



**SAMPLE  
PREPARATION,  
QC, FORMULATIONS**

**BENCHTOP SOLUTIONS  
FOR CANNABIS &  
HEMP APPLICATIONS**

***FRITSCH***

  
[www.cannabis-milling.com](http://www.cannabis-milling.com)



## **SAMPLE PREPARATION**

PRIMARY CONSIDERATIONS WHEN SELECTING A MILLING SYSTEM FOR ANALYTICAL SAMPLE PREPARATION INCLUDE:

- \* Sample size/volume
- \* Sample matrix (plant material, edible, oil/tincture, etc.)
- \* Number of samples per day
- \* Analytes to be measured
- \* Controllable, reproducible particle size reduction, regardless of end-user
- \* Mill itself does NOT alter the chemical composition of the starting sample
- \* Ease of cleaning to prevent sample cross-contamination

sieve cassette V2A  
square perforation  
no. 45.5500.10

## HOMOGENIZATION OF FLOWER, LEAF SAMPLES & CRYSTALLINE ISOLATES

- Flower/leaf samples from 2 g to 120+ g
- Isolate samples from 2 g to 120 g (up to 10 kg/sample with optional Cyclone collector)

Configured as a continuous milling system, the P14 allows continuous feeding of material, and active removal of material from the rotor area typically within a fraction of a second. Because the homogenization occurs so quickly and the material is actively removed, there is no time for frictional temperature increase to occur that could cause chemical degradation. Product contact surfaces are stainless steel, or food-grade plastic vacuum hose for the Cyclone,



**PULVERISETTE 14**  
CLASSIC LINE VARIABLE SPEED ROTOR MILL

and can all be cleaned thoroughly between batches to reduce the likelihood of cross-contamination. Variable speed motor and range of sieve rings, provides control of particle size output.

## HOMOGENIZATION OF EDIBLES & SAMPLES



**PULVERISETTE 0**  
BALL MILL

- Embrittle edibles & samples directly in liquid nitrogen, and create homogenous powder (representative sampling) in minutes
- Edibles & samples up to 50+ g, depending on matrix
- Flower/leaf samples from 2 g to 10+ g



**PULVERISETTE 11**  
KNIFE MILL

- Embrittle edibles & samples directly in liquid nitrogen, and create homogenous powder (representative sampling) in minutes
- Edibles & samples up to 300+ g, depending on matrix
- Flower/leaf samples from 2 g to 30+ g – using single-use grinding vessels in 10 ml or 100 ml volume
- Create & save SOP's

## PARTICLE SIZE CHARACTERIZATION

Characterizing the particle size distribution and shape morphology of a sample may be performed for the following reasons:

- To confirm that a milling system has achieved particles within an accepted range
- In Quality Control: As a criterion for release into the manufacturing process (raw material testing) or for product sale
- In R&D: To study the efficacy of a compound based on its particle size, and/or on the perceived quality of a formulated product

Particle size analysis by traditional sieving methods involves passing the material through a series of sieve pans with progressively smaller openings, and calculating the weight of material that is retained in each pan. Data obtained by using this method is limited by the number of different sieves that are used, and can be confounded if and when particles stick to the metal surfaces.



**ANALYSETTE 22\***  
NANOTEC LASER PARTICLE SIZER

Laser particle size analyzers with reverse Fourier optical system, pioneered and patented by FRITSCH over 35 years ago, have become a world-wide standard across a wide range of industries, for precise size characterization of materials down into the low nanometer range. The A22 has been used successfully to characterize CBD and related isolates, using either a wet or dry dispersion method.

