Chemical Stability Of Pharmaceuticals A Handbook For Pharmacists 2nd Revised Edition

This handbook is the first to cover all aspects of stability testing in pharmaceutical development. Written by a group of international experts, the book presents a scientific understanding of regulations and balances methodologies and best practices.

Of the thousands of novel compounds that a drug discovery project team invents and that bind to the therapeutic target, typically only a fraction of these have sufficient ADME/Tox properties to become a

drug product. Understanding ADME/Tox is critical for all drug researchers, owing to its increasing importance in advancing high quality candidates to clinical studies and the processes of drug discovery. If the properties are weak, the candidate will have a high risk of failure or be less desirable as a drug product. This book is a tool and resource for scientists engaged in, or preparing for, the selection and optimization process. The authors describe how properties affect in vivo pharmacological activity and impact in vitro assays. Individual drug-like properties are discussed from a practical point of view, such as solubility, permeability and metabolic stability, with regard to fundamental understanding, applications of property data in drug discovery and

*examples of structural modifications that have achieved improved property performance. The authors also review various methods for the screening (high throughput), diagnosis (medium throughput) and in-depth (low throughput) analysis of drug properties. * Serves as an essential working handbook aimed at scientists and students in medicinal chemistry * Provides practical, step-by-step guidance on property fundamentals, effects, structure-property relationships, and structure modification strategies * Discusses improvements in pharmacokinetics from a practical chemist's standpoint This is the first volume to make available specific case histories of therapeutic proteins and peptides that have been marketed or are currently under clinical testing. The*

editors have selected a wide range of molecules derived from monoclonal antibodies, recombinant DNA, and natural and chemical sources to provide formulation scientists with practical examples of the deveopment of pharmaceutical products.

Drug Stability for Pharmaceutical Scientists is a clear and easy-to-follow guide on drug degradation in pharmaceutical formulation. This book features valuable content on both aqueous and solid drug solutions, the stability of proteins and peptides, acid-base catalyzed and solvent catalyzed reactions, how drug formulation can influence drug stability, the influence of external factors on reaction rates and much more. Full of examples of real-life formulation problems and step-by-

step calculations, this book is the ideal resource for graduate students, as well as scientists in the pharmaceutical and related industries. Illustrates important theoretical concepts with numerous examples, figures, calculations, learning problems and questions for self-study and retention of material Provides answers and explanations to test your knowledge Enables you to better understand key concepts such as rate and order of reaction, reaction equilibrium, complex reaction mechanisms and more Includes an in-depth discussion of both aqueous and solid drug solutions and contains the latest international regulatory requirements on drug stability

In Manufacture, Formulation and Clinical Use

Study of Drug Delivery Behavior

Through Biomembranes Using Thermal and Bioanalytical Techniques
Aulton's Pharmaceutics Fundamentals and Pharmaceutical Industry Practices
Handbook of Stability Testing in Pharmaceutical Development
Accelerated Predictive Stability (APS)

Amorphous pharmaceuticals are becoming increasingly important because different drying procedures such as freeze-drying and spray-drying used for biotechnology based products like proteins produce amorphous solids, or glasses. In amorphous solids, the translational and rotational motions occur

much more slowly than in the solution state, but the mobility is sufficient to allow degradation on the time scale of normal pharmaceutical storage. The physical and chemical properties of formulations in the solid state depend on the dynamics in the amorphous state. Different types of motions, i.e., global Î± motions, secondary Î2 motions, and fast dynamics are suspected to play a key role in determining the overall stability of glasses and their relative contributions are affected

by formulation and processing conditions. For any type of degradation reaction, physical (e.g., crystallization) or chemical (e.g., cyclization) molecular motion is necessary, and there is sufficient mobility in the glass below room temperature to allow these reactions, which makes stabilization a challenging subject for pharmaceutical scientists. The nature and consequences of molecular motions in amorphous pharmaceuticals is reviewed. Glassy systems

experience an increase in relaxation time, i.e., decrease in overall molecular mobility, upon aging at temperatures below the glass transition temperature (Tg). By experimental studies (Differential Scanning Calorimetery-DSC) and theoretical analysis (Tool-Narayanaswamy-Moynihan phenomenology-TNM), the optimum annealing conditions to obtain maximum structural relaxation in lyophilized glasses, composed of a saccharide excipient and a small concentration of

