

# Particle-particle Adhesion in Pharmaceutical Powder Handling



**Fridrun Podczeck**

Imperial College Press

# Particleparticle Adhesion In Pharmaceutical Powder Handling

**Vijay Kumar Thakur, Manju Kumari  
Thakur**



## **Particleparticle Adhesion In Pharmaceutical Powder Handling:**

Particle-particle Adhesion In Pharmaceutical Powder Handling Fridrun Podczeck,1998-07-31 This monograph describes the physical principles of adhesion between particles and surfaces These principles are applied to pharmaceutical processes involved in the manufacture of solid dosage forms such as powders granules tablets and dry powder inhalations To help in the understanding of these systems physical properties of solid surfaces and an introduction to the theory of friction is given Techniques for measuring particle adhesion and fracture mechanical properties of powders are introduced as far as these are relevant to the processes discussed The philosophy of the book deviates from that of standard pharmaceutical textbooks in that it focuses primarily on physical principles involved in the manufacture of dosage forms rather than describing these processes purely by observation

**Particle Adhesion and Removal** K. L. Mittal,Ravi Jaiswal,2015-02-02 The book provides a comprehensive and easily accessible reference source covering all important aspects of particle adhesion and removal The core objective is to cover both fundamental and applied aspects of particle adhesion and removal with emphasis on recent developments Among the topics to be covered include 1 Fundamentals of surface forces in particle adhesion and removal 2 Mechanisms of particle adhesion and removal 3 Experimental methods e g AFM SFA SFM IFM etc to understand particle particle and particle substrate interactions 4 Mechanics of adhesion of micro and nanoscale particles 5 Various factors affecting particle adhesion to a variety of substrates 6 Surface modification techniques to modulate particle adhesion 7 Various cleaning methods both wet dry for particle removal 8 Relevance of particle adhesion in a host of technologies ranging from simple to ultra sophisticated

*Predictive Modeling of Pharmaceutical Unit Operations* Preetanshu Pandey,Rahul Bharadwaj,2016-09-26 The use of modeling and simulation tools is rapidly gaining prominence in the pharmaceutical industry covering a wide range of applications This book focuses on modeling and simulation tools as they pertain to drug product manufacturing processes although similar principles and tools may apply to many other areas Modeling tools can improve fundamental process understanding and provide valuable insights into the manufacturing processes which can result in significant process improvements and cost savings With FDA mandating the use of Quality by Design QbD principles during manufacturing reliable modeling techniques can help to alleviate the costs associated with such efforts and be used to create in silico formulation and process design space This book is geared toward detailing modeling techniques that are utilized for the various unit operations during drug product manufacturing By way of examples that include case studies various modeling principles are explained for the nonexpert end users A discussion on the role of modeling in quality risk management for manufacturing and application of modeling for continuous manufacturing and biologics is also included Explains the commonly used modeling and simulation tools Details the modeling of various unit operations commonly utilized in solid dosage drug product manufacturing Practical examples of the application of modeling tools through case studies Discussion of modeling techniques used for a risk based approach to regulatory filings Explores

the usage of modeling in upcoming areas such as continuous manufacturing and biologics manufacturing

**Handbook of Polymers for Pharmaceutical Technologies, Processing and Applications** Vijay Kumar Thakur, Manju Kumari Thakur, 2015-08-04 Polymers are one of the most fascinating materials of the present era finding their applications in almost every aspects of life Polymers are either directly available in nature or are chemically synthesized and used depending upon the targeted applications Advances in polymer science and the introduction of new polymers have resulted in the significant development of polymers with unique properties Different kinds of polymers have been and will be one of the key in several applications in many of the advanced pharmaceutical research being carried out over the globe This 4 part set of books contains precisely referenced chapters emphasizing different kinds of polymers with basic fundamentals and practicality for application in diverse pharmaceutical technologies The volumes aim at explaining basics of polymers based materials from different resources and their chemistry along with practical applications which present a future direction in the pharmaceutical industry Each volume offer deep insight into the subject being treated Volume 1 Structure and Chemistry Volume 2 Processing and Applications Volume 3 Biodegradable Polymers Volume 4 Bioactive and Compatible Synthetic Hybrid Polymers

