12

Powder flow

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CHAPTER CONTENTS

KEY POINTS

- The flow of powders and granules (a very common pharmaceutical operation) is much more difficult than that of liquids. The flow is often variable and unpredictable.
- These difficulties are caused by the adhesive and cohesive characteristics of the powder. These are surface properties and thus their magnitude is greatly influenced by particle and surface characteristics, such as particle size, roughness, surface free energy, shape, etc.
- A thorough knowledge of powder flow can assist in the design of efficient equipment for powder handling.
- It is important that, even in the early stages of formulation development, the pharmaceutical scientist is aware of how the intended formulation will perform, for example, on a high-speed tabletting machine.
- Because of the importance of powder flow, many laboratory tests have been developed to help predict how a material (or more often a mix of materials) will perform during manufacture. Hausner ratio and Carr's Index have proved to be particularly useful in this context.
- It is an important aspect in formulation design for the pharmaceutical scientist to make every effort to improve the flow of the powders in a particular product, rather than just accepting the material supplied in order to minimize production problems. The scientist can help to set the specification of size, shape, size distribution, etc., or make formulation changes, e.g. by adding flow activators or glidants.

Introduction

Powders are generally considered to be composed of solid particles of the same or different chemical compositions having equivalent diameters less than 1000 μm. Granules are groups of particles formed