



SIEVE ANALYSIS

TAPPED DENSITY & BULK DENSITY

ANGLE OF REPOSE & COMPRESSIBILITY

FLOWABILITY & FLOODABILITY

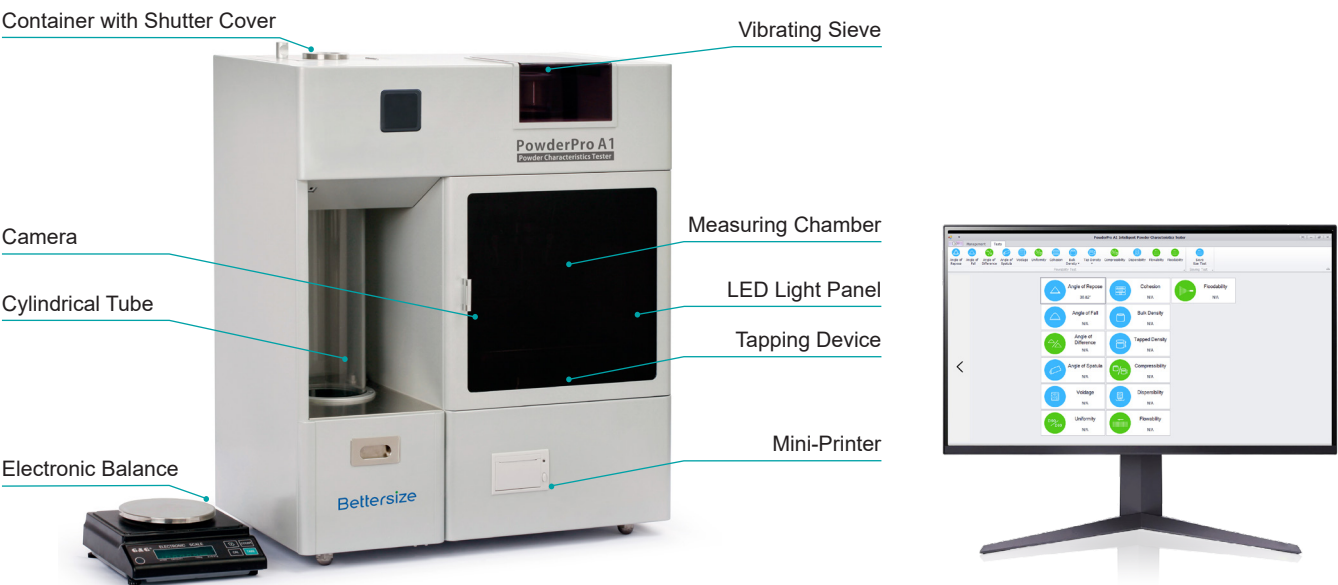


# PowderPro A1

Your 14-in-1 Powder Characteristics Tester

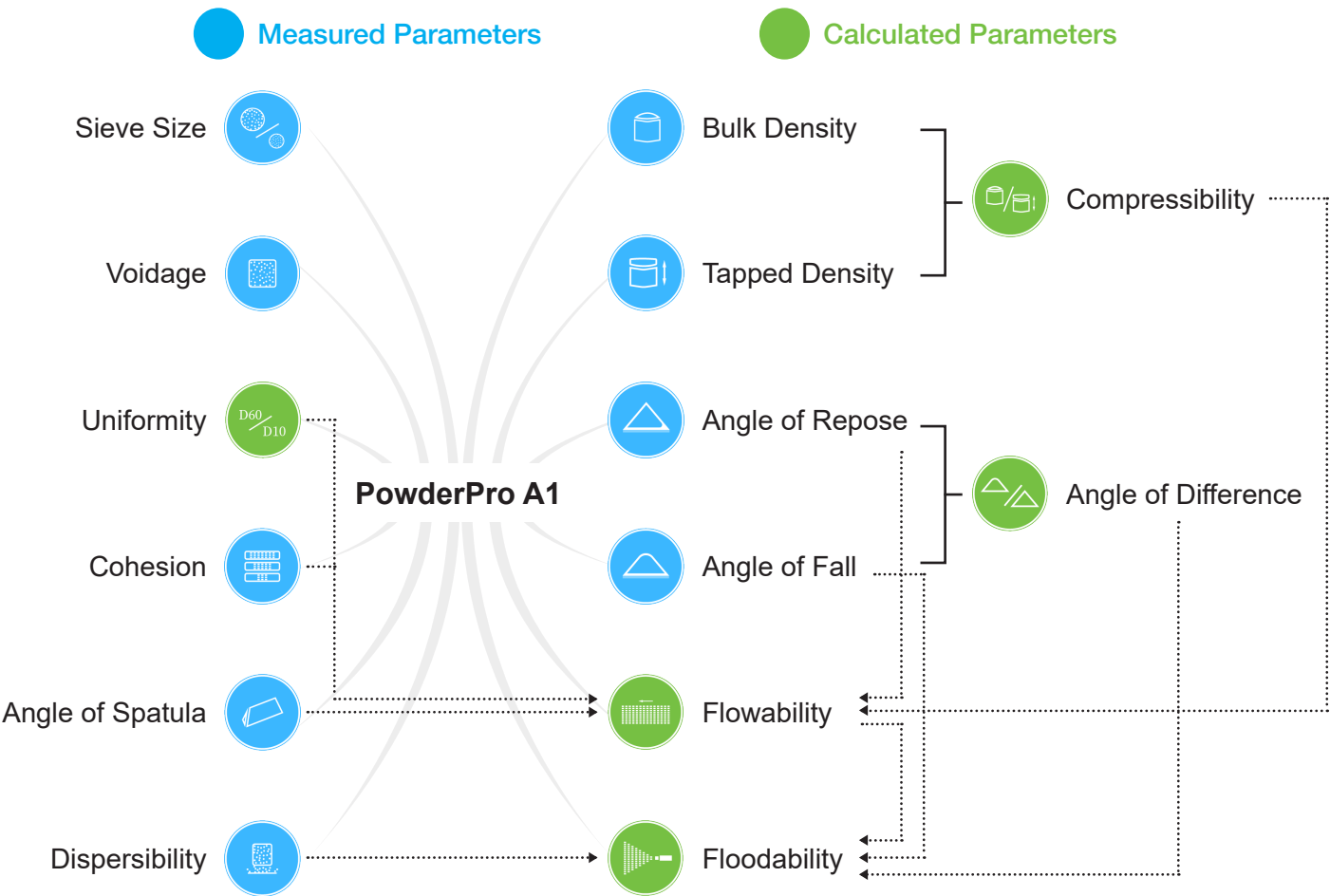
**Bettersize**  
BETTER PARTICLE SIZE SOLUTIONS

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



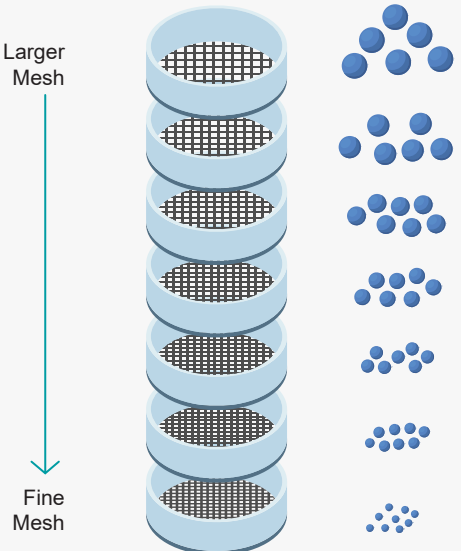
Ceramics



Battery materials



SIEVE SIZE

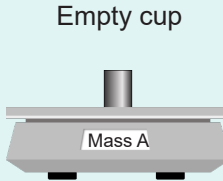


The PowderPro A1 is equipped with an integrated sieving function that facilitates sieve analysis, a key method for determining particle size distribution. This technique helps evaluate important properties like flowability, reactivity, and compressibility, making it invaluable for industries like pharmaceuticals,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