**Dosage Form Design Parameters**, 2018-07-25 Dosage Form Design Parameters Volume II examines the history and current state of the field within the pharmaceutical sciences presenting key developments Content includes drug development issues the scale up of formulations regulatory issues intellectual property solid state properties and polymorphism Written by experts in the field this volume in the Advances in Pharmaceutical Product Development and Research series deepens our understanding of dosage form design parameters Chapters delve into a particular aspect of this fundamental field covering principles methodologies and the technologies employed by pharmaceutical scientists In addition the book contains a comprehensive examination suitable for researchers and advanced students working in pharmaceuticals cosmetics biotechnology and related industries Examines the history and recent developments in drug dosage forms for pharmaceutical sciences Focuses on physicochemical aspects preformulation solid state properties and polymorphism Contains extensive references for further discovery and learning that are appropriate for advanced undergraduates graduate students and those interested in drug dosage design

**Pharmaceutical Inhalation Aerosol Technology, Second Edition** Anthony J. Hickey, 2003-09-03 This thoroughly revised and expanded reference provides authoritative discussions on the physiologic pharmacologic metabolic molecular cellular and physicochemical factors influencing the efficacy and utilization of pharmaceutical aerosol It analyzes the latest science and developments in the generation administration and characterization of these compounds showcasing current clinical applications the efficiency and limitations of major aerosol products and emerging aerosol therapies impacting the field

**Pharmaceutical Process Engineering** Anthony J. Hickey, David Ganderton, 2016-03-09 With step by step methods of drug production and knowledge of major unit operations and key concepts of pharmaceutical engineering this guide will help to improve communication among the varied

professionals working in the pharmaceutical industry Key features REVISION OF A BESTSELLER Updates include recent advances in the field to keep pharmac

*Modern Pharmaceutics* Gilbert S. Banker, Juergen Siepmann, Christopher Rhodes, 2002-05-24 Completely revised and expanded throughout Presents a comprehensive integrated sequenced approach to drug dosage formulation design and evaluation Identifies the pharmacodynamic and physicochemical factors influencing drug action through various routes of administration

**Chemical Engineering in the Pharmaceutical Industry** David J. am Ende, 2011-03-10 This book deals with various unique elements in the drug development process within chemical engineering science and pharmaceutical R D The book is intended to be used as a professional reference and potentially as a text book reference in pharmaceutical engineering and pharmaceutical sciences Many of the experimental methods related to pharmaceutical process development are learned on the job This book is intended to provide many of those important concepts that R D Engineers and manufacturing Engineers should know and be familiar if they are going to be successful in the Pharmaceutical Industry These include basic analytics for quantitation of reaction components often skipped in ChE Reaction Engineering and kinetics books In addition Chemical Engineering in the Pharmaceutical Industry introduces contemporary methods of data analysis for kinetic modeling and extends these concepts into Quality by Design strategies for regulatory filings For the current professionals in silico process modeling tools that streamline experimental screening approaches is also new and presented here Continuous flow processing although mainstream for ChE is unique in this context given the range of scales and the complex economics associated with transforming existing batch plant capacity The book will be split into four distinct yet related parts These parts will address the fundamentals of analytical techniques for engineers thermodynamic modeling and finally provides an appendix with common engineering tools and examples of their applications

**Particulate Products** Henk G. Merkus, Gabriel M.H. Meesters, 2013-11-19 Particulate products make up around 80% of chemical products from all industry sectors Examples given in this book include the construction materials fine ceramics and concrete the delicacies chocolate and ice cream pharmaceutical powders medical inhalers and sun screen liquid and powder paints Size distribution and the shape of the particles provide for different functionalities in these products Some functions are general others specific General functions are powder flow and require at the typical particulate concentrations of these products that the particles cause adequate rheological behavior during processing and or for product performance Therefore this book addresses particle packing as well as its relation to powder flow and rheological behavior Moreover general relationships to particle size are discussed for e g color and sensorial aspects of particulate products Product specific functionalities are often relevant for comparable product groups Particle size distribution and shape provide for example the following functionalities dense particle packing in relation to sufficient strength is required in concrete construction ceramic objects and pharmaceutical tablets good sensorial properties mouthfeel to chocolate and ice cream effective dissolution flow and compression properties for pharmaceutical powders adequate hiding power and effective

