Tiny and Delicate – Focus on Particles.

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The problem:

The processing characteristics of a powder or a suspension are crucially dependent on *size*, *shape* and *surface chemistry* of the particles. One kind of powder may finely trickle, and the next one may be prone to agglomeration. Too large particles can lead to clogging of filters; too small particles can lead to a heavy dust formation during processing. This is only a small selection of effects attributable to different particle properties.

The solution:

The Analytical Services Obernburg uses different analytical methods for particle characterization as shown below.

Example: particle size distribution

The particle size distribution is analyzed by means of laser diffraction for particles between 0.1 µm and 2000 µm in size. One obtains a distribution curve that gives both the particle size and various statistical parameters describing the distribution (Fig. 1). These data are directly useful in quality control to validate the production process. The analysis is possible in different liquids – so one can find a suitable medium for any sample; its selection is determined by the solubility or the swelling behaviour of the sample.

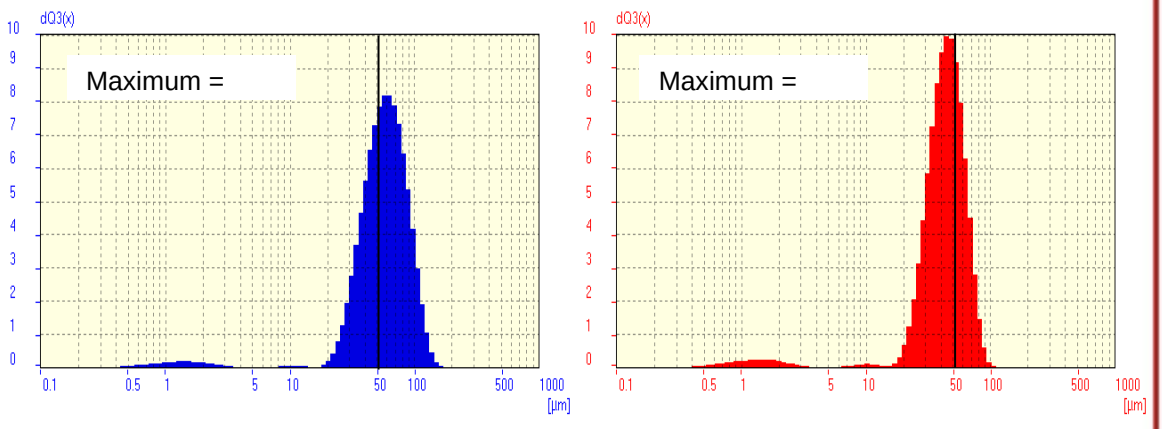

Fig. 1: Particle size distribution of two samples from different production batches.

Industries (A-Z)
Medical Technology
Lacquer manufacturer
Compundeure

Objectives
Particle size
Particle shape
Agglomeration tendency

Materials (A-Z)
Powder
Suspensions

Analytical Methods (A-Z)
Laser diffraction
Scanning Electron Microscopy (SEM-EDX)

Related Topics

Example: particle shape

For particle shape analysis, different microscopical analysis methods are available – from optical microscopy via electron microscopy (SEM) up to scanning force microscopy (AFM). By means of these methods, not only the particle shape but also its surface structure is characterized in detail. Both properties are essential for the interaction between particles (e.g. for the agglomeration tendency, see Fig. 2). If required, the particles shape can be quantified by a subsequent image analysis.

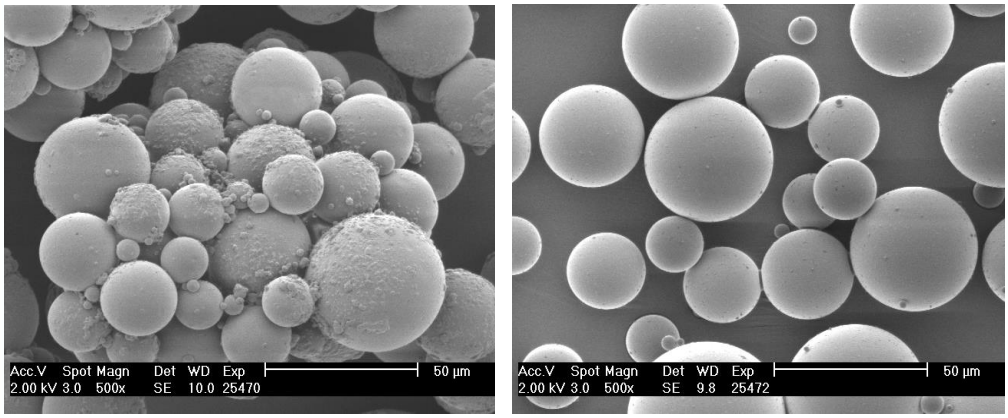

Fig. 2: Comparison of powders of different tendency to agglomeration.

Example: surface chemistry

Just like the size and shape of particles, also their surface chemistry (moisture, impurities such as oils, intentional surface modification) has an effect on the properties during processing or on the particle distribution in the final product. Depending on the problem, different chemical or spectroscopic methods (e.g. FTIR, Raman, XPS) are applied here to detect changes of the surface chemistry.

The advantages:

The methods described allow an extensive characterization and visualization of particles in powders or in suspensions. For quality control, thus both raw materials and final products can be analyzed. In failure analysis, these methods are capable for identifying the causes of failure. In addition, the Analytical Services Obernburg has a sound know-how in analysing catalysts or filler materials in solids.

Interested?
The microscopy group of the Analytical Services Obernburg is ready to answer your questions and to help you.

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