a pipeline pigging system Teaches how to detect, monitor, and control pipeline corrosion Reviews onshore and offshore safety and environmental practices Discusses how to evaluate mechanical integrity

Valves are the components in a fluid flow or pressure system that regulate either the flow or the pressure of the fluid. They are used extensively in the process industries, especially petrochemical. Though there are only four basic types of valves, there is an enormous number of different kinds of valves within each category, each one used for a specific purpose. No other book on the market analyzes the use, construction, and selection of valves in such a comprehensive manner. Covers new environmentally-conscious equipment and practices, the most important hot-button issue in the petrochemical industry today Details new generations of valves for offshore projects, the oil industry's fastest-growing segment Includes numerous new products that have never before been written about in the mainstream literature

This updated version of one of the most popular and widely used CCPS books provides plant design engineers, facility operators, and safety professionals with key information on selected topics of interest. The book focuses on process safety issues in the design of chemical, petrochemical, and hydrocarbon processing facilities. It discusses how to select designs that can prevent or mitigate the release of flammable or toxic materials, which could lead to a fire, explosion, or environmental damage. Key areas to be enhanced in the new edition include inherently safer design, specifically concepts for design of inherently safer unit operations and Safety Instrumented Systems and Layer of Protection Analysis. This book also provides an extensive bibliography to related publications and topic-specific information, as well as key information on failure modes and potential design solutions.

This indispensable book systematically guides you through Pressure Relief Valves and how they work. It shows how protective devices perform an important function in preventing the accumulation of overpressure that can result in failure and the uncontrolled release of stored energy. They are therefore categorised as safety critical items of engineering equipment. The book goes on to show that their design and testing is heavily controlled by published technical standards because many countries are covered by statutory legislation. The content of the book shows that service damage and degradation mechanisms are outlined for various applications – PRVs and bursting discs are used in a wide variety of process conditions, ranging from clean service to heavily corrosive process fluids. This results in a correspondingly large number of damage mechanisms that can prevent them from working if they are not inspected and tested correctly. Risk based inspection procedures are introduced in this book as a method of

minimising the chances of failure, and therefore maintaining high levels of safety. This Quick Guide to Pressure Relief Valves is intended to provide easily accessible technical information for engineers and technicians involved in the operation, testing and maintenance of pressure systems. It also covers other types of protective devices such as bursting discs.

Covers process descriptions, design method, operating procedures, and troubleshooting in great detail. This text is the definitive source on its topic and contains numerous diagrams and appendices, as well as case histories and review questions with numerical problems.

Updated and better than ever, *Design of Gas-Handling Systems and Facilities*, 3rd Edition includes greatly expanded chapters on gas-liquid separation, gas sweetening, gas liquefaction, and gas dehydration —information necessary and critical to production and process engineers and designers. Natural gas is at the forefront of today's energy needs, and this book walks you through the equipment and processes used in gas-handling operations, including conditioning and processing, to help you effectively design and manage your gas production facility. Taking a logical approach from theory into practical application, *Design of Gas-Handling Systems and Facilities*, 3rd Edition contains many supporting equations as well as detailed tables and charts to facilitate process design. Based on real-world case studies and experience, this must-have training guide is a reference that no natural gas practitioner and engineer should be without.

Packed with charts, tables, and diagrams Features the prerequisite ASME and API codes Updated chapters on gas-liquid separation, gas sweetening, gas liquefaction and gas dehydration

This classic reference has built a reputation as the "go to" book to solve even the most vexing pipeline problems. Now in its seventh edition, *Pipeline Rules of Thumb Handbook* continues to set the standard by which all others are judged. The 7th edition features over 30% new and updated sections, reflecting the exponential changes in the codes, construction and equipment since the sixth edition. The seventh edition includes: recommended drill sizes for self-tapping screws, new ASTM standard reinforcing bars, calculations for calculating grounding resistance, national Electrical Code tables, Coriolis meters, pump seals, progressive cavity pumps and accumulators for lubricating systems. \* Shortcuts for pipeline construction, design, and engineering \* Calculations methods and handy formulas \* Turnkey solutions to the most vexing pipeline problems

The report into the Piper Alpha disaster recommended that experience gained in the control of hazards onshore should be applied to improve safety standards offshore. These papers review what has been learnt so far with regard to major hazards and consider the application onshore and offshore.