aspartame as a model "drug" were determined. The optimum aging temperature was found to be about 15-20Â° below Tg which resulted in maximum structural relaxation. The fast dynamics measured using NMR T1 and T 1Ï spin-lattice relaxation times indicated that a maximal relaxed state can be obtained by annealing at the optimum temperature, where a minimum in global mobility estimated by Ï„Î2 measured using Isothermal Microcalorimetry (IMC) and DSC and modeled using TNM occurs. Chemical stability

results showed that thermal conditioning of samples under protocols that were predicted and shown to produce optimum annealing for "mobility" were close to those conditions that produce optimum chemical stability as measured by degradation rate. The comparison between chemical stability in sucrose and trehalose formulation suggest that mobility measured by structural relaxation is not a perfect surrogate for the mobility critical to chemical decomposition. That is, it is possible

that the "fast motions" rather than the Î±-relaxations are critical to stability under some circumstances. The only book that provides a single compilation of all currently available stability information on drugs in compounded oral, enteral, topical, and ophthalmic formulations. Based on data published over the past 40 years, the reference summarizes specific formulations and stability studies. The book assist readers in determining whether

formulated compounds will be stable for the anticipated duration of use, how to properly store and repackage compounded formulations, how to formulate in accordance with documented standards, and counseling patients on the use and storage of compounded medications. The second edition thoroughly updates monographs on 280 products, and includes 674 references from the worldwide literature. This comprehensive up-to-date guide and information source is an instructive

companion for all scientists involved in research and development of drugs and, in particular, of pharmaceutical dosage forms. The editors have taken care to address every conceivable aspect of the preparation of pharmaceutical salts and present the necessary theoretical foundations as well as a wealth of detailed practical experience in the choice of pharmaceutically active salts. Altogether, the contributions reflect the multidisciplinary nature

of the science involved in selection of suitable salt forms for new drug products.

This volume offers a comprehensive guide on the theory and practice of amorphous solid dispersions (ASD) for handling challenges associated with poorly soluble drugs. In twenty-three inclusive chapters, the book examines thermodynamics and kinetics of the amorphous state and amorphous solid dispersions, ASD technologies, excipients for stabilizing amorphous

solid dispersions such as polymers, and ASD manufacturing technologies, including spray drying, hot melt extrusion, fluid bed layering and solvent-controlled micro-precipitation technology (MBP). Each technology is illustrated by specific case studies. In addition, dedicated sections cover analytical tools and technologies for characterization of amorphous solid dispersions, the prediction of long-term stability, and the

development of suitable dissolution methods and regulatory aspects. The book also highlights future technologies on the horizon, such as supercritical fluid processing, mesoporous silica, KinetiSol®, and the use of non-salt-forming organic acids and amino acids for the stabilization of amorphous systems. Amorphous Solid Dispersions: Theory and Practice is a valuable reference to pharmaceutical scientists interested in developing bioavailable and

therapeutically effective formulations of poorly soluble molecules in order to advance these technologies and develop better medicines for the future.

Impact of Optimum Annealing on Chemical Stabilization of Model Amorphous Pharmaceuticals
Rational Design of Stable Protein Formulations
Handbook of Modern Pharmaceutical Analysis
Amorphous Solid Dispersions
Principles and Applications
Pharmaceutical Salts and

Co-crystals

A Practical Guide to Molecular Cloning By Bernard Perbal Presents detailed procedures for all phases of DNA cloning experiments. Starting with laboratory equipment and safety considerations, this practical guide goes on to describe enzymes, vectors, purification and characterization techniques, genetic mapping, modification of DNA fragments with cohesive termini, ligation, preparation of genomic libraries, sequencing of DNA, and more. 1984 554 pp. Pharmaceutical Calculations, 2nd Ed. By Joel L. Zatz Expanded and updated, this examination of pharmaceutical calculations features a programmed format—designed for fast-paced

learning—and a progression of topics that builds on previous instruction. The second edition of this popular text includes current unit designations and abbreviations, additional material on the alligation technique and infusion calculations, and many new problems. 1981 388 pp. Drug Level Monitoring, Volume 2 Analytical Techniques, Metabolism, and Pharmacokinetics By Emil T. Lin and Wolfgang Sadée The second volume in a series that describes drug level assays in biological fluid. Reviews of the analysis, metabolism and pharmacokinetics of 16 major classes are included. Details are presented on therapeutic drug

