

SIEVE ANALYSIS

TAPPED DENSITY & BULK DENSITY

ANGLE OF REPOSE & COMPRESSIBILITY

FLOWABILITY & FLOODABILITY

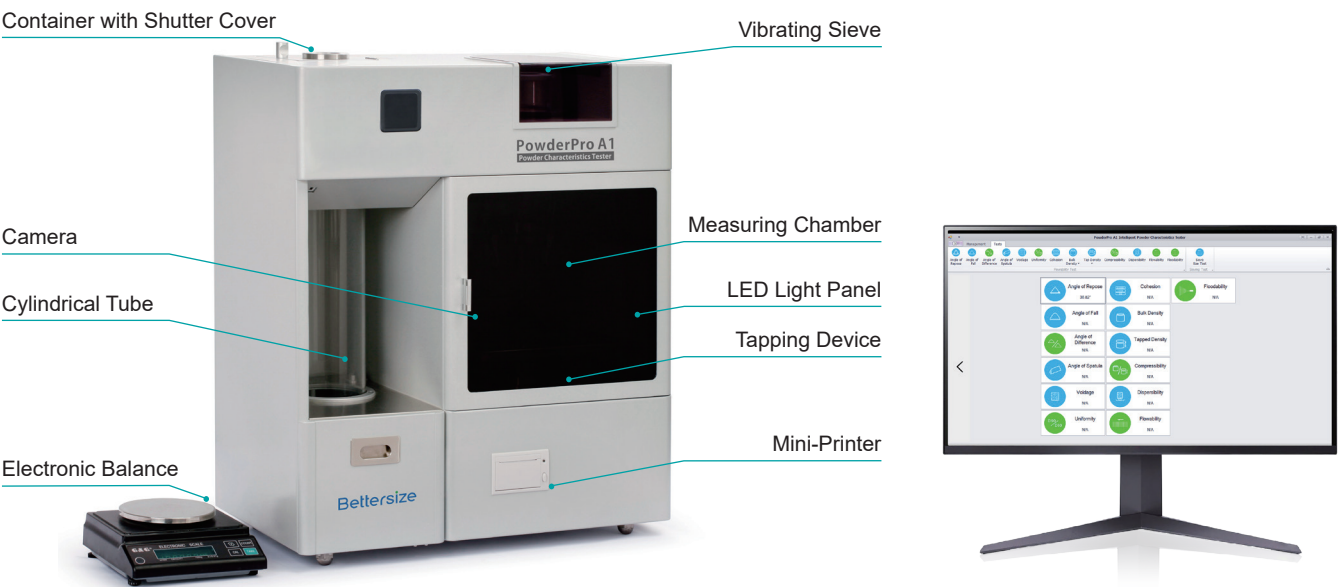


# PowderPro A1

Your 14-in-1 Powder Characteristics Tester

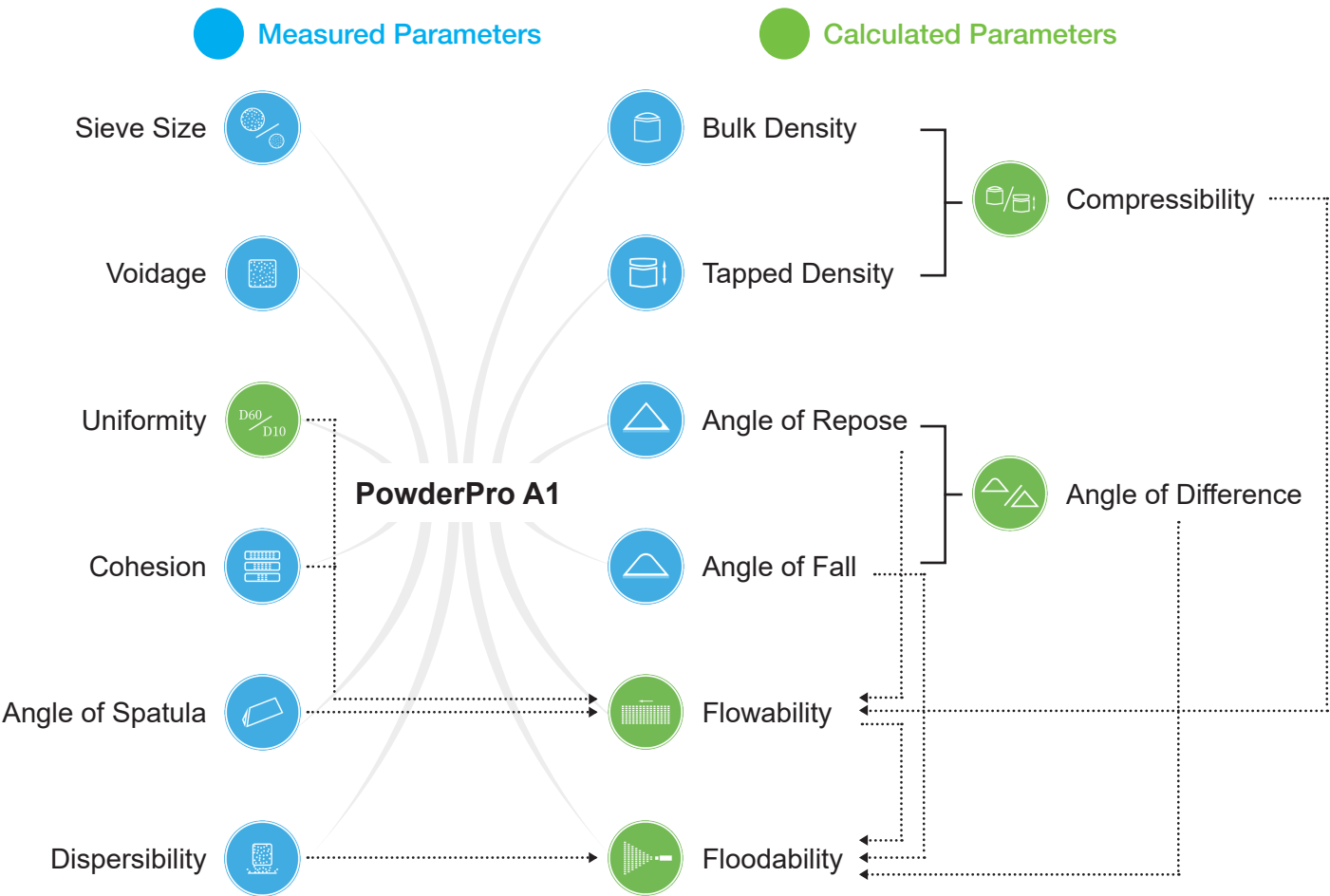
**Bettersize**  
BETTER PARTICLE SIZE SOLUTIONS

INTRODUCTION



The PowderPro A1 is a versatile, high-performance instrument capable of measuring and analyzing 14 different powder characteristics, including critical parameters like flowability, compressibility, and density. It incorporates advanced technologies such as Wi-Fi enabled intelligent control, image processing, 3D electromagnetic vibration, and