This comprehensive sister volume to Cliff Matthews' highly successful *Handbook of Mechanical Works Inspection* gives a detailed coverage of pressure equipment and other mechanical plant such as cranes and rotating equipment. Key features: Accessible source of information Lavishly illustrated with numerous diagrams, photographs, and tables A wealth of valuable information Detailed, comprehensive

coverage Written in easily accessible style A 'must buy' reference book The Handbook of Mechanical In-Service Inspection is a vital source of information for: plant owners and operators maintenance engineers inspection engineers from insurance companies and 'competent bodies' who perform in-service inspection health and safety operatives engineers operating pressure systems and mechanical plant all those concerned with the safe and efficient operation of machinery, plant, and pressure equipment. All engineering pressure systems and other types of mechanical equipment must be installed, operated, and maintained properly. It must be safe and comply with standards, regulations, and guidelines. In-service inspection is more formally controlled by statutory requirements than other types of inspection. The Handbook of Mechanical In-service Inspection puts a good deal of emphasis on the 'compliance' aspects and the 'duty of care' requirements placed on plant owners, operators, and inspectors. The book is suitable for those who operate pressure systems, lifting equipment, and similar mechanical plant are subject to rigorous inspection from external bodies as a matter of course. All operators have a duty to conduct in-service checks and internal inspection procedures to ensure the safe, reliable, and economic running of their equipment. This new edition of the most complete handbook for chemical and process engineers incorporates the latest information for engineers and practitioners who depend on it as a working tool. New material explores the recent trends and updates of gas treating and fractionator computer solutions analysis. Substantial additions to this edition include a new section on gasification that reflects the many new trends and techniques in the field and a treatment on compressible fluid flow. This convenient volume provides engineers with hundreds of common sense techniques, shortcuts, and calculations to quickly and accurately solve day-to-day design, operations, and equipment problems. Here, in a compact, easy-to-use format, are practical tips, handy formulas, correlations, curves, charts, tables, and shortcut methods that will save engineers valuable time and effort. \* The standard handbook for chemical and process engineers \* All new material on pinch point analysis on networks of heat exchangers and updates on gas treating in process design and heat transfer \* Hundreds of common sense techniques and calculations

Providing in-depth guidance on how to design and rate emergency pressure relief systems, Guidelines for Pressure Relief and Effluent Handling Systems incorporates the current best designs from the Design Institute for Emergency Relief Systems as well as American Petroleum Institute (API) standards. Presenting a methodology that helps properly size all the components in a pressure relief system, the book includes software with the CCFlow suite of design tools and the new SuperChems for DIERS Lite software, making this an essential resource for engineers designing chemical plants, refineries, and similar facilities. Access to Software Access the Guidelines for Pressure Relief and Effluent Handling Software and documents using a web browser at: <http://www.aiche.org/ccps/PRTools> Each folder will have a readme file and installation instructions for the program. After downloading SuperChems™ for DIERS Lite the purchaser of this book must contact the AIChE Customer Service with the numeric code supplied within the book. The purchaser will then be supplied with a license code to be able to install and run SuperChems™ for DIERS Lite. Only one license per purchaser will be issued.