concentrations in plasma, pharmacokinetic parameters, and a large number of drug assay procedures applicable to biological specimens. All of these subject areas have been carefully combined to render this book a unique reference source, teaching tool, and guide to drug level monitoring. 1985 250 pp. Accelerated Predictive Stability (APS): Fundamentals and Pharmaceutical Industry Practices provides coverage of both the fundamental principles and pharmaceutical industry applications of the APS approach. Fundamental chapters explain the scientific basis of the APS approach, while case study chapters from many innovative pharmaceutical companies

provide a thorough overview of the current status of APS applications in the pharmaceutical industry. In addition, up-to-date experiences in utilizing APS data for regulatory submissions in many regions and countries highlight the potential of APS in support of registration stability testing for certain regulatory submissions. This book provides high level strategies for the successful implementation of APS in a pharmaceutical company. It offers scientists and regulators a comprehensive resource on how the pharmaceutical industry can enhance their understanding of a product's stability and predict drug expiry more accurately and quickly. Provides a

comprehensive, one-stop-shop resource for accelerated predictive stability (APS) Presents the scientific basis of different APS models Includes the applications and utilities of APS that are demonstrated through numerous case studies Covers up-to-date regulatory experience

Pharmaceutics is one of the most diverse subject areas in all of pharmaceutical science. In brief, it is concerned with the scientific and technological aspects of the design and manufacture of dosage forms or medicines. An understanding of pharmaceutics is therefore vital for all pharmacists and those pharmaceutical scientists who are involved with converting a

drug or a potential drug into a medicine that can be delivered safely, effectively and conveniently to the patient. Now in its fourth edition, this best-selling textbook in pharmaceutics has been brought completely up to date to reflect the rapid advances in delivery methodologies by eye and injection, advances in drug formulations and delivery methods for special groups (such as children and the elderly), nanomedicine, and pharmacognosy. At the same time the editors have striven to maintain the accessibility of the text for students of pharmacy, preserving the balance between being a suitably pitched introductory text and a clear

reflection of the state of the art. provides a logical, comprehensive account of drug design and manufacture includes the science of formulation and drug delivery designed and written for newcomers to the design of dosage forms New to this edition New editor: Kevin Taylor, Professor of Clinical Pharmaceutics, School of Pharmacy, University of London. Twenty-two new contributors. Six new chapters covering parenteral and ocular delivery; design and administration of medicines for the children and elderly; the latest in plant medicines; nanotechnology and nanomedicines, and the delivery of biopharmaceuticals. Thoroughly revised and updated

throughout.

A needed resource for pharmaceutical scientists and cosmetic chemists, Essential Chemistry for Formulators of Semisolid and Liquid Dosages provides insight into the basic chemistry of mixing different phases and test methods for the stability study of nonsolid formulations. The book covers foundational surface/colloid chemistry, which forms the necessary background for making emulsions, suspensions, solutions, and nano drug delivery systems, and the chemistry of mixing, which is critical for further formulation of drug delivery systems into semisolid (gels, creams, lotions, and ointments) or liquid final

dosages. Expanding on these foundational principles, this useful guide explores stability testing methods, such as particle size, rheological/viscosity, microscopy, and chemical, and closes with a valuable discussion of regulatory issues. Essential Chemistry for Formulators of Semisolid and Liquid Dosages offers scientists and students the foundation and practical guidance to make and analyze semisolid and liquid formulations. Unique coverage of the underlying chemistry that makes possible stable dosages Quality content written by experienced experts from the drug development industry Valuable information for academic and industrial

scientists developing topical and liquid dosage formulations for pharmaceutical as well as skin care and cosmetic products

Pharmaceutical Stability Testing to Support Global Markets

Stability of Protein Pharmaceuticals: Chemical and physical pathways of protein degradation

Part A: Chemical and Physical Pathways of Protein Degradation

Essential Chemistry for Formulators of Semisolid and Liquid Dosages

The Stability and Stability Testing of Pharmaceuticals

Chemical Stability of Pharmaceuticals

Aimed at product and process developers in the biopharmaceutical industry and

academia, this is the first book to describe freeze-drying, as related to the pharmaceutical industry. Recombinant proteins and polypeptides continue to be the most important class of biotechnology-derived agents in today's pharmaceutical industry. Over the past few years, our fundamental understanding of how proteins degrade and how stabilizing agents work has made it possible to approach formulation of protein pharmaceuticals from a much more rational point of view. This book describes the current level of understanding of protein instability and the strategies for stabilizing proteins under a variety of stressful conditions.

