

THE SCIENCE OF DOSAGE FORM DESIGN



Edited by
M. E. Aulton



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- 28. **Coating of tablets and multiparticulates** 441
John Hogan
- 29. **Hard gelatin capsules** 449
Brian Jones
- 30. **Soft gelatin capsules** 461
Keith Hutchison, Josephine Ferdinando
- 31. **Pulmonary drug delivery** 473
Kevin Taylor
- 32. **Nasal drug delivery** 489
Peter Taylor
- 33. **Transdermal drug delivery** 499
Brian Barry
- 34. **Rectal and vaginal drug delivery** 534
Josef Tukker

PART FIVE

Pharmaceutical microbiology 597

- 39. **Fundamentals of microbiology** 599

Geoff Hanlon

- 40. **Pharmaceutical applications of microbiological techniques** 623

Norman Hodges

- 41. **The action of physical and chemical agents on microorganisms** 643

Geoff Hanlon, Norman Hodges

- 42. **Microbiological contamination and preservation of pharmaceutical products** 658

Malcolm Parker, Norman Hodges

Index 669

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CHAPTER CONTENTS

Introduction 398**Quality attributes of tablets 398****Tablet manufacturing 399**

- Stages in tablet formation 399
 - Die filling 399
 - Tablet formation 399
 - Tablet ejection 399
- Tablet presses 399
 - Single-punch press (eccentric press) 399
 - Rotary press 400
 - Computerized hydraulic press 400
 - Instrumentation of tablet presses 400
- Technical problems during tableting 402
- Tablet production via granulation 403
 - Rationale for granulating powders prior to tableting 403
 - Granulation by convective mixing 403
 - Alternative granulation procedures 404
- Tablet production by direct compaction 404

Tablet excipients 404

- Filler (or diluent) 404
- Disintegrant 406
- Binder 407
- Glidant 408
- Lubricant 408
- Antiadherent 410
- Sorbent 410
- Flavour 410
- Colourant 410

Tablet types 410

- Classification of tablets 410
- Disintegrating tablets 411
- Chewable tablets 412
- Effervescent tablets 412
- Lozenges 413
- Sublingual and buccal tablets 413
- Extended-release tablets 413
 - Classification of extended-release tablets 413
 - Diffusion-controlled release systems 414
 - Reservoir systems 414
 - Matrix systems 415
 - Dissolution-controlled release systems 415

- Erosion-controlled release systems 416
- Osmosis-controlled release systems 417

Tablet testing 417

- Uniformity of content of active ingredient 417
- Disintegration 418
- Dissolution 419
 - Stirred-vessel methods 419
 - Continuous-flow methods 419
- Mechanical strength 420
 - Attrition-resistance methods 422
 - Fracture-resistance methods 422

Fundamental aspects of the compression of powders 423

- Mechanisms of compression of particles 423
- Evaluation of compression behaviour 424
 - Procedures 424
 - Inspection of tablets 425
 - Pore structure and specific surface area of tablets 425
 - Force-displacement profiles 426
 - Tablet volume-applied pressure profiles 427
 - Heckel equation 427
 - Strain-rate sensitivity 428
 - Kawakita equation 428
 - Evaluation of die-wall friction during compression 428

Fundamental aspects of the compaction of powders 430

- Bonding in tablets 430
- The compactability of powders and the strength of tablets 431
- Post-compaction tablet strength changes 433

Relationships between material properties and tablet strength 435

- Factors of importance for powder compactability 435
- The compaction of solid particles 435
- The compaction of granules 437
- The compaction of binary mixtures 438

References 439**Bibliography 439**

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39

compression is not new. In 1843 the first patent for a hand-operated device used to form a tablet was granted. The use of tablets as dosage form became of interest to the growing pharmaceutical industry, but within pharmacies the pill (a dosage form for oral administration formed by hand into spherical particles about 4–6 mm in diameter) remained the most popular solid dosage form for a long time.

A tablet consists of one or more drugs (active ingredients) as well as a series of other substances used in the formulation of a complete preparation. In the European Pharmacopoeia (3rd edition, 1997) tablets are defined as 'solid preparations each containing a single dose of one or more active ingredients and obtained by compressing uniform volumes of particles. They are intended for oral administration. Some are swallowed whole, some after being chewed, some are dissolved or dispersed in water before being administered and some are retained in the mouth, where the active ingredient is 'liberated'. Thus, a variety of tablets exists and the type of excipients and also the way in which they are incorporated in the tablet vary between the different types. There are also other dosage forms that can be prepared in a similar way, such as suppositories, but which are administered by other routes.

Tablets are used mainly for systemic drug delivery but also for local drug action. For systemic use the drug must be released from the tablet, i.e. normally dissolved in the fluids of the mouth, stomach or intestine, and thereafter be absorbed into the systemic circulation, by which it reaches its site of action. Alternatively, tablets can be formulated for local delivery of drugs in the mouth or gastrointestinal tract, or can be used to increase temporarily the pH of the stomach.

Tablets are popular for several reasons:

- The oral route represents a convenient and safe way of drug administration.
- Compared to liquid dosage forms tablets have general advantages in terms of the chemical and physical stability of the dosage form.
- The preparation procedure enables accurate dosing of the drug.

or poorly absorbable drugs. In addition, some drugs may cause local irritant effects or otherwise cause harm to the gastrointestinal mucosa.

QUALITY ATTRIBUTES OF TABLETS

Like all other dosage forms, tablets should fulfil a number of specifications regarding their chemical, physical and biological properties. Quality issues relating to the final product are worth considering early in the development process (and thus early in this chapter) as they give an indication of the goal to be achieved during the development and manufacture of tablets.

Tests and specifications for some of these properties are given in pharmacopoeias. The most important of these are dose content and dose uniformity, the release of the drug in terms of tablet disintegration and drug dissolution, and the microbial quality of the preparation. In addition, the authorities and manufacturers define a set of other specifications. One such important property is the resistance of the tablet towards attrition and fracture.

The quality attributes a tablet must fulfil can be summarized as follows:

1. The tablet should include the correct dose of the drug.
2. The appearance of the tablet should be elegant and its weight, size and appearance should be consistent.
3. The drug should be released from the tablet in a controlled and reproducible way.
4. The tablet should be biocompatible, i.e. not include excipients, contaminants and microorganisms that could cause harm to patients.
5. The tablet should be of sufficient mechanical strength to withstand fracture and erosion during handling.
6. The tablet should be chemically, physically and microbiologically stable during the lifetime of the product.

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