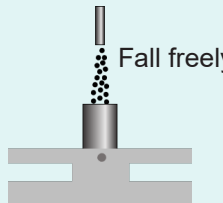
Measurement of Flowability

Bulk Density ( $\rho_B$ )

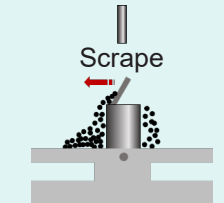


Empty cup

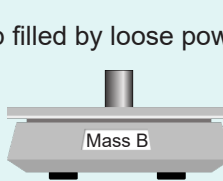
Mass A



Fall freely



Scrape

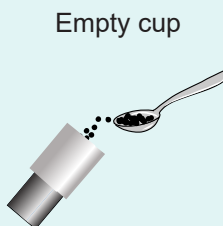


Cup filled by loose powders

Mass B

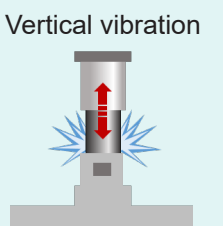
$$\text{Bulk Density } (\rho_B) = \frac{\text{Mass B} - \text{Mass A}}{\text{Volume of the Cup}}$$

Tapped Density ( $\rho_T$ )

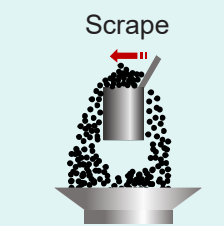


Empty cup

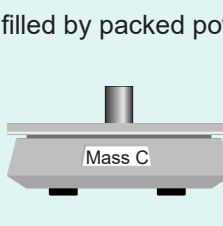
Mass A



Vertical vibration



Scrape



Cup filled by packed powders

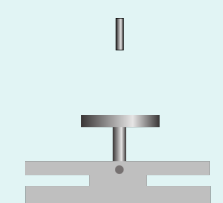
Mass C

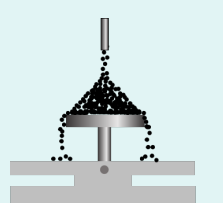
$$\text{Tapped Density } (\rho_T) = \frac{\text{Mass C} - \text{Mass A}}{\text{Volume of the Cup}}$$

Compressibility ( $C_p$ )

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

Angle of Repose ( $\theta_R$ )





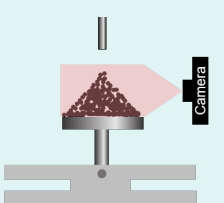
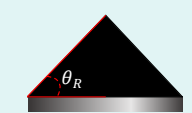
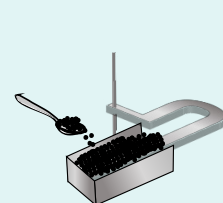


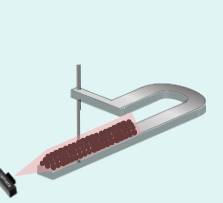
Image processing technology

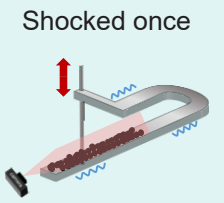


$\theta_R$

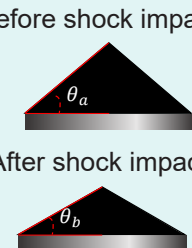
Angle of Spatula ( $\theta_{sp}$ )







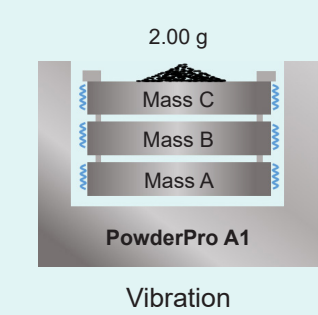
Shocked once



Before shock impacts  
 $\theta_a$   
After shock impacts  
 $\theta_b$

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

Cohesion ( $C_h$ )



