

PARTICLE SIZE ANALYSIS PMMA

TASK

The processing properties of a powder or suspension depend crucially on the particle size, the particle shape and the surface chemistry of the particles. One powder may trickle finely, while another tends to clump together. Particles that are too large can clog filters, while particles that are too small can cause a high level of dust formation during further processing. This is just a small selection of issues that can be attributed to different particle properties.

SOLUTION

Analytik Service Obernburg uses various analytical methods for particle characterization, which are described in more detail below.

Industries

Medical technology
Paint manufacturers
Compounders

Analysis goals

Particle size
Particle shape
Agglomeration
tendency

Materials

Powders
Suspensions

Analysis method

Laser diffraction
Scanning electron
microscopy (SEM-EDX)



EXAMPLE - PARTICLE SIZE DISTRIBUTION

The particle size distribution is determined using laser diffraction. Particles between 0.1 μm and 2000 μm can be measured. A distribution curve is obtained from which the particle size can be read, as well as various statistical values to describe the distribution (Fig. 1). These values can be used directly to validate the manufacturing process in quality assurance. The test is carried out on the powder dispersed in water. By measuring without and with ultrasound, a distinction can be made between agglomerates and primary particles.

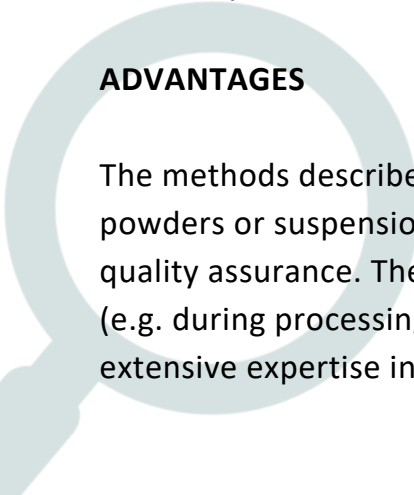
EXAMPLE - PARTICLE SHAPE

Various microscopic measurement methods are available to examine the particle shape - from light microscopy and electron microscopy (SEM) to atomic force microscopy (AFM). This allows not only the shape of the particles to be characterized, but also their surface fine structure. Both are decisive for the interaction between the particles (e.g. agglomeration tendency) (Fig. 2). If required, the shape of the particles can be quantified by subsequent computer image analysis.

EXAMPLE - SURFACE CHEMISTRY

Just like the particle shape, the surface chemistry (moisture, foreign substances such as oils or specific surface modifications) also influences the properties during processing or the distribution of the particles in the end product. Depending on the issue at hand, different chemical or spectroscopic methods are used to detect changes in surface chemistry.

ADVANTAGES



The methods described allow extensive characterization and visualization of particles in powders or suspensions. This allows raw materials or products to be analyzed as part of quality assurance. The methods are also suitable for determining the cause of problems (e.g. during processing) in the event of damage. Analytik Service Obernburg also has extensive expertise in the analysis of catalysts or fillers in solids.

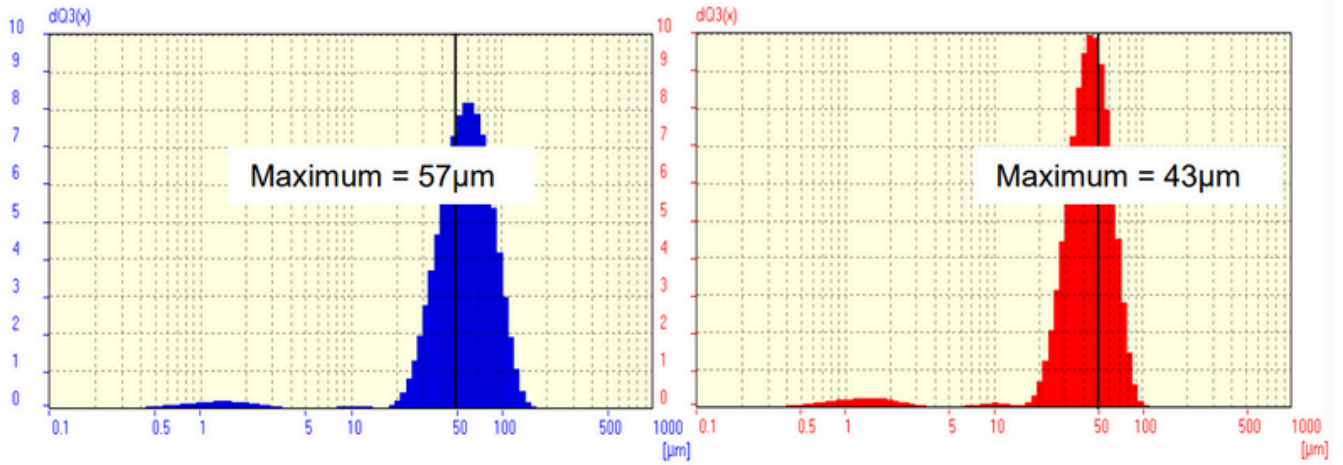


Fig. 1: Particle size distribution of two samples from different production batches.

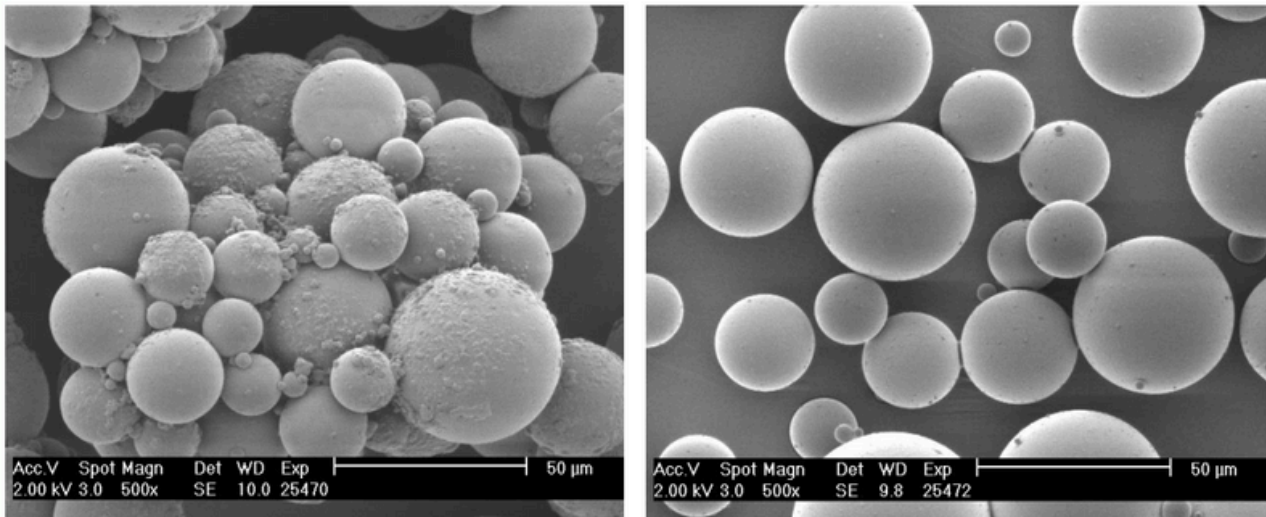


Fig. 2: Comparison of powders with different agglomeration tendencies