rotating tapped density measurement. This cutting-edge system delivers fast, straightforward, and highly precise evaluations of powder properties, making it an essential tool for studying and analyzing powder materials across a wide range of industries.

MEASURED & CALCULATED PARAMETERS



APPLICATION CASES

Building materials



Metal powders



Soils & sediments



Powder detergents



Pharmaceuticals



Toners



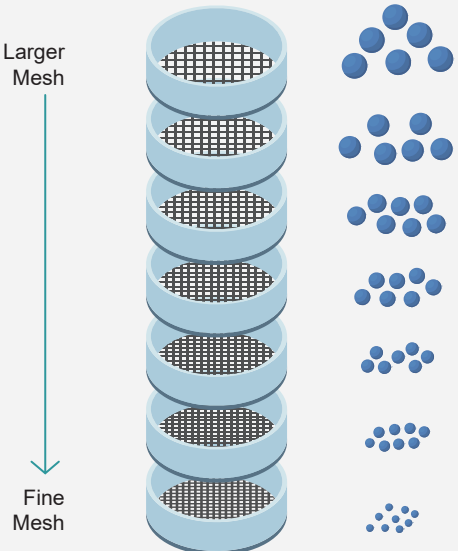
Ceramics



Battery materials



SIEVE SIZE

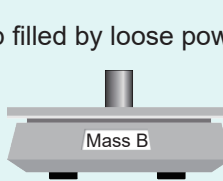
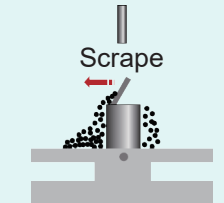
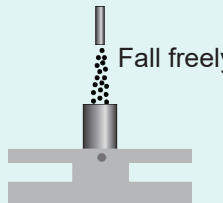
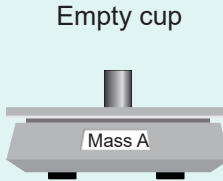