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*Chemical Engineering in the Pharmaceutical Industry* Mary T. am Ende, David J. am

Ende, 2019-04-08 A guide to the important chemical engineering concepts for the development of new drugs revised second edition The revised and updated second edition of *Chemical Engineering in the Pharmaceutical Industry* offers a guide to the experimental and computational methods related to drug product design and development The second edition has been greatly expanded and covers a range of topics related to formulation design and process development of drug products The authors review basic analytics for quantitation of drug product quality attributes such as potency purity content uniformity and dissolution that are addressed with consideration of the applied statistics process analytical technology and process control The 2nd Edition is divided into two separate books 1 Active Pharmaceutical Ingredients API s and 2 Drug Product Design Development and Modeling The contributors explore technology transfer and scale up of batch processes that are exemplified experimentally and computationally Written for engineers working in the field the book examines in silico process modeling tools that streamline experimental screening approaches In addition the authors discuss the emerging field of continuous drug product manufacturing This revised second edition Contains 21 new or revised chapters including chapters on quality by design computational approaches for drug product modeling process design with PAT and process control engineering challenges and solutions Covers chemistry and engineering activities related to dosage form design and process development and scale up Offers analytical methods and applied statistics that highlight drug product quality attributes as design features Presents updated and new example calculations and associated solutions Includes contributions from leading experts in the field Written for pharmaceutical engineers chemical engineers undergraduate and graduation students and professionals in the field of pharmaceutical sciences and manufacturing *Chemical Engineering in the Pharmaceutical Industry* Second Edition contains information designed to be of use from the engineer s perspective and

spans information from solid to semi solid to lyophilized drug products

**Multiphase Flow with Solid Particles** Pawel Kosinski, 2023-10-19 Multiphase flow is an area of fluid dynamics that describes interactions between two or more phases of matter and is relevant across a wide range of industrial processes and natural environmental systems from the transport of natural resources to volcanic ash flow This book covers the topic in detail providing clear explanations of the underlying physics behind the complex behaviour of solid particles in fluids The forces involved in particle fluid interactions are first used to describe the interactions between the particles and the fundamentals of contact mechanics are then outlined and applied to model interparticle collisions The book is illustrated with frequent worked examples and algorithms enabling the reader to develop the required tools for simulating the flow of fluids with solid particles This self contained text will appeal to physicists applied mathematicians and mechanical engineers working in this important area of research

**Handbook of Lung Targeted Drug Delivery Systems** Yashwant Pathak, Nazrul Islam, 2021-10-18 Handbook of Lung Targeted Drug Delivery Systems Recent Trends and Clinical Evidences covers every aspect of the drug delivery to lungs the physiology and pharmacology of the lung modelling for lung delivery drug devices focused on lung treatment regulatory requirements and recent trends in clinical applications With the advent of nano sciences and significant development in the nano particulate drug delivery systems there has been a renewed interest in the lung as an absorption surface for various drugs The emergence of the COVID 19 virus has brought lung and lung delivery systems into focus this book covers new developments and research used to address the prevention and treatment of respiratory diseases Written by well known scientists with years of experience in the field this timely handbook is an excellent reference book for the scientists and industry professionals Key Features Focuses particularly on the chemistry clinical pharmacology and biological developments in this field of research Presents comprehensive information on emerging nanotechnology applications in diagnosing and treating pulmonary diseases Explores drug devices focused on lung treatment regulatory requirements and recent trends in clinical applications Examines specific formulations targeted to pulmonary systems

**Inhalation Drug Delivery** Paolo Colombo, Daniela Traini, Francesca Buttini, 2013-02-11 There has been a rapid evolution in the field of inhalation drug therapy including new drugs increased regulation and quality control and strong pressure from generics Inhalation Drug Therapy brings together the most current inhalation drug research as well as practical developments and processes into one essential guide Focusing on inhalation products and specific equipment and techniques used in manufacturing and quality control the book balances research with the industrial aspects of creating the drugs and features a highly regarded author team with both academic and industry experience

