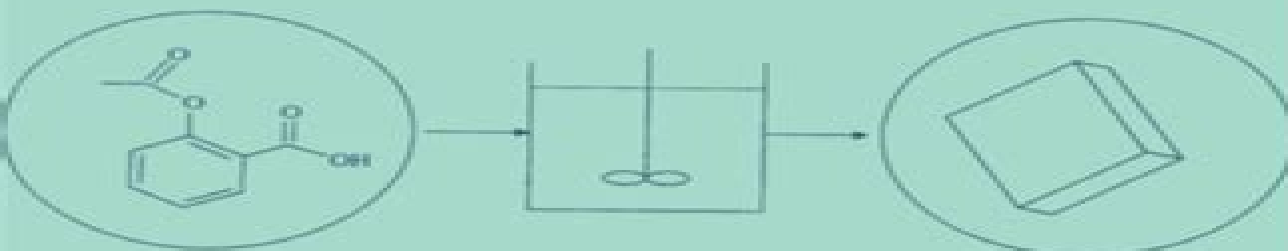


From Molecules to Crystallizers

An Introduction to Crystallization

**Roger Davey and
John Garside**



From Molecules To Crystallizers

**Alison Lewis, Marcelo Seckler, Herman
Kramer, Gerda van Rosmalen**



From Molecules To Crystallizers:

From Molecules to Crystallizers Roger Davey, 2000 Handbook of Industrial Crystallization Allan Myerson, 2002-01-08
Crystallization is an important separation and purification process used in industries ranging from bulk commodity chemicals to specialty chemicals and pharmaceuticals. In recent years a number of environmental applications have also come to rely on crystallization in waste treatment and recycling processes. The authors provide an introduction to the field of newcomers and a reference to those involved in the various aspects of industrial crystallization. It is a complete volume covering all aspects of industrial crystallization including material related to both fundamentals and applications. This new edition presents detailed material on crystallization of biomolecules, precipitation, impurity, crystal interactions, solubility, and design. Provides an ideal introduction for industrial crystallization newcomers. Serves as a worthwhile reference to anyone involved in the field. Covers all aspects of industrial crystallization in a single complete volume. *Molecular Modeling for the Design of Novel Performance Chemicals and Materials* Beena Rai, 2012-03-23
Molecular modeling (MM) tools offer significant benefits in the design of industrial chemical plants and material processing operations. While the role of MM in biological fields is well established, in most cases MM works as an accessory in novel products/materials development rather than a tool for direct innovation. As a result, MM engineers and practitioners are often seized with the question: How do I leverage these tools to develop novel materials or chemicals in my industry? *Molecular Modeling for the Design of Novel Performance Chemicals and Materials* answers this important question via a simple and practical approach to the MM paradigm. Using case studies, it highlights the importance and usability of MM tools and techniques in various industrial applications. The book presents detailed case studies demonstrating diverse applications such as mineral processing, pharmaceuticals, ceramics, energy storage, electronic materials, paints/coatings, agrochemicals, and personal care. The book is divided into themed chapters covering a diverse range of industrial case studies from pharmaceuticals to cement. While not going too in depth into fundamental aspects, the book covers almost all paradigms of MM and references are provided for further learning. The text includes more than 100 color illustrations of molecular models. Handbook of Industrial Drying Arun S. Mujumdar, 2014-07-11
This Fourth Edition book includes 12 new chapters covering computational fluid dynamic simulation, solar impingement, and pulse combustion drying of fruits/vegetables, sugar, biomass, and coal. Physicochemical aspects of sludge drying and life cycle assessment of drying systems. Addressing commonly encountered dryers as well as innovative dryers with future potential, the fully revised text not only delivers a comprehensive treatment of the current state of the art but also serves as a consultative reference for streamlining industrial drying operations to increase energy efficiency and cost effectiveness. Industrial Crystallization Alison Lewis, Marcelo Seckler, Herman Kramer, Gerda van Rosmalen, 2015-07-02
A comprehensive overview of industrial crystallization, its theory and practice, including recent advances, real world case studies, and worked examples. *Crystallization Process Systems* Alan G. Jones, 2002-04-04

Crystallization Process Systems gives a clear concise balanced and up to date presentation of crystallization and solid liquid separation of the crystalline product The information is presented in a coherent concise and logical sequence based on the fundamentals of particulate crystallization processes as systems By emphasising the analysis design and operation of particulate crystallization processes as systems the reader will be able to make a better judgement about the best cheapest and most effective production method to use Presents a coherent concise and logical sequence based on the fundamentals of particulate crystallization processes as systems Emphasis on the design and optimization of the crystallization processing system