The PowderPro A1 is equipped with an integrated sieving function that facilitates sieve analysis, a key method for determining particle size distribution. This technique helps evaluate important properties like flowability, reactivity, and compressibility, making it invaluable for industries like pharmaceuticals, geology, metallurgy, and construction.

By directly connecting to a balance that captures the tare weight of sieves, the PowderPro A1 minimizes human error, ensuring more accurate and reliable results. This user-friendly and cost-effective solution improves particle size analysis while ensuring superior product quality.

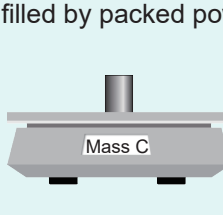
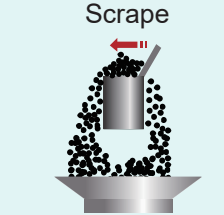
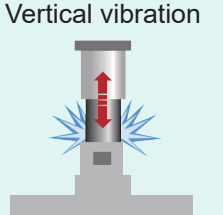
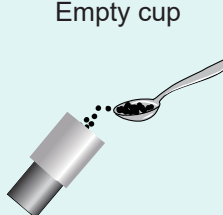
Measurement of Flowability

Bulk Density ( $\rho_B$ )



$Bulk\ Density\ (\rho_B) = \frac{Mass\ B - Mass\ A}{Volume\ of\ the\ Cup}$

Tapped Density ( $\rho_T$ )



$Tapped\ Density\ (\rho_T) = \frac{Mass\ C - Mass\ A}{Volume\ of\ the\ Cup}$

Compressibility ( $C_p$ )

$Compressibility\ (C_p) = \frac{(\rho_T - \rho_B)}{\rho_T} \times 100\%$

Angle of Repose ( $\theta_R$ )

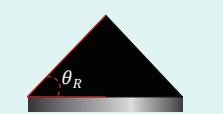
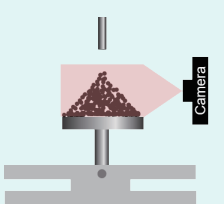
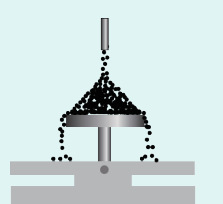
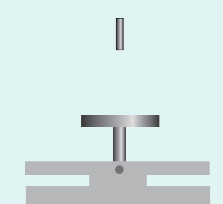
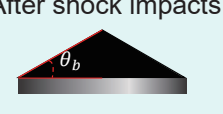
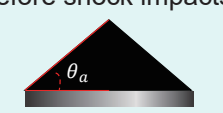
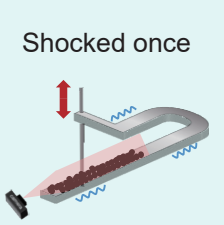
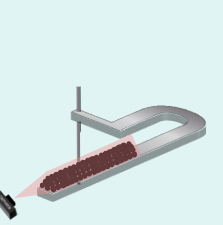
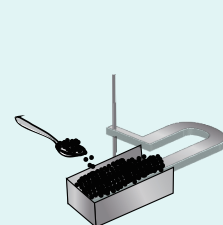


Image processing technology

Angle of Spatula ( $\theta_{sp}$ )



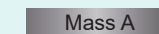
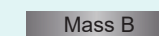
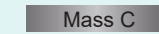
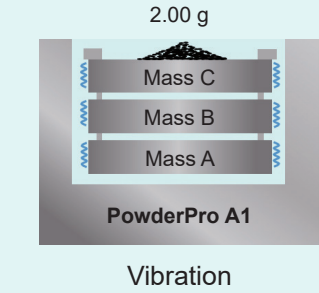
Shocked once

