

5.1. MICROMERITICS

5.1.1. Introduction

A field of science that deals with the study of small particles is known as micromeritics. The knowledge and control of particle size shows its relevance in the field of pharmacy and material science. The field of micromeritics includes the characterisation of:

- 1) Individual particles,
- 2) Particle size distribution, and
- 3) Rheology of powders.

The physical, chemical, and pharmacological properties of drug are associated with the size and surface area of a particle. Release of dosage form from a drug administered orally, parentally, rectally, and topically is influenced by the particle size of drug.

Physical stability and pharmacological response of pharmaceutical preparations, i.e., suspensions, emulsions, and tablets, are also dependable on the particle size.

In the field of pharmacy, micromeritics has become an important area of study. The pharmacists consider their pharmaceutical attributes and biological necessities during the preparations of dosage forms.

5.1.2. Characteristics of Particles

Characteristics of the particles affect the dissolution rate, absorption rate, content uniformity, taste, texture, colour, and stability of drug. The properties mentioned below characterise the individual particles:

- 1) Particle size,
- 2) Particle size distribution,
- 3) Mean particle size,
- 4) Particle number,
- 5) Number and weight distribution,
- 6) Particle shape, and
- 7) Specific surface.

5.1.2.1. Particle Size

The term **particle size** is used to compare the dimensions of solid particles (flakes), liquid particles (droplets), or gaseous particles (bubbles).

The term particle size is applicable for:

- 1) Colloidal particles,
- 2) Particles in ecology,
- 3) Particles present in particulate matter,
- 4) Particles that form a granular material, and
- 5) The particle size of a spherical object (unambiguously and quantitatively defined by its diameter).

Some of the materials are found to be irregular and non-spherical in shape, but are asymmetrical, e.g., powder. Thus, the particle size is not easily determined as a meaningful diameter; but is expressed as the diameter associated with an equivalent spherical diameter.

The particle size can be expressed in the following ways:

- 1) **Surface Diameter (d_s):** It is the diameter of a sphere having the same surface area as that of the asymmetric particle.
- 2) **Volume Diameter (d_v):** It is the diameter of a sphere having the same volume as that of the asymmetric particle.
- 3) **Projected Diameter (d_p):** It is the diameter of a sphere having the same area of the asymmetric particle as observed under a microscope.
- 4) **Stoke's Diameter (d_{st}):** It is the diameter of an equivalent sphere undergoing sedimentation at the same rate as the asymmetric particle.
- 5) **Sieve Diameter (d_{sieve}):** It is the diameter of a sphere that passes through the same sieve aperture as the asymmetric particle.
- 6) **Volume-Surface Diameter (d_{vs}):** It is the diameter of a sphere having the same volume to surface area ratio as the asymmetric particle.