Practical Process Research and Development Neal G. Anderson, 2012-05-23 Designed to provide a comprehensive step by step approach to organic process research and development in the pharmaceutical fine chemical and agricultural chemical industries this book describes the steps taken following synthesis and evaluation to bring key compounds to market in a cost effective manner It describes hands on step by step approaches to solving process development problems including route reagent and solvent selection optimising catalytic reactions chiral syntheses and green chemistry Second Edition highlights Reflects the current thinking in chemical process R D for small molecules Retains similar structure and orientation to the first edition Contains approx 85% new material Primarily new examples work up and prospective considerations for pilot plant and manufacturing scale up Some new expanded topics e g green chemistry genotoxins enzymatic processes Replaces the first edition although the first edition contains useful older examples that readers may refer to Provides insights into generating rugged practical cost effective processes for the chemical preparation of small molecules Breaks down process optimization into route reagent and solvent selection development of reaction conditions workup crystallizations and more Presents guidelines for implementing and troubleshooting processes

Crystallization of Organic Compounds Hsien-Hsin Tung, Edward L. Paul, Michael Midler, James A. McCauley, 2009-06-17 Filled with industrial examples emphasizing the practical applications of crystallization methodologies Based on the authors hands on experiences as process engineers at Merck Crystallization of Organic Compounds guides readers through the practical aspects of crystallization It uses plenty of case studies and examples of crystallization processes ranging from development through manufacturing scale up The book not only emphasizes strategies that have been proven successful it also helps readers avoid common pitfalls that can render standard procedures unsuccessful The goal of this text is twofold Build a deeper understanding of the fundamental properties of crystallization as well as the impact of these properties on crystallization process development Improve readers problem solving abilities by using actual industrial examples with real process constraints Crystallization of Organic Compounds begins with detailed discussions of fundamental thermodynamic properties nucleation and crystal growth kinetics process dynamics and scale up considerations Next it investigates modes of operation including cooling evaporation anti solvent and reactive crystallization The authors conclude with special applications such as ultrasound in crystallization and computational fluid dynamics in crystallization Most chapters feature multiple examples that guide readers step by step

through the crystallization of active pharmaceutical ingredients APIs With its focus on industrial applications this book is recommended for chemical engineers and chemists who are involved with the development scale up or operation of crystallization processes in the pharmaceutical and fine chemical industries **Batch Processes** Ekaterini

Korovessi,Andreas A. Linninger,2005-09-26 Reduced time to market lower production costs and improved flexibility are critical success factors for batch processes Their ability to handle variations in feedstock and product specifications has made them key to the operation of multipurpose facilities and therefore quite popular in the specialty chemical pharmaceutical agricultural and Advanced Computational Techniques for Heat and Mass Transfer in Food Processing

Krunal Gangawane,Madhuresh Dwivedi,2022-02-01 Computational methods have risen as a powerful technique for exploring the system phenomena and solving real life problems Currently there are two principle computational approaches for system analysis continuous and discrete In the continuous approach the governing equations can be obtained by applying the fundamental laws such as conservation of mass momentum and energy over an infinitesimal control volume On the other hand the discrete approach concentrates on mimicking the molecular movement within the system Both approaches have pros and cons and continuous development and improvement in the existing computational methods are ongoing Advanced Computational Techniques for Heat and Mass Transfer in Food Processing provides in a single source information on the use of methods based on numerical and computational analysis as applied in food science and technology It explores the use of various numerical computational techniques for the simulation of fluid flow and heat and mass transfer within food products Key Features Explores various numerical techniques used for modeling and validation Describes the knowhow of numerical and computational techniques for food process operations Covers a detailed numerical or computational approach of the principles of heat and mass transfer in the food processing operation Discusses the detailed computational simulation procedure of the food operation Recent years have witnessed a rapid development in the field of computational techniques owing to its abundant benefit to the food processing industry The relevance of advanced computational methods has helped in understanding the fundamental physics of thermal and hydrodynamic behavior that can provide benefits to the food processing industry in numerous applications As a single information source for those interested in the use of methods based on numerical and computational analysis as applied in food science and technology this book will ably serve any food academician or researcher in learning the advanced numerical techniques exploring fluid flow crystallization and other food processing operations **Industrial Crystallization** Gerard Capellades,Fredrik L. Nordstrom,2025-06-12 The goal of this

primer is to introduce crystallization to newcomers in the field with three primary readers in mind 1 new graduate students starting a crystallization project 2 scientists in industry who may be familiar with general chemistry and or crystallography and want to get an introduction to the topics behind crystallizer design and 3 students taking a crystallization elective course or a crystallization module in a broader separations course Contrary to a textbook or review article this is a digital primer

