

Determination of Angle of Repose and Lubricant Effect

Practical 04 | Physical Pharmaceutics II

Aim

To determine Angle of Repose and Lubricant Effect, and interpret the recorded observations.

Principle

- The angle formed by a powder heap is a method-dependent indicator of flow behaviour. Lubricant identity and concentration can change interparticle interactions.
- The property is obtained from a defined observable under controlled conditions.
- Replicate measurements, instrument checks and consistent units are needed before comparison.

Materials and Apparatus

- Assigned powder/lubricant comparisons and fixed-height or assigned cone apparatus.
- Assigned test material and calibration or comparison material.
- The apparatus specified for this property, a balance or volumetric equipment where relevant, and a record sheet.

Method

1. Record the powder condition and lubricant identity/concentration.
2. Set the assigned funnel/cone apparatus without changing its geometry between comparisons.
3. Form the heap by the specified procedure and measure height and base radius.
4. Repeat with a fresh representative portion.
5. Calculate the angle from $\arctan(\text{height}/\text{radius})$.
6. Compare preparations and explain why the method and powder history affect the result.

Observation Record

Complete this record using actual laboratory findings or the provided teaching data.

Observation / parameter	Record / finding
Powder/lubricant condition	_____
Cone height h	_____
Cone radius r	_____
Replicates	_____

Calculations and Interpretation

- $\tan(\theta) = h/r$; $\theta = \arctan(h/r)$.
- Compare preparations using the same cone-building method.

Worked Illustration

Illustration: a heap 3.0 cm high with 5.0 cm radius gives $\theta = \arctan(3/5) = 31.0$ degrees.

The values in this illustration are for calculation practice.

Result

Record the actual finding, calculated value with units where relevant, and a conclusion supported by the observations.

Finding: _____

Conclusion: _____

Precautions

- Keep temperature and test conditions consistent across comparative readings.
- Record raw readings before rounding calculated values.
- Do not compare results obtained with different methods as if they were interchangeable.

Viva Questions

1. Why control the test conditions?

A change in conditions may alter the measured property independently of the intended variable.

2. Why retain replicate readings?

They show repeatability and help identify an anomalous measurement.

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