Powder properties

Manufacturing processes frequently involve the movement, blending, manipulation and compression of powders and so will be affected by powder properties. Powder properties that are affected by size and shape can be manipulated without changing physical form by changing crystal habit.

Particle size and shape

Particle shape is most easily determined by visual inspection with a microscope (some typical particle shapes are shown in Fig. 23.16). Usually a light microscope will suffice, unless the material is a spray-dried or micronized powder, in which case scanning electron microscopy (SEM) might be a better option. If the particles are not spherical but are irregularly shaped, it is difficult to define exactly which dimension should be used to define the particle size. Several semi-empirical measures have been proposed, e.g. Feret's diameter and Martin's diameter (see Chapter 9, Fig. 9.3 and associated text).

Powder flow

Powders must have good flow properties in order to fill tablet presses or capsule filling machines and to ensure blend uniformity when mixed with excipients. This is discussed in Chapter 12.

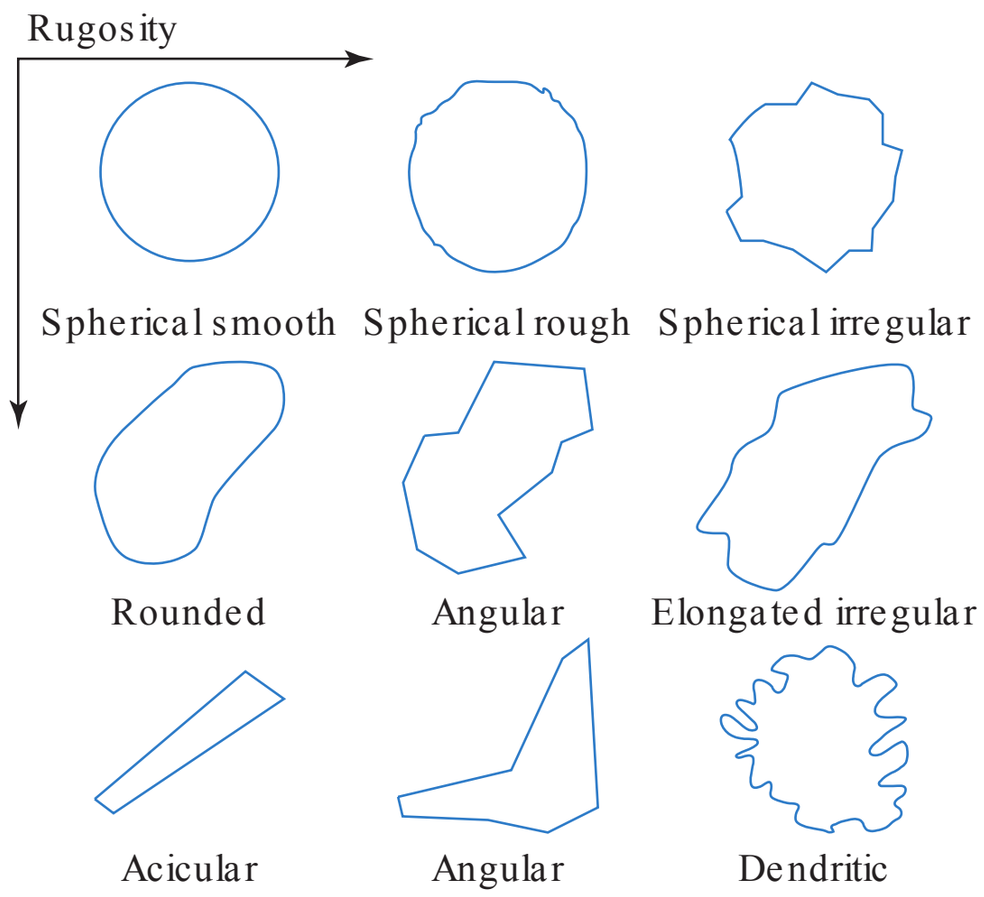

Fig. 23.16 • Some typical powder shapes.