where the authors prioritize simplicity over completeness and breadth over depth Each chapter in the primer contains selected references such as Read These Next for those who wish to dive deeper into a specific topic Crystallization can be found in multiple areas within materials design and separations The product of a crystallization step may be a single crystal or a powder It may be composed of small organic molecules inorganic salts biological molecules or single elements Similarly it may have been crystallized from its molten state or pre dissolved in an appropriate solvent and then crystallized via e g cooling antisolvent addition a chemical reaction or solvent evaporation Each of these combinations may be their field of research requiring very different approaches and considerations that warrant their primers This primer focuses on solvent mediated crystallization as a separation process often called solution crystallization with solid liquid suspensions being the main product

Chemical Process Equipment - Selection and Design (Revised 2nd Edition) James R. Couper, W Roy Penney, James R. Fair PhD, 2009-08-11 A facility is only as efficient and profitable as the equipment that is in it this highly influential book is a powerful resource for chemical process or plant engineers who need to select design or configure plant successfully and profitably It includes updated information on design methods for all standard equipment with an emphasis on real world process design and performance The comprehensive and influential guide to the selection and design of a wide range of chemical process equipment used by engineers globally Copious examples of successful applications with supporting schematics and data to illustrate the functioning and performance of equipment Revised edition new material includes updated equipment cost data liquid solid and solid systems and the latest information on membrane separation technology Provides equipment rating forms and manufacturers data worked examples valuable shortcut methods rules of thumb and equipment rating forms to demonstrate and support the design process Heavily illustrated with many line drawings and schematics to aid understanding graphs and tables to illustrate performance data

Purification of Biotechnological Products Adalberto Pessoa Jr, Beatriz Vahan Kilikian, Paul Long, 2024-05-23 This outstanding text focuses on providing professionals and students working in the pharmaceutical and biotechnology field with the background necessary for developing of a product or process and with the necessary rigor required by federal regulatory agencies in the pharmaceutical industry The material will enable teachers lecturers and professors in biotechnology to prepare courses on basic concepts and applications for the purification of biotechnological products of industrial interest These can be applied in practice for example with projects on purification development on an industrial scale or useful unit operations for the development of bioproducts of commercial interest Features Purification and development of new bioproducts and improvement of those being produced Provides a background and concepts on the purification of biomolecules and with an industrial perspective It allows professionals to understand the entire process of developing a biopharmaceutical or bio food from bench to industry in biotechnology one of the fastest growing sectors of the economy It promotes the dissemination of information in a didactic way which is of paramount importance for interdisciplinary fields It enables the reader to follow

step by step stages of the development of a new biopharmaceutical and allows the optimization of existing processes

Chemical Process Equipment James R. Couper, W Roy Penney, James R. Fair PhD, 2012-12-06 *Chemical Process Equipment* is a results oriented reference for engineers who specify design maintain or run chemical and process plants This book delivers information on the selection sizing and operation of process equipment in a format that enables quick and accurate decision making on standard process and equipment choices saving time improving productivity and building understanding Coverage emphasizes common real world equipment design rather than experimental or esoteric and focuses on maximizing performance Legacy reference for chemical and related engineers who work with vendors to design specify and make final equipment selection decisions Copious examples of successful applications with supporting schematics and data to illustrate the functioning and performance of equipment Provides equipment rating forms and manufacturers data worked examples valuable shortcut methods and rules of thumb to demonstrate and support the design process Heavily illustrated with line drawings and schematics to aid understanding as well as graphs and tables to illustrate performance data **BIWIC 2006**

Peter Jansens, Joop ter Horst, Shanfeng Jiang, 2006 Talks about the shift of focus from design of large continuous dedicated crystallizers to control of batch wise operated basic equipment and the attention for modeling and optimization of precipitation and anti solvent crystallization processes and a concentration on crystallization of organic molecular compounds instead of inorganic salts *Handbook of Crystal Growth* Peter Rudolph, 2014-11-04 Vol 2A Basic Technologies *Handbook of Crystal Growth Second Edition Volume IIA Basic Technologies* presents basic growth technologies and modern crystal cutting methods Particularly the methodical fundamentals and development of technology in the field of bulk crystallization on both industrial and research scales are explored After an introductory chapter on the formation of minerals ruling historically the basic crystal formation parameters advanced basic technologies from melt solution and vapour being applied for research and production of the today most important materials like silicon semiconductor compounds and oxides are presented in detail The interdisciplinary and general importance of crystal growth for human live are illustrated Vol 2B Growth Mechanisms and Dynamics *Handbook of Crystal Growth Second Edition Volume IIB Growth Mechanisms and Dynamics* deals with characteristic mechanisms and dynamics accompanying each bulk crystal growth method discussed in Volume IIA Before the atoms or molecules pass over from a position in the fluid medium gas melt or solution to their place in the crystalline face they must be transported in the fluid over macroscopic distances by diffusion buoyancy driven convection surface tension driven convection and forced convection rotation acceleration vibration magnetic mixing Further the heat of fusion and the part carried by the species on their way to the crystal by conductive and convective transport must be dissipated in the solid phase by well organized thermal conduction and radiation to maintain a stable propagating interface Additionally segregation and capillary phenomena play a decisional role for chemical composition and crystal shaping respectively Today the increase of high quality crystal yield its size enlargement and reproducibility are