"Part B explores protein degradation occuring in vivo during protein synthesis in cells, examines the isolation and purification of proteins, details protein use in organisms, and reviews techniques to enhance protein stability."--Publisher description (LoC).

Drug products are complex mixtures of drugs and excipients and, as such, their chemical and physical stability kinetics are complex. This book discusses the stability of these dosage forms with preformulation studies through to the studies on the final products. The book is intended for graduate students, researchers and professionals in the field of

Pharmaceutics and Pharmaceutical Chemistry.

Stability of Protein Pharmaceuticals

Handbook of Pharmaceutical Salts Properties, Selection, and Use

Pharmaceutical Crystals

Chemical Stability of Amorphous Pharmaceuticals Prepared with Silicates

from ADME to Toxicity Optimization

Drug Stability and Chemical Kinetics

The second edition of Pharmaceutical Stress Testing: Predicting Drug Degradation provides a practical and scientific guide to designing, executing and interpreting stress testing studies for drug substance and drug product. This is the only guide

available to tackle this subject in-depth. The Second Edition expands coverage from chemical stability into the physical aspects of stress testing, and incorporates the concept of Quality by Design into the stress testing construct / framework. It has been revised and expanded to include chapters on large molecules, such as proteins and antibodies, and it outlines the changes in stress testing that have emerged in recent years. Key features include: A renowned Editorial team and contributions from all major drug companies, reflecting a wealth of experience. 10 new chapters, including Stress Testing and its relationship to the

assessment of potential genotoxic degradants, combination drug therapies, proteins, oligonucleotides, physical changes and alternative dosage forms such as liposomal formulations Updated methodologies for predicting drug stability and degradation pathways Best practice models to follow An expanded Frequently Asked Questions section This is an essential reference book for Pharmaceutical Scientists and those working in Quality Assurance and Drug Development (analytical sciences, formulations, chemical process, project management).

The vast majority of drugs are

organic molecular entities. A clear understanding of the organic chemistry of drug degradation is essential to maintaining the stability, efficacy, and safety of a drug product throughout its shelf-life. During analytical method development, stability testing, and pharmaceutical manufacturing troubleshooting activities, one of the frequently occurring and usually challenging events would be the identification of drug degradants and understanding of drug degradation mechanisms and pathways. This book is written by a veteran of the pharmaceutical industry who has first-hand experience in drug design and development, drug degradation

mechanism studies, analytical development, and manufacturing process troubleshooting and improvement. The author discusses various degradation pathways with an emphasis on the mechanisms of the underlying organic chemistry, which should aid greatly in the efforts of degradant identification, formulation development, analytical development, and manufacturing process improvement. Organic reactions that are significant in drug degradation will first be reviewed and then illustrated by examples of drug degradation reported in the literature. The author brings the book to a close with a final

chapter dedicated to the strategy for rapid elucidation of drug degradants with regard to the current regulatory requirements and guidelines. One chapter that should be given special attention is Chapter 3, Oxidative Degradation. Oxidative degradation is one of the most common degradation pathways but perhaps the most complex one. This chapter employs more than sixty drug degradation case studies with in-depth discussion in regard to their unique degradation pathways. With the increasing regulatory requirements on the quality and safety of pharmaceutical products, in particular with regard to drug

impurities and degradants, the book will be an invaluable resource for pharmaceutical and analytical scientists who engage in formulation development, analytical development, stability studies, degradant identification, and support of manufacturing process improvement. In addition, it will also be helpful to scientists engaged in drug discovery and development as well as in drug metabolism studies.

