

Elementary Principles Of Chemical Processes

International Edition

the leading integrated chemical process design guide now with new problems new projects and more more than ever effective design is the focal point of sound chemical engineering analysis synthesis and design of chemical processes third 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 book 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 fully updated third edition presents entirely new problems at the end of every chapter it also adds extensive coverage of batch process design including realistic examples of equipment sizing for batch sequencing batch scheduling for

multi product plants improving production via intermediate storage and parallel equipment and new optimization techniques specifically for batch processes coverage includes conceptualizing and analyzing chemical processes flow diagrams tracing process conditions and more chemical process economics analyzing capital and manufacturing costs and predicting or assessing profitability synthesizing and optimizing chemical processing experience based principles bfd pfd simulations and more analyzing process performance via i o models performance curves and other tools process troubleshooting and debottlenecking chemical engineering design and society ethics professionalism health safety and new green engineering techniques participating successfully in chemical engineering design teams analysis synthesis and design of chemical processes third edition draws on nearly 35 years of innovative chemical engineering instruction at west virginia university it includes suggested curricula for both single semester and year long design courses case studies and design projects with practical applications and appendixes with current equipment cost data and preliminary design information for eleven chemical processes including seven brand new to this edition

annual re issue of the royal engineer institute s occasional papers issued quarterly

since the publication of the second edition several united states jurisdictions have mandated consideration of inherently safer design for certain facilities notable examples are the inherently safer technology ist review requirement in the new jersey toxic chemical prevention act tcpa and the inherently safer systems analysis issa required by the contra costa county california industrial safety ordinance more recently similar requirements have been proposed at the u s federal level in the pending epa risk management plan rmp revisions since the concept of inherently safer design applies globally with its origins in the united kingdom the book will apply globally the new edition builds on the same philosophy as the first two editions but further clarifies the concept with recent research practitioner observations added examples and industry methods and discussions of security and regulatory issues inherently safer chemical processes presents a holistic approach to making the development manufacture and use of chemicals safer the main goal of this book is to help guide the future state of chemical process evolution by illustrating and emphasizing the merits of integrating inherently safer design process related research development and design into a comprehensive process that balances safety capital and environmental concerns throughout the life cycle of the process it discusses strategies of how to substitute more benign chemicals at the development stage minimize risk in the transportation of chemicals use safer processing methods at the manufacturing stage and decommission a manufacturing plant so that what is left behind does not endanger the public or environment

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

includes list of members 1882 1902 and proceedings of the annual meetings and various

supplements

this book promotes process design strategies and methods to chemical engineering students and encourages experienced engineers to reflect on and perhaps challenge their daily approach to process design the production facilities and supply chains of the chemical industry represent complex global systems built on sophisticated technological processes while process design of the past could rely on steadily growing economies creating a predictable framework of product demand raw material availability and technological progress today global competition shorter product cycles unreliable raw material supplies and emerging disruptive technologies create new challenges to the design of efficient flexible and sustainable processes a holistic design methodology has to take care of these challenges process design can build on many excellent chemical engineering textbooks focusing on unit operations process intensification or process integration only a few books address the creative step finding an initial process structure process design methodologies constitute the main topic of this book a special focus is given to the search for an optimal process structure process synthesis since an inferior process structure cannot be upgraded into an optimal process during later extensive optimization of process parameters regardless of the effort the design methodology illustrated in the textbook first outlines alternate strategies to find an initial process structure hierarchical approach or superstructure concepts with heuristic rules or mixed integer non linear programming the role of design targets to guide a process designer is shown for energy integration and capital investment in a next design step process intensification and integration are used to improve the initial process structure with respect to unit operation efficiencies heating cooling and mixing and process synergies heat power integration reaction distillation dividing wall column etc resulting in superior processes the last step of the process design methodology introduces the concept of no regret solutions these no regret solutions aim at process designs offering a robust performance in different future scenarios fluctuating or unexpected product demand modular designs offer a powerful tool to establish highly flexible chemical processes the design methodology is demonstrated in a comprehensive design case dealing with 6 chemical processes integrated into a production site the design procedure to derive process and plant structures is illustrated in a step by step approach to a large extend this book on process design builds on experiences of the author at bayer technology services the book includes the input of many bayer people technical contributions exciting suggestions and enlightening discussions the book summarizes courses on process intensification and process design given by the author at the technical university dresden tu dresden 2008 east china university of science and technology ecust shanghai 2012 2014 and ruhr university bochum rub 2014 2015

elementary principles of chemical processes 4th edition student international version prepares students to formulate and solve material and energy balances in chemical process systems and lays the foundation for subsequent courses in chemical engineering the text provides a realistic informative and positive introduction to the practice of chemical engineering

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