imperative conditions to match the strong economy Volume 2A Presents the status and future of Czochralski and float zone growth of dislocation free silicon Examines directional solidification of silicon ingots for photovoltaics vertical gradient freeze of GaAs CdTe for HF electronics and IR imaging as well as antiferromagnetic compounds and super alloys for turbine blades Focuses on growth of dielectric and conducting oxide crystals for lasers and non linear optics Topics on hydrothermal flux and vapour phase growth of III nitrides silicon carbide and diamond are explored Volume 2B Explores capillarity control of the crystal shape at the growth from the melt Highlights modeling of heat and mass transport dynamics Discusses control of convective melt processes by magnetic fields and vibration measures Includes imperative information on the segregation phenomenon and validation of compositional homogeneity Examines crystal defect generation mechanisms and their controllability Illustrates proper automation modes for ensuring constant crystal growth process Exhibits fundamentals of solution growth gel growth of protein crystals growth of superconductor materials and mass crystallization for food and pharmaceutical industries **Crystallization Technology Handbook** A. Mersmann,2001-05-08 This handbook seeks to facilitate the selection design and operation of large scale industrial crystallizers that process crystals with the proper size distribution shape and purity sought This second edition offers results on direct contact cooling crystallization

Crystallization J W Mullin,2001-05-09 Since the first publication of this definitive work nearly 40 years ago this fourth edition has been completely rewritten Crystallization is used at some stage in nearly all process industries as a method of production purification or recovery of solid materials Incorporating all the recent developments and applications of crystallization technology Crystallization gives clear accounts of the underlying principles a review of the past and current research themes and guidelines for equipment and process design This new edition introduces and enlarges upon such subjects as Control and Separation of polymorphs and chiral crystals Micro and macro mixing and the use of computer fluid dynamics Seeding and secondary nucleation in batch crystallization processes Incorporation of upstream and downstream requirements into design procedures for crystallization plant Computer aided molecular design and its use in crystal habit modifier selection Crystallization provides a comprehensive overview of the subject and will prove invaluable to all chemical engineers and industrial chemists in the process industries as well as crystallization workers and students in industry and academia Crystallization is written with the precision and clarity of style that is John Mullin s hallmark a special feature being the large number of appendices that provide relevant physical property data Covers all new developments and trends in crystallization Comprehensive coverage of subject area DNA Computing Claudio Ferretti,2005-06 This book constitutes the thoroughly refereed postproceedings of the 10th International Workshop on DNA Based Computers DNA10 held in Milano Italy in June 2004 The 39 revised full papers presented were carefully selected during two rounds of reviewing and improvement from an initial total of 94 submissions The papers address all current issues in DNA based computing and biomolecular computing ranging from theoretical and methodological issues to implementations and experimental aspects

Comprehensive Organic Synthesis, 2014-02-14 The second edition of *Comprehensive Organic Synthesis* winner of the 2015 PROSE Award for Multivolume Reference Science from the Association of American Publishers builds upon the highly respected first edition in drawing together the new common themes that underlie the many disparate areas of organic chemistry. These themes support effective and efficient synthetic strategies thus providing a comprehensive overview of this important discipline. Fully revised and updated, this new set forms an essential reference work for all those seeking information on the solution of synthetic problems, whether they are experienced practitioners or chemists whose major interests lie outside organic synthesis. In addition, synthetic chemists requiring the essential facts in new areas as well as students completely new to the field will find *Comprehensive Organic Synthesis* Second Edition Nine Volume Set an invaluable source providing an authoritative overview of core concepts. Winner of the 2015 PROSE Award for Multivolume Reference Science from the Association of American Publishers, it contains more than 170 articles across nine volumes, including detailed analysis of core topics such as bonds, oxidation and reduction. Includes more than 10 000 schemes and images. Fully revised and updated, important growth areas including combinatorial chemistry, new technological, industrial and green chemistry developments are covered extensively.

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