2.00 g


Mass C

Mass B

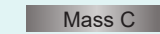
Mass A

PowderPro A1


Vibration




Mass C



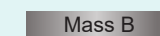
Mass C




Mass X




Mass B



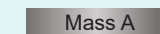
Mass B




Mass Y



Mass A



Mass A



Mass Z

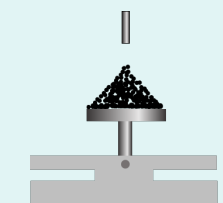
$$\text{Cohesion } (C_h) = (X \times 5\% + Y \times 3\% + Z \times 1\%) \div 0.1 \text{ g} \times 100\%$$

Uniformity ( $U_f$ )

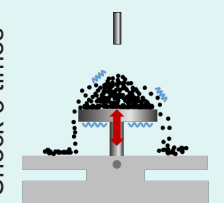
$$\text{Uniformity } (U_f) = \frac{\text{Particle size at the 60 \% point of the cumulative, undersize PSD } \frac{D_{60}}{D_{10}}}{\text{Particle size at the 10 \% point of the cumulative, undersize PSD } \frac{D_{60}}{D_{10}}}$$

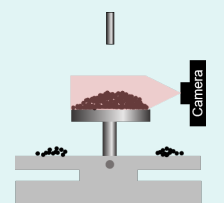
Measurement of Floodability

Angle of Fall ( $\theta_F$ )



Shock 3 times





Camera




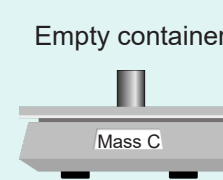
Image processing technology

$\theta_F$

Angle of Difference ( $\Delta\theta$ )

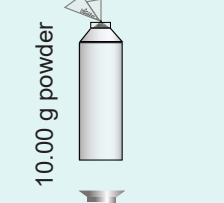
$$\text{Angle of Difference } (\Delta\theta) = \text{Angle of Repose } (\theta_R) - \text{Angle of Fall } (\theta_F)$$

Dispersibility ( $D_s$ )




Empty container

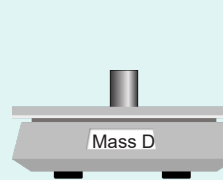
Mass C



10.00 g powder



Fall freely



Mass D

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



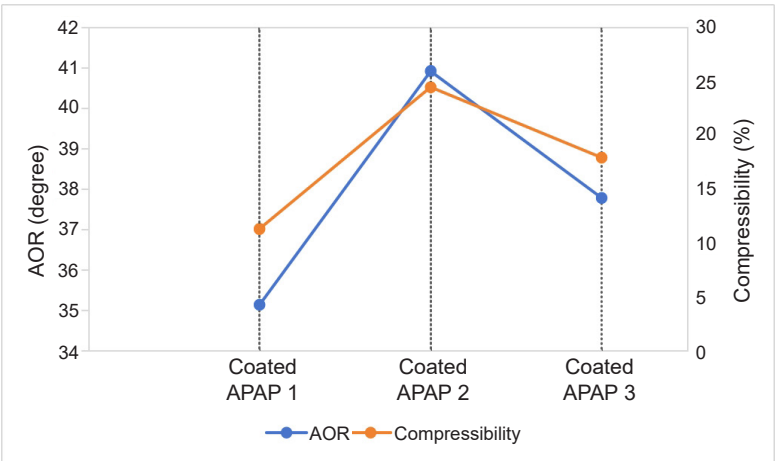
APPLICATION CASES

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



[www.bettersizeinstruments.com](http://www.bettersizeinstruments.com)  
[info@bettersize.com](mailto:info@bettersize.com)

**Bettersize Instruments Ltd.**

**Address:** No. 9, Ganquan Road, Jinquan Industrial Park,  
Dandong, Liaoning, China  
**Postcode:** 118009  
**Tel:** +86-755-26926582

**Bettersize Inc.**

**Address:** Suite K-2, 3188 Airway Ave, Costa Mesa, CA  
92626, United States  
**Tel:** +1 833-699-7493 (SIZE)

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**Qi srl**  
t +39 06 9105461  
[www.qitech.it](http://www.qitech.it) | [SalesQi@qitech.it](mailto:SalesQi@qitech.it)

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