Before shock impacts

After shock impacts

$Angle\ of\ Spatula\ (\theta_{sp}) = \frac{\theta_a + \theta_b}{2}$

Cohesion ( $C_h$ )



2.00 g

Mass C

Mass B

Mass A

PowderPro A1

Vibration

Mass X

Mass Y

Mass Z

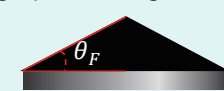
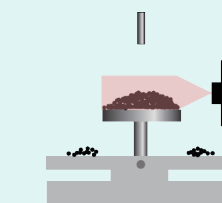
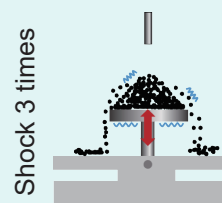
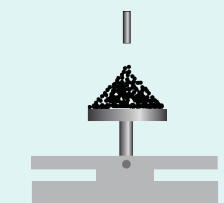
$Cohesion\ (C_h) = (X \times 5\% + Y \times 3\% + Z \times 1\%) \div 0.1\ g \times 100\%$

Uniformity ( $U_f$ )

$Uniformity\ (U_f) = \frac{Particle\ size\ at\ the\ 60\ \% \ point\ of\ the\ cumulative,\ undersize\ PSD\ D_{60}}{Particle\ size\ at\ the\ 10\ \% \ point\ of\ the\ cumulative,\ undersize\ PSD\ D_{10}}$

Measurement of Floodability

Angle of Fall ( $\theta_F$ )



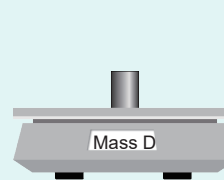
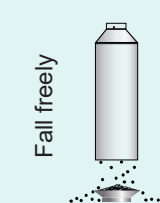
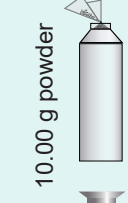
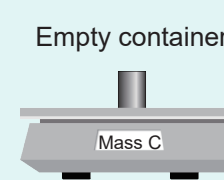
Shock 3 times

Image processing technology

Angle of Difference ( $\Delta\theta$ )

$Angle\ of\ Difference\ (\Delta\theta) = Angle\ of\ Repose\ (\theta_R) - Angle\ of\ Fall\ (\theta_F)$

Dispersibility ( $D_s$ )



Empty container

10.00 g powder

Fall freely

Mass C

Mass D

$Dispersibility\ (D_s) = \frac{10.00\ g - (Mass\ D - Mass\ C)}{10.00\ g} \times 100\%$

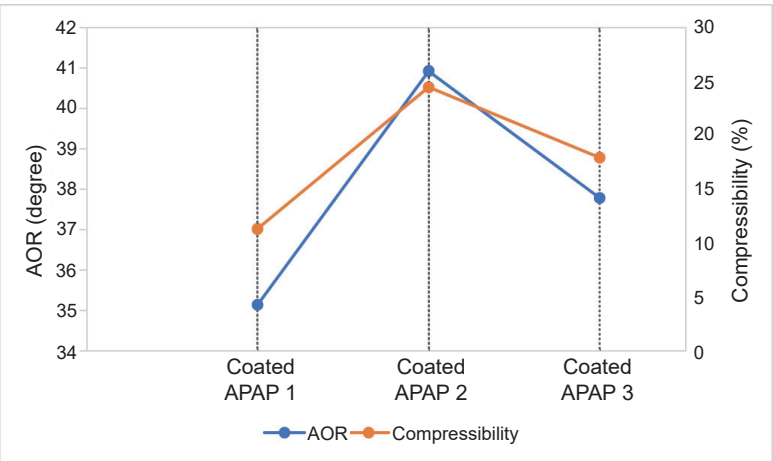
APPLICATION CASES

Medicinal Powder Flowability: AOR and Compressibility Analysis

In accordance with pharmacopoeia guidelines, measuring the angle of repose (AOR) and compressibility of medicinal powders is essential for assessing their flowability and ensuring optimal performance in pharmaceutical applications.

$$Compressibility\ (C_p) = \frac{(\rho_T - \rho_B)}{\rho_T} \times 100\%$$

In this application, the PowderPro A1 evaluates the fowability of acetaminophen (APAP) powders with different coatings by measuring both the angle of repose and compressibility. Coatings help reduce friction between particles, prevent clumping, and improve powder flow during manufacturing and dosing. Improved flowability can ensure consistent production and increased efficiency in packaging.



