

Book reviews

Advanced Pharmaceutical Solids

Jens T. Carstensen; Marcel Dekker, New York, Basel, 2001, 518 pages, ISBN 0-8247-0431-2 (US\$ 195.00)

The author of this book is a well known scientist with a broad experience in pharmaceutical solid science. The book summarises several decades of teaching for graduate students and presents a look back. The intention is to provide information about solids and solid dosage forms for advanced pharmaceutical scientists and practitioners. The scope of the book lies between those of textbooks about general pharmaceutical technology and specialised books on certain dosage forms or solid state topics. In this respect, it might fill a gap to give a broad overview in pharmaceutical solid science.

The content is intended to be focused on the principles and models of solids but not on details, particular examples or equipment. Beside very recent references presenting new aspects and the latest developments the author frequently tries to cite those scientists, who were the really innovators in different topics of pharmaceutical solid science. Thus, many 'classical' references are given in the text. On the other hand, a number of papers are discussed critically with respect to misinterpretations.

The 29 chapters cover topics ranging from one component systems to sustained release by microencapsulation. The first chapters are dealing with basic characteristics of solids like solubility, particle size, micromeritics, crystallisation, amorphates, polymorphism, moisture isotherms and melting point diagrams. Then the principles of dissolution, solid state stability and the effect of moisture on solid state stability are elucidated. In these parts of the book, a number of thermodynamic principles, other physico-chemical basics and statistical distributions are presented comprehensively, and many other topics are mentioned briefly.

The following part of the book concerned with a bulk of particles and several processes: apparent volumes and densities, cohesion, powder flow, comminution, blending and wet granulation. In the last part of the book, more complicated dosage forms and excipients are analysed: hard shell capsules, tablets including aspects of disintegration and dissolution, polymers, coating of tablets, single unit sustained release dosage forms and sustained release by microencapsulation. With increasing complexity of the presented systems, it becomes more difficult to present basic principles and models. Important items are presented and discussed, some of them are related to certain types of equipment. Due to the limited space, it is difficult to be

comprehensive, e. g. the chapter wet granulation consists only of 21 pages including one page for pellets (my favourite subject). Important models for wet granulation and the mechanisms of granule formation are not presented. The physics of the process is described in 10 lines. The reader might be happy to learn something about recent developments, e. g. the work of Tardos, Watano or Iveson.

The textbook seems to be useful for people who start to specialise in the field of solid dosage forms and for all scientists who would like to study a brief introduction to a specific topic of pharmaceutical solid sciences. The author does not only present knowledge but gives critical remarks on the correct methodology of treating data, on possible misinterpretations and on the novelty and soundness of different concepts. The reader gets some advice and benefits from the rich experience of the author. This makes the book very valuable, not only for beginners. However, a specialist in a certain field will refer to more specialised textbooks.

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"Particle-Particle Adhesion in Pharmaceutical Powder Handling"

Fridrun Podczek, World Scientific Publishing Ltd., ISBN 1-86094-112-5, £35.00

This monograph describes in four chapters the particle-particle-interaction in pharmaceutical powder handling. The pharmaceutical aspects are reduced to a few examples of the pharmaceutical praxis. The described principles are fundamental and useful for all other industries which have to handle powders.

The first chapter deals with the basic forces which are responsible for the interactions and adhesion of particles at walls and surfaces. Special attention is directed to the adhesion models of Krupp, Dahneke, Johnson-Kendall-Roberts (JKR) and Deryaguin-Müller-Toporov (DMT). The models differ from one to the other by the way in

which the deformation of the adhesion partners is introduced to the adhesion theory, including the elastic deformation based on Hertz-theory, on plastic or viscoelastic properties. The theory mostly used in the Anglo-American scientific world is the JKR theory with the improvements and extensions of Maugis, Barquins and Pollock. Until today the mathematical models fail in their practical application because of neglecting the ever-existing surface roughness. An empirical adaptation is therefore necessary.

In the second chapter Podczek gives a short (perhaps too short) overview of the theory of friction. Instead of regarding the perpendicular adhesion forces used in the adhesion theories, in the friction theory the tangential forces are more important. Unfortunately there is no strong correlation between perpendicular and tangential forces, which could help in predicting the friction phenomena.

Chapter 3 describes the trial to combine the knowledge of idealised adhesion with the properties of powders used in bunkers and silos, in redispersing of particles within the air for the medical purpose of inhalation, in agglomeration and tableting. Podczek states that there is no lack in finding and discussing the parameters influencing these processes, but nearly all investigations failed in correlating the basic physics with the practice.

The last chapter deals with the methods of measuring particle adhesion such as centrifugation, using the scanning force microscope or separating by flow forces. Measuring material properties such as Young's modulus and tensile strength close this chapter.

The special value of the monograph is based on the detailed presentations and comparisons of all known models of adhesion forces. The other chapters are very short and only for users who deal with the practical problems of adhesion influencing powder technology for the first time.

Of especial worth for everyone is the extended bibliography.

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