While poor powder flow will not hinder development of a dosage form it may prove a major challenge for commercial manufacture and so early assessment of powder flow allows time to ameliorate any problems. Assessing powder flow is easy when large volumes of material are available, but during preformulation methods must be used that require only small volumes of powder. The two most relevant methods of assessment at the preformulation stage involve the measurement of the angle of repose and measurement of bulk density. These measurements and their use in powder flow prediction are discussed in Chapter 12. The parameters of angle of repose (Table 12.1 and Table 12.2), Carr's index (Eqn 12.14, Table 12.3) and Hausner ratio (Eqn 12.13, Table 12.3) (the latter two are both calculated from measurements of bulk density) have proved to be the most useful in predicting bulk properties when only a small amount of test material is available (illustrated in Fig. 23.17).

Compaction properties

Compaction is a result of the compression and cohesion properties of a drug (Chapter 30). These

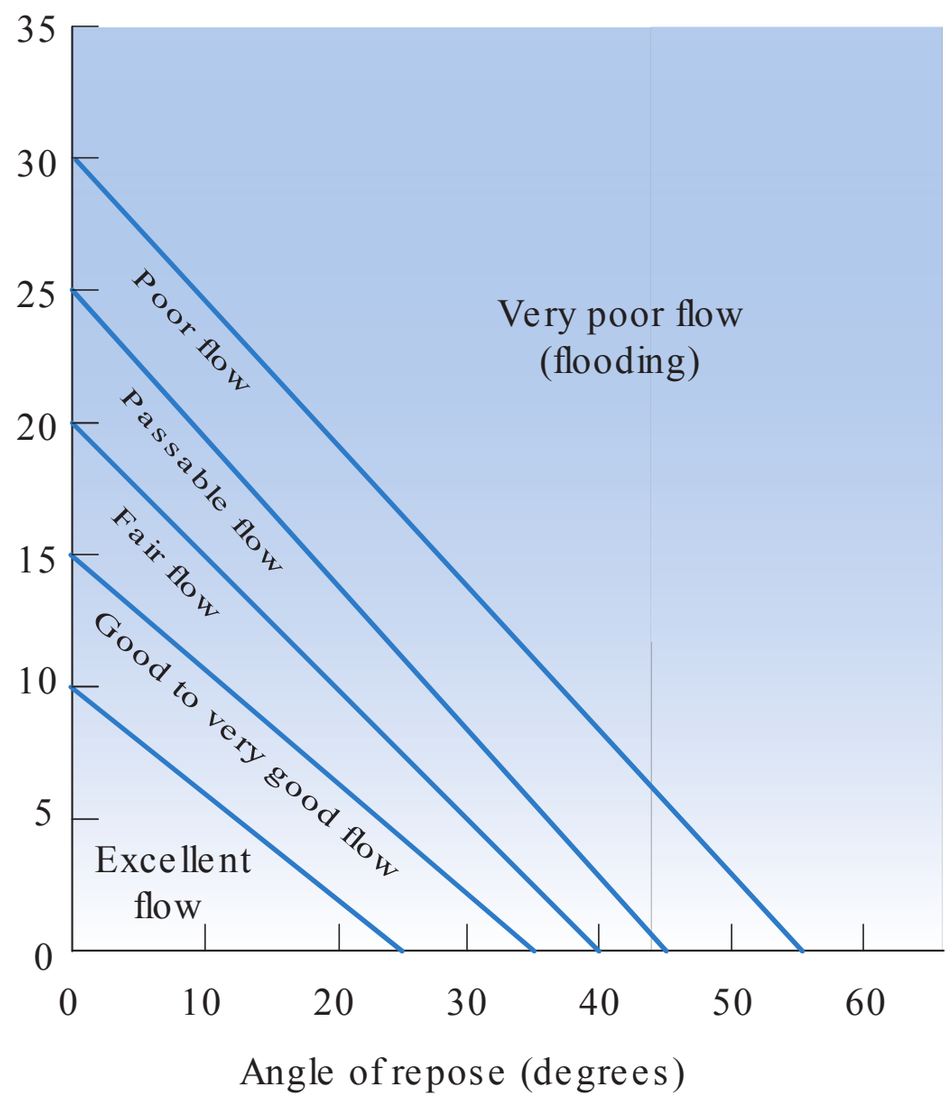

Fig. 23.17 • Relationship between Carr's index and angle of repose, and their correlation to powder flow characteristics.