This Master of Science thesis encompasses two projects in chemical pharmaceuticals. The first is a study of excipients and the added new information collected beyond Thermal Gravimetric Analysis and

Differential Scanning Calorimetry from Dielectric Analysis. These new properties enhance our global knowledge of excipients by thermal analytical methods. Excipients, the inactive ingredients in formulated drugs, aid different functions of the active pharmacy ingredient, the drugs. Low temperature transitions, by DEA including melting of frozen solvents, e.g. water, are more definitive than observed by low temperature DSC. Millions of dollars are expended annually on pharmaceutical testing to qualify excipients for fully formulated drugs, medicines and active ingredients. To understand the

action of the excipients in the human body at body temperature of 37°C, the study of their individual and interactive properties are desirable. DEA DSC and Thermal Gravimetric analysis (TGA) methods are employed to screen the most widely used drug excipients. In this study the following excipients were examined by DEA: cotton seed oil, mannitol, peanut oil, polyethylene glycol, sugar, sodium lauryl sulfate, sodium starch glycolate, sodium stearate, canola oil, and anhydrous lactose, benzoic acid and vanillin. The comparison of DSC and DEA thermal curves for each excipient indicates that major endothermic

events have occurred e.g., volatilization or melting of the excipient are viewed as fundamental DEA properties. These properties are the rise in permittivity and dielectric loss factor. The focus of this project was to learn to prepare, examine and interpret the resulting variations. The electrical conductivity (e" * frequency* constant), permittivity (e') and tan delta value (e"/e') are used to enhance the characterization of the excipient. The second, and major project for this thesis, is to evaluate bipolar disorder drug transport with and without an applied electric field of 10V mm-1. Drug delivery was tested with

several animal models, dry shed snake skins and a moist pig skin, which will be used to develop a new transdermal patch. Characterization of appropriate drugs by DEA and other thermal analytical methods will aid the understanding of chemical stability and interactions .These properties will aid a Bipolar Disorder (BPD) patient to receive their correct dosage in a timely manner and improve patient compliance. BPD also called as Manic Depressive Disorder results in extreme shifts in mood and behavior that may last for weeks or months, causing severe disturbances in the lives of those affected. A high percentage of

BPD is untreated due to the lack of a well-tolerated and effective drug transport therapy. So, the analysis of the selected drugs by thermal analytical techniques gives support to understand the transport properties. Studying the transport properties of these drugs through a transdermal route may pave the way for a novel transdermal drug delivery method. In this study, Dielectric Analysis (DEA) is used to characterize and evaluate the transport properties of the selected drugs (Olanzapine, Risperidone, and Quetiapine Fumarate). Dielectric Analysis implements drug delivery employing an AC frequency,

modulating drugs of a wide molecular weight range (e.g. 300 to 30,000 Daltons) with an interdigitated electrode system. In this analysis, the drugs were studied using animal models (Shed snake skin and pig skin). There is a specific frequency we discovered for each drug, where the change in the electric profile begins which "aids the delivery". The delivery is measured by enhanced conductivity and is paralleled with increased drug throughput tracked by UV analysis.

Following its successful predecessor, this book covers the fundamentals, delivery routes and vehicles, and practical

applications of drug delivery. In the 2nd edition, almost all chapters from the previous are retained and updated and several new chapters added to make a more complete resource and reference. • Helps readers understand progress in drug delivery research and applications • Updates and expands coverage to reflect advances in materials for delivery vehicles, drug delivery approaches, and therapeutics • Covers recent developments including transdermal and mucosal delivery, lymphatic system delivery, theranostics • Adds new chapters on nanoparticles, controlled drug release systems, theranostics,

protein and peptide drugs, and biologics delivery

Theory and Practice

An Annotated Bibliography, 1939-1963

Case Histories

Modulation of Chemical Reactions by Glass Packing

Stability of Drugs and Dosage Forms

Freeze-drying of Pharmaceuticals and Biopharmaceuticals

The United States Food and Drug Administration (FDA) and other regulatory bodies around the world require that impurities in drug substance and drug product levels recommended by the International

Conference on Harmonisation (ICH) be isolated and characterized. Identifying process-related impurities and degradation products also helps us to understand the production of impurities and assists in defining degradation mechanisms. When this process is performed at an early stage, there is ample time to address various aspects of drug development to prevent or control the production of impurities and degradation products well before the regulatory filing and thus

assure production of a high-quality drug product. This book, therefore, has been designed to meet the need for a reference text on the complex process of isolation and characterization of process-related (synthesis and formulation) impurities and degradation products to meet critical requlatory requirements. It's objective is to provide guidance on isolating and characterizing impurities of pharmaceuticals such as drug candidates, drug substances, and drug

products. The book outlines impurity identification processes and will be a key resource document for impurity analysis, isolation/synthesis, and characterization. - Provides valuable information on isolation and characterization of impurities. - Gives a regulatory perspective on the subject. - Describes various considerations involved in meeting regulatory requirements. - Discusses various sources of impurities and degredation products.