The Safety Valve Handbook is a professional reference for design, process,

instrumentation, plant and maintenance engineers who work with fluid flow and transportation systems in the process industries, which covers the chemical, oil and gas, water, paper and pulp, food and bio products and energy sectors. It meets the need of engineers who have responsibilities for specifying, installing, inspecting or maintaining safety valves and flow control systems. It will also be an important reference for process safety and loss prevention engineers, environmental engineers, and plant and process designers who need to understand the operation of safety valves in a wider equipment or plant design context. No other publication is dedicated to safety valves or to the extensive codes and standards that govern their installation and use. A single source means users save time in searching for specific information about safety valves. The Safety Valve Handbook contains all of the vital technical and standards information relating to safety valves used in the process industry for positive pressure applications. Explains technical issues of safety valve operation in detail, including identification of benefits and pitfalls of current valve technologies. Enables informed and creative decision making in the selection and use of safety valves. The Handbook is unique in addressing both US and European codes: - covers all devices subject to the ASME VIII and European PED (pressure equipment directive) codes; - covers the safety valve recommendations of the API (American Petroleum Institute); - covers the safety valve recommendations of the European Normalisation Committees; - covers the latest NACE and ATEX codes; - enables readers to interpret and understand codes in practice. Extensive and detailed illustrations and graphics provide clear guidance and explanation of technical material, in order to help users of a wide range of experience and background (as those in this field tend to have) to understand these devices and their applications. Covers calculating valves for two-phase flow according to the new Omega 9 method and highlights the safety difference between this and the traditional method. Covers selection and new testing method for cryogenic applications (LNG) for which there are currently no codes available and which is a booming industry worldwide. Provides full explanation of the principles of different valve types available on the market, providing a selection guide for safety of the process and economic cost. Extensive glossary and terminology to aid readers' ability to understand documentation, literature, maintenance and operating manuals. Accompanying website provides an online valve selection and codes guide.

The security and economic stability of many nations and multinational oil companies are highly dependent on the safe and uninterrupted operation of their oil, gas and chemical facilities. One of the most critical impacts that can occur to these operations are fires and explosions from accidental or political incidents. This publication is intended as a general engineering handbook and reference guideline for those personnel involved with fire and explosion protection aspects of critical hydrocarbon facilities. Design guidelines and specifications of major, small and independent oil companies as well as information from engineering firms and published industry references have been reviewed to assist in its preparation. Some of the latest published practices and research into fire and explosions have also been mentioned.

API Standard 520 Sizing, selection, and installation of pressure-relieving devices in refineries  
A Quick Guide to Pressure Relief Valves (PRVs)  
John Wiley & Sons

With new and growing interest in dealing with the hazards of reactive chemicals, this book offers guidelines that can significantly reduce the risk or mitigate the severity of

accidents associated with storing and handling reactive materials. Necessary elements of a reliable system to prevent equipment or human failures that might lead to a reactive chemical incident are sound and responsible management policies, together with a combination of superior siting, design, fabrication, erection, inspection, monitoring, maintenance, operations and maintenance of facilities. These Guidelines deal with all of these elements with emphasis on design considerations.

"Written by engineers for engineers (with over 150 International Editorial Advisory Board members), this highly lauded resource provides up-to-the-minute information on the chemical processes, methods, practices, products, and standards in the chemical, and related, industries. "

This handbook describes and discusses the features that make up the petroleum refining industry. It begins with a description of the crude oils and their nature, and continues with the saleable products from the refining processes, with a review of the environmental impact. There is a complete overview of the processes that make up the refinery with a brief history of those processes. It also describes design technique, operation, and, in the case of catalytic units, the chemistry of the reaction routes. These discussions are supported by calculation procedures and examples, sufficient to enable input to modern computer simulation packages.

Batch reaction systems pose unique challenges to process safety managers because they do not operate in a steady state. The sequence of processing steps, and frequent start-ups and shutdowns, increase the possibility of human errors and equipment failures. And, since batch plants are often designed for shared use, frequent modification of piping and layout may occur, resulting in complex "management of change" issues. This book identifies the singular concerns of batch reaction systems—including potential sources of unsafe conditions—and provides a "how-to" guide for the practicing engineer in dealing with them by applying appropriate practices to prevent accidents.

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