




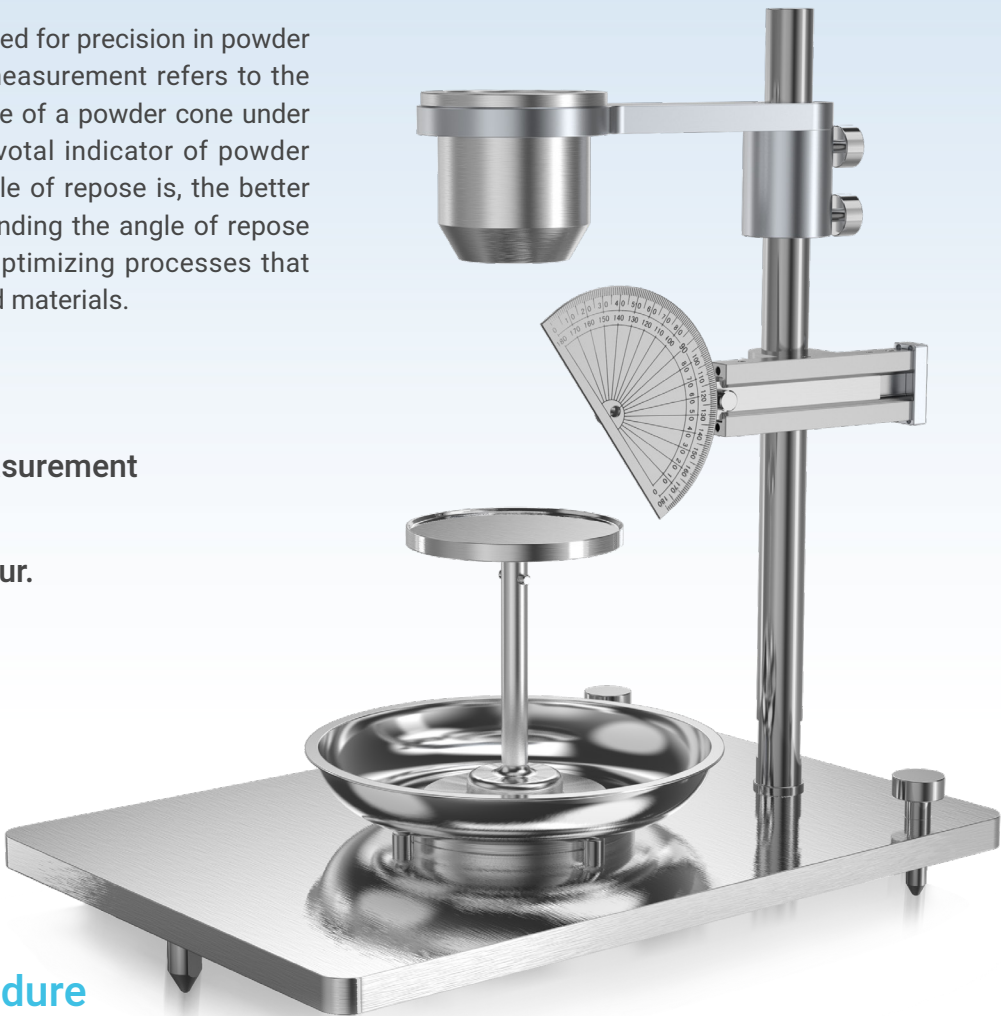
# BeDensi AR

## Angle of Repose Tester

BeDensi AR is meticulously crafted for precision in powder angle of repose testing. This measurement refers to the angle created by the sloping side of a powder cone under specific conditions and is a pivotal indicator of powder flowability. The smaller the angle of repose is, the better the flowability will be. Understanding the angle of repose is essential in assessing and optimizing processes that involve the handling of powdered materials.