This book comprehensively reviews drug stability and chemical kinetics: how external factors can influence the stability of drugs, and the reaction rates that trigger these effects. Explaining the important theoretical concepts of drug stability and chemical kinetics, and providing numerous examples in the form of illustrations, tables and calculations, the book helps readers gain a better understanding of the rates of reactions, order of reactions, types of degradation and how to

prevent it, as well as types of stability studies. It also offers insights into the importance of the rate at which the drug is degraded and/or decomposed under various external and internal conditions, including temperature, pH, humidity and light. This book is intended for researchers, PhD students and scientists working in the field of pharmacy, pharmacology, pharmaceutical chemistry, medicinal chemistry and biopharmaceutics.
During the past decade,

the importance of amorphous water-soluble substances has been increasingly recognised within the food and pharmaceutical industries. In response, Amorphous Food and Pharmaceutical Systems brings together current leading experts to contribute to this unique cross-disciplinary account of the subject. Coverage includes: water-compatible amorphous solids (physical, chemical behaviour), low water content systems (water as plasticizer); applications in food and pharmaceutical

sciences and industries (processing and stability) along with state-of-the-art technology in food and pharmaceutical systems. This timely publication will be welcomed by academic and industrial researchers and professionals in the pharmaceuticals, food, materials and polymer sciences.

An important resource that puts the focus on understanding and handling of organic crystals in drug development Since a majority of pharmaceutical solid-state materials are

organic crystals, their handling and processing are critical aspects of drug development. Pharmaceutical Crystals: Science and Engineering offers an introduction to and thorough coverage of organic crystals, and explores the essential role they play in drug development and manufacturing. Written contributions from leading researchers and practitioners in the field, this vital resource provides the fundamental knowledge and explains the connection between

pharmaceutically relevant properties and the structure of a crystal. Comprehensive in scope, the text covers a range of topics including: crystallization, molecular interactions, polymorphism, analytical methods, processing, and chemical stability. The authors clearly show how to find solutions for pharmaceutical form selection and crystallization processes. Designed to be an accessible guide, this book represents a valuable resource for improving the

drug development process of small drug molecules. This important text: Includes the most important aspects of solid-state organic chemistry and its role in drug development Offers solutions for pharmaceutical form selection and crystallization processes Contains a balance between the scientific fundamental and pharmaceutical applications Presents coverage of crystallography, molecular interactions, polymorphism, analytical

methods, processing, and chemical stability Written for both practicing pharmaceutical scientists, engineers, and senior undergraduate and graduate students studying pharmaceutical solid-state materials, Pharmaceutical Crystals: Science and Engineering is a reference and textbook for understanding, producing, analyzing, and designing organic crystals which is an imperative skill to master for anyone working in the field.

A Handbook for Pharmacists

Essentials of

Pharmaceutical Chemistry
Pharmaceutical Stress Testing
Predicting Drug Degradation, Second Edition
Physicochemical Principles of Pharmacy
A Textbook of Pharmaceutical Analysis

This unique book focuses on the currently 'hot topic' of Pharmaceutical Salts and Co-crystals. Combining both reports of the latest academic research and comprehensive overviews of basic principles,

with more applied contributions from selected experts in industry.

Provides a sound theoretical basis for understanding chemical kinetics and its uses in studying drug stability. Treats the calculations, approximations, and estimates that are useful to the pharmacist in professional practice, and presents a collection of selected drug-stability data from the pharmaceutical literature. This

Handbook makes accessible to the pharmacist much of the information necessary to make pharmaceutical decisions about drug stability. Changes in this edition include thorough revision of the chapter on oxidation, addition of a new chapter on solid-state stability, and a tripling of the number of stability monographs. All monographs figures have been redrawn, most of them from published data, and all sources

are cited.