\*See also Analysette 28 Dynamic ImageSizer

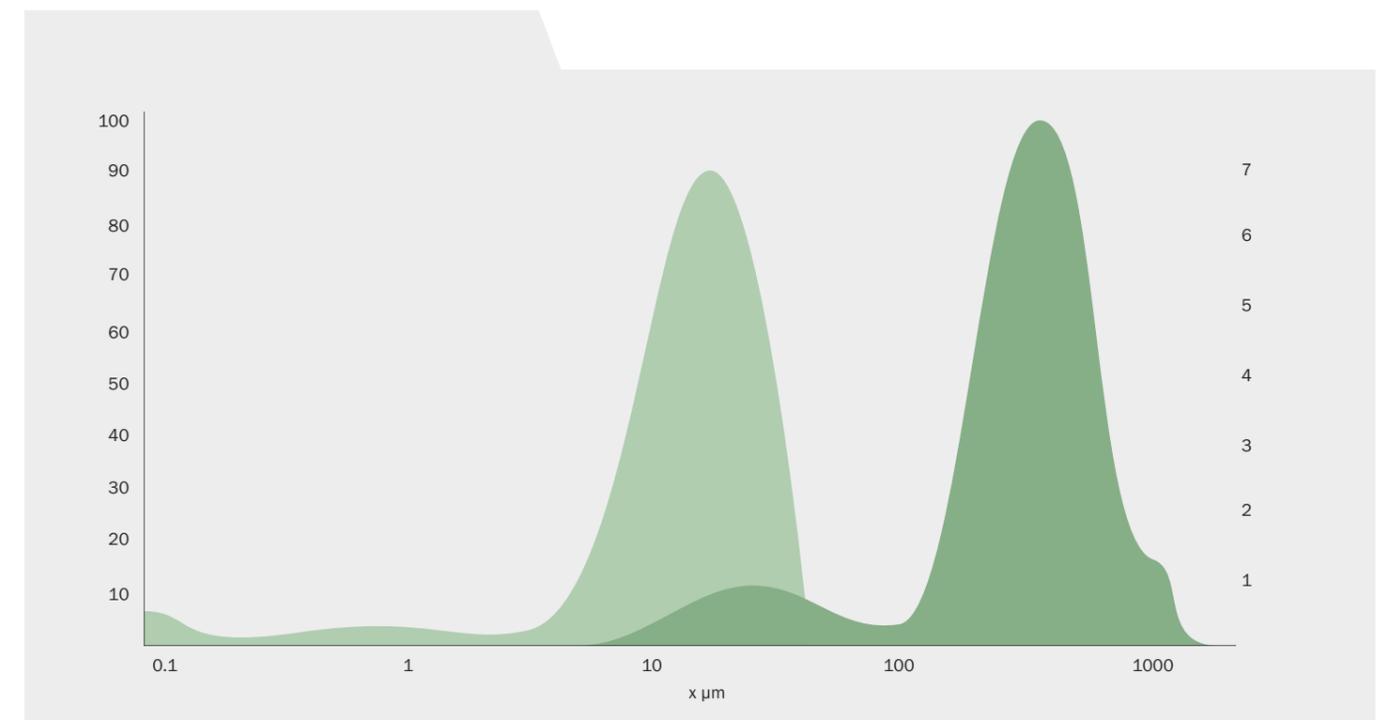


Fig. 2: The ANALYSETTE 22 NanoTec was used to measure CBD isolate before and after homogenization. Starting CBD sample (dark green) contained a mixture of loose granules with a wide particle size distribution. Material homogenized using the PULVERISETTE 14 classic line variable speed rotor mill (light green) resulted in a particle size consistency similar to talcum powder.



Fig. 1: Inside of PULVERISETTE 14 rotor mill, showing fixed collection pan, rotor, and sieve ring. High performance Cyclone sample collector in stainless steel is shown on the left. Used together with modified collection pan, the P14 system and Cyclone allow continuous feeding and homogenization of flowers or CBD isolate into the low micron range (consistency of talcum powder).

## ABOUT

Fritsch Milling and Sizing is a 100-yr-old, family-owned business based in Germany, with operations world-wide. Fritsch serves a wide range of industries including food, pharmaceuticals, agriculture, and nanotechnology, and manufactures a broad range of milling systems and particle size analyzers.

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Quality made in Germany  
Since 1920

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