### Angle of Repose Measurement

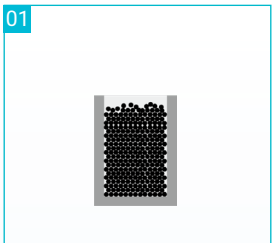
-  USP
-  Ph. Eur.
-  ISO



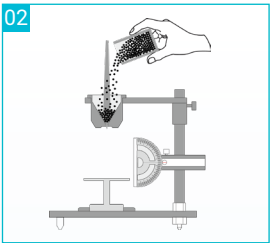
## Measurement Procedure

### Angle of Repose

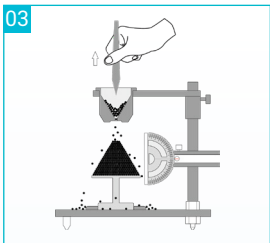
The angle of repose refers to the angle between the sloping side of a powder cone plane under specific conditions. It is a significant indicator of powder flowability.



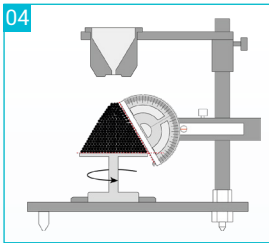
Fill container



Add sample



Remove rod



Measure the angles at 0°, 120° and 240° positions

$$\text{Angle of Repose } (\theta_r) = \frac{(\theta_{r_{0^\circ}} + \theta_{r_{120^\circ}} + \theta_{r_{240^\circ}})}{3}$$

Angle of Repose (°)	Flow Properties
≤ 25	Excellent
25 - 30	Good
30 - 40	Passable
> 40	Very poor

Flowability Evaluation Based on Angle of Repose

## Application Example

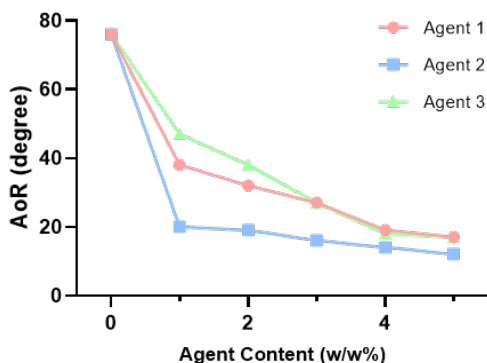
Characterizing flowability of powders across a broad spectrum of industries with the BeDensi AR, which includes materials such as coatings, ceramic, silica, activated carbon, and milk powder.

By utilizing BeDensi AR, various samples undergo comprehensive assessments, each uniquely characterized by its measured angle of repose. This analysis serves as a valuable tool in the optimization of processes and enhancement of product quality across diverse applications.

Sample	Angle of Repose	Flowability
Lazurite Pigment	21°	Excellent
Ceramic Powder	28°	Good
SiO <sub>2</sub> Powder	34°	Passable
Activated Carbon	39°	Passable
Milk Powder	46°	Very Poor

## Industry Solution

Assisting in the optimization of ceramic powder flowability.



In 3D printing industry, ZrO<sub>2</sub> powder can be sintered or fused together layer by layer to form complex structures with precision. Thus the flowability of ZrO<sub>2</sub> powder is a crucial factor in the synthesis of materials suitable for binder jet 3D printing.

In this application case, the flowability of ZrO<sub>2</sub> powder with different flow agents is evaluated by using BeDensi AR to measure the angle of repose. The results from the graph clearly indicate that ZrO<sub>2</sub> with Agent 2 exhibits the smallest angle of repose, signifying superior flowability when compared to the other two types of flow agents. This conclusion guides in selecting the optimal flow agent to improve the powder's behavior during 3D printing.

## Specification



Parameter	BeDensi AR
Size of Protractor	10 cm
Diameter of Orifice	5 mm
Inclined Angle of Funnel	60° ± 0.5°
Height Between Bottom of Funnel and Measuring Platform	Max: 10 cm
Compliance (for angle of repose)	● USP <1174> ● Ph. Eur. <2.9.36> ● ISO <4324>

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