This book describes the role modern pharmaceutical analysis plays in the development of new drugs. Detailed information is provided as to how the quality of drug products is assured from the point of discovery until the patient uses the drug. Coverage includes state-of-the-art topics such as analytics for combinatorial chemistry and high-throughput screening, formulation development, stability

studies, international regulatory aspects and documentation, and future technologies that are likely to impact the field. Emphasis is placed on current, easy-to-follow methods that readers can apply in their laboratories. No book has effectively replaced the very popular text, Pharmaceutical Analysis, that was edited in the 1960s by Tak Higuchi. This book will fill that gap with an up-to-date treatment that is both

handy and authoritative. Developing Solid Oral Dosage Forms is intended for pharmaceutical professionals engaged in research and development of oral dosage forms. It covers essential principles of physical pharmacy, biopharmaceutics and industrial pharmacy as well as various aspects of state-of-the-art techniques and approaches in pharmaceutical sciences and technologies along with examples and/or

case studies in product development. The objective of this book is to offer updated (or current) knowledge and skills required for rational oral product design and development. The specific goals are to provide readers with: Basics of modern theories of physical pharmacy, biopharmaceutics and industrial pharmacy and their applications throughout the entire process of research and development of oral

dosage forms Tools and approaches of preformulation investigation, formulation/process design, characterization and scale-up in pharmaceutical sciences and technologies New developments, challenges, trends, opportunities, intellectual property issues and regulations in solid product development The first book (ever) that provides comprehensive and in-depth coverage of

what's required for developing high quality pharmaceutical products to meet international standards It covers a broad scope of topics that encompass the entire spectrum of solid dosage form development for the global market, including the most updated science and technologies, practice, applications, regulation, intellectual property protection and new development trends with case studies in every chapter A strong

team of more than 50 well-established authors/co-authors of diverse background, knowledge, skills and experience from industry, academia and regulatory agencies

Drug Delivery

Organic Chemistry of Drug Degradation

Photostability Of Drugs And Drug Formulations

Developing Solid Oral Dosage Forms

Factors Affecting Chemical Stability of Pharmaceuticals

Handbook of Isolation

and Characterization of Impurities in Pharmaceuticals

Chemically stable solids are in demand for many applications, including pharmaceuticals and organic electronics. Previous efforts in crystals have established the importance of molecular packing in influencing chemical stability by comparing reaction kinetics in different polymorphs. However, efforts to improve chemical stability by modulating molecular packing in amorphous materials have seen much smaller effects. Recently, physical vapor deposition (PVD), a common

method to prepare thin films for organic electronics, is reported to create organic glasses with exceptional properties that cannot be accessed by any other method. By vapor-depositing molecules onto a substrate maintained at the temperature below the glass transition temperature (Tg), PVD glasses can demonstrate significantly enhanced thermal stability and increased density relative to traditional liquid-cooled glasses; the optimum substrate temperature usually occurs near 0.85 Tg. The discovery of high-density and high-thermal stability glasses by vapor-deposition

provides an opportunity to address questions of how chemical stability can be improved in glasses. The body of this work deals with the characterization of a variety of chemical reactions in organic glasses and establishes the connection between enhanced chemical stability and the distinctive glass packing achieved by vapor-deposition. Films of azobenzenes, photochromic molecules that can undergo trans to cis photoisomerization, were prepared by vapor-deposition at a wide range of substrate temperature. Photostability of vapor-deposited Disperse Orange 37, a push-pull

azobenzene with fast cis-trans thermal isomerization, is found to increase by as much as a factor of 50 relative to the liquid-cooled glass. Photostability was determined by measuring density and molecular orientation changes by ellipsometry during irradiation to induce photoisomerization. We further show that the enhanced photostability in vapor-deposited glasses is a general phenomenon by using a non-push-pull azobenzene, 4,4'-diphenyl azobenzene (DPA). By mixing DPA into the glass host of celecoxib, we directly measure populations of trans and cis DPA via UV-