Carr Index and Flowability Insights of Protein Powder

The PowderPro A1 serves as a powerful tool for new product development and scientific research of protein powder, particularly in evaluating flowability through the Carr Index method.

Flowability Evaluation

| Measuring Items                       | Collagen 1                     |       | Collagen 2 |       |
|---------------------------------------|--------------------------------|-------|------------|-------|
|                                       | Value                          | Index | Value      | Index |
| Angle of Repose (°)                   | 37.97                          | 18    | 46.71      | 12    |
| Angle of Spatula (°)                  | 53.43                          | 16    | 63.16      | 12    |
| Tapped Density (g/cm³)                | 0.45                           |       | 0.59       |       |
| Bulk Density (g/cm³)                  | 0.35                           |       | 0.41       |       |
| Compressibility (%)                   | 22.22                          | 16    | 31.00      | 10    |
| Uniformity                            | 2.88                           | 23    | 3.61       | 23    |
| Evaluation of Flowability             |                                |       |            |       |
| Flowability Index                     | 73.00                          |       | 57.00      |       |
| Evaluation                            | Good                           |       | Not Good   |       |
| Necessity of bridge-breaking measures | Sometimes vibrator is required |       | Required   |       |

After conducting the flowability tests with the PowderPro A1, the software automatically calculates the Carr Index and provides evaluations for the collagen powder samples. This functionality enables direct comparison between samples and helps assess how improved flowability can enhance solubility, aiding in selecting the best materials for optimal formulation.



FEATURES

Measuring angle with imaging technology

A high-definition Charge Coupled Device (CCD) camera captures an image of the powder pile, allowing precise measurement of parameters like the angle of repose, angle of fall and angle of spatula. These measurements are obtained with high precision and good repeatability through the advanced image processing technology.

Compact design

The PowderPro A1 offers a compact solution that measures nine parameters - including the angle of repose, angle of fall, angle of spatula, bulk density, tapped density, cohesion, dispersibility, voidage and sieve size - as well as five calculated values including the angle of difference, compressibility, uniformity, flowability index and floodability index, all in just one instrument.

Automatic control technology

Fully automatic computer control ensures easy usage and fast operation.

Data communication

An electronic balance is connected with the instrument and the weight data can be recorded by the control system for further data processing and calculation.

Unique data output

A mini-printer of the PowderPro A1 is convenient and efficient to print the measurement data timely.

SPECIFICATION

|                  |             |                                         |
|------------------|-------------|-----------------------------------------|
| Parameters       | Number      | 9 (Measured) + 5 (Calculated)           |
| Measuring Angle  | Method      | Fully Automatic by CCD Camera           |
|                  | Range       | 0-90°                                   |
| Repeatability    |             | ≤ 3%                                    |
| Tapping          | Frequency   | 50-300 taps/min (Continuous Adjustment) |
|                  | Drop Height | 3 or 14 mm                              |
| Conformity       | ISO         | ISO 3953                                |
|                  | USP         | USP <616>                               |
|                  | Ph. Eur.    | Ph. Eur. 20934                          |
| Control Terminal | PC          | Windows System                          |
| Connection       |             | Wi-Fi, LAN                              |
| Dimension        |             | 600 × 350 × 730 mm (L × W × H)          |
| Weight           |             | 42 kg                                   |
| Power Supply     |             | AC 110/220 V, 50/60 Hz, 230 W           |

# Bettersize

BETTER PARTICLE SIZE SOLUTIONS

## Bettersize Instruments Ltd.

No. 9, Ganquan Road, Jinqian Industrial Park,  
Dandong, Liaoning, China

**Postcode:** 118009

**Tel:** +86-755-26926582

## Bettersize Inc.

3185 Airway Ave, Suite C2, Costa Mesa,  
CA 92626, United States

**Tel:** +1 833-699-7493 (SIZE)

[info@bettersize.com](mailto:info@bettersize.com)

[www.bettersizeinstruments.com](http://www.bettersizeinstruments.com)



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