**Aulton's Pharmaceuticals E-Book** Kevin M.G. Taylor, Michael E. Aulton, 2013-07-29 Pharmaceuticals 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 pharmaceuticals 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 pharmaceuticals 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 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 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 Encyclopedia of Surface and Colloid Science, 2004 Update Supplement P. Somasundaran, 2014-05-08 Appending the Encyclopedia of Surface and Colloid Science by 42 entries as well as 3800 new citations 1012 equations and 485 illustrations and chemical structures this important supplement summarizes a constellation of new theoretical and experimental findings related to chemical characterization mechanisms interfacial behavior methods and mo

**Physicochemical Principles of Pharmacy** Alexander T Florence, David Attwood, 2015-12-01 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 Pharmaceutical Powder and Particles Anthony J. Hickey, Stefano Giovagnoli, 2025-03-03 This book in the AAPS book series concisely reviews important aspects of powder and particle systems and the critical quality attributes that should be used as a guide to future developments intended to maximize the control of product quality and performance Hickey and Giovagnoli have written an essential book for any scientists involved in powder or particle research and manufacturing It is appropriate for those just entering the field or as a rapid reference for the experienced pharmaceutical scientist The authors have both academic and industrial experience and the coverage includes solid state chemistry crystallization physical processes particle size and distribution particle interaction manufacturing processes quality by design and a general discussion of the industry Pharmaceutical Powder and Particles is intended to concisely review important aspects of powder and particle systems and the critical quality attributes that should be used as a guide to future developments intended to maximize the control of product quality and performance Innovation in manufacturing has



expanded the range of options available for solid dosage form manufacture while continuing to rely on first principles of solid state chemistry and characterization methods for powders and particles In this new edition the authors have expanded on existing chapters and added sections on new developments in the recent and evolving manufacturing processes including additive manufacturing technologies controlled crystallization spray freeze drying technology and more The editors have also comprehensively updated the references throughout the entire book

**Supercritical Fluid Technology for Drug Product Development** Peter York,Uday B. Kompella,Boris Y. Shekunov,2004-03-23 Interconnecting the fundamentals of supercritical fluid SCF technologies their current and anticipated utility in drug delivery and process engineering advances from related methodological domains and pharmaceutical applications this volume unlocks the potential of supercritical fluids to further the development of improved pharmaceutical products from drug powders for respiratory delivery to drug delivery systems for controlled release

**Pharmaceutical Capsules** Fridrun Podczeck,Brian E. Jones,2004 Updated and expanded second edition covers all aspects of capsule technology including history standards methods and equipment used in manufacture filling printing weighing cleaning and inspecting of both hard and soft capsules

This book delves into Particleparticle Adhesion In Pharmaceutical Powder Handling. Particleparticle Adhesion In Pharmaceutical Powder Handling is an essential topic that needs to be grasped by everyone, ranging from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Particleparticle Adhesion In Pharmaceutical Powder Handling, encompassing both the fundamentals and more intricate discussions.

1. The book is structured into several chapters, namely:
    - Chapter 1: Introduction to Particleparticle Adhesion In Pharmaceutical Powder Handling
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    - Chapter 3: Particleparticle Adhesion In Pharmaceutical Powder Handling in Everyday Life
    - Chapter 4: Particleparticle Adhesion In Pharmaceutical Powder Handling in Specific Contexts
    - Chapter 5: Conclusion
  2. In chapter 1, the author will provide an overview of Particleparticle Adhesion In Pharmaceutical Powder Handling. The first chapter will explore what Particleparticle Adhesion In Pharmaceutical Powder Handling is, why Particleparticle Adhesion In Pharmaceutical Powder Handling is vital, and how to effectively learn about Particleparticle Adhesion In Pharmaceutical Powder Handling.
  3. In chapter 2, the author will delve into the foundational concepts of Particleparticle Adhesion In Pharmaceutical Powder Handling. This chapter will elucidate the essential principles that need to be understood to grasp Particleparticle Adhesion In Pharmaceutical Powder Handling in its entirety.
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  5. In chapter 4, the author will scrutinize the relevance of Particleparticle Adhesion In Pharmaceutical Powder Handling in specific contexts. This chapter will explore how Particleparticle Adhesion In Pharmaceutical Powder Handling is applied in specialized fields, such as education, business, and technology.
  6. In chapter 5, the author will draw a conclusion about Particleparticle Adhesion In Pharmaceutical Powder Handling. This chapter will summarize the key points that have been discussed throughout the book.
- The book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Particleparticle Adhesion In Pharmaceutical Powder Handling.

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