Vis spectroscopy and show that the rate of photoisomerization varies as a function of the substrate temperature. Photostability correlates with the density of packing, where the optimum glass is about one order of magnitude more photostable than the liquid-cooled glass. These results show substantially increased photostability of azobenzenes in both neat films and mixtures and provide a molecular explanation for enhanced photostability in glasses. We further investigate the influence of dense glass packing on photodegradation, an important reaction type

responsible for degradation in pharmaceuticals and failure in organic electronics. Indomethacin, a pharmaceutical molecule that can undergo photodecarboxylation reaction when irradiated by UV light, was studied as a model system. Photodegradation of indomethacin was assessed through the light-induced mass decrease in glassy thin films caused by the loss of CO2, as characterized by a quartz crystal microbalance (QCM). For the most stable glass, vapor-deposited at 0.85 Tg, the photodegradation rate is about 50% slower than for the liquid-cooled glass when

irradiated by a 312 nm UV light. The enhanced stability against degradation correlates with glass density. We speculate that high-density glasses limit the local molecular reconfiguration required for photodecarboxylation. Additionally, to broaden the impact of vapor-deposition on chemical stability, we performed the solid-gas reaction of indomethacin with ammonia. Indomethacin has a carboxylic acid group that can react with ammonia to yield ammonium salt. In this case, chemical reactivity is assessed through the increase in mass induced by the addition of ammonia to

glassy thin films, as characterized by a QCM. Vapor-deposited indomethacin with increased density shows slower reaction rates with ammonia relative to the liquid-cooled glass, and the maximum difference in reaction rates is over one order of magnitude. We suggest that the diminished solubility of ammonia in vapor-deposited glasses contributes to their remarkable chemical stability.

Presents a detailed discussion of important solid-state properties, methods, and applications of solid-state analysis Illustrates the various phases or forms that solids can assume and

discussesvarious issues related to the relative stability of solid forms and tendencies to undergo transformation Covers key methods of solid state analysis including X-ray powder diffraction, thermal analysis, microscopy, spectroscopy, and solid state NMR Reviews critical physical attributes of pharmaceutical materials, mainly related to drug substances, including particle size/surface area, hygroscopicity, mechanical properties, solubility, and physical and chemical stability Showcases the application of solid state material science in rational selection of drug solid forms,

analysis of various solid forms within drug substance and the drug product, and pharmaceutical product development Introduces appropriate manufacturing and control procedures using Quality by Design, and other strategies that lead to safe and effective products with a minimum of resources and time

This 6th edition of the established textbook covers every aspect of drug properties from the design of dosage forms to their delivery by all routes to sites of action in the body.

An introduction to pharmaceutical chemistry for undergraduate pharmacy,

chemistry and medicinal chemistry students. Essentials of Pharmaceutical Chemistry is a chemistry introduction that covers all of the core material necessary to provide an understanding of the basic chemistry of drug molecules. Now a core text on many university courses, it contains numerous worked examples and problems. The 4th edition includes new chapters on Chromatographic Methods of Analysis, and Medicinal Chemistry - The Science of Drug Design. Drug-like Properties: Concepts, Structure Design and Methods

Science and Engineering

Trissel's Stability of

Compounded Formulations
Solid-State Properties of Pharmaceutical Materials
Pharmaceutical Theory and Practice
Drug Stability for Pharmaceutical Scientists

The International Conference of Harmonization (ICH) has worked on har- nizing the stability regulations in the US, Europe, and Japan since the early 1990s. Even though the Stability Guidelines Q1A (R2) was issued over a decade ago, issues surrounding this arena continue to surface as the

principles described in the guideline are applied to different technical concentrations. As a result, the stability community has continued to discuss concerns and find ways of harmonizing regulatory requirements, streamlining practices, improving processes in order to bring safe and effective medical supplies to the patients around the world. In 2007, the American Association of Pharmaceutical Scientists (AAPS) Stability Focus Group organized two

workshops – the Stability Workshop and the Degradation Mechanism Workshop. These meetings attracted many industry scientists as well as representatives from several regulatory agencies in the world to discuss important topics related to pharmaceutical stability practices. Recognizing the importance of documenting these discussions and with the permission of AAPS, I have worked with speakers to assemble a

collection of 30 articles from presentations given at these two meetings, mainly the Stability Workshop. I trust that this book will be beneficial to all of you in providing guidance and up-to-date information for building quality stability programs. v Freedom of our mind is Mother of all inventions. The Design and Manufacture of Medicines Amorphous Food and Pharmaceutical Systems Stability and Characterization of

Protein and Peptide Drugs
Regulations, Methodologies, and Best Practices