D.PHARM • FIRST YEAR

Pharmaceutics

CHAPTER 4.2

Size Separation



ENGLISH CHAPTER NOTES

DIPLOMA IN PHARMACY

SIZE SEPARATION

Size separation divides a particulate mixture into fractions of different sizes.

WHY SEPARATE?

- Control the particle-size distribution required for a product.
- Remove oversize particles and unwanted fines.
- Improve uniformity of mixing, dosing and processing.
- Support consistent dissolution and product quality.
- Recover useful material and reduce waste.



APPLICATIONS



Pharmaceuticals: powder grading and raw-material quality control.



Food and agriculture: grain, flour and seed grading.



Chemicals and minerals: classification of particulate feed and products.

★ Size reduction makes particles smaller; size separation sorts existing particles.

MECHANISMS OF SIZE SEPARATION

Different methods use aperture size or particle behaviour in a fluid.

SCREENING AND AIR METHODS

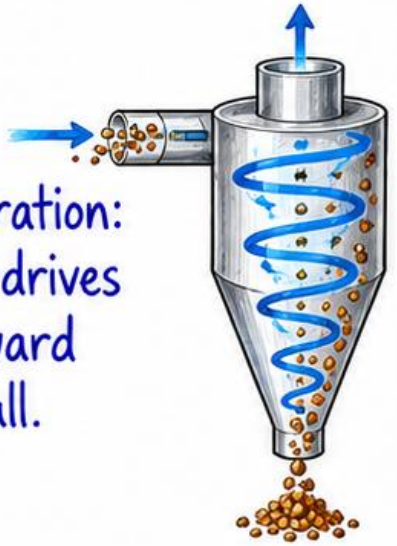
- Sieving: particles pass through a specified mesh aperture or remain above it.



- Air classification: an air stream separates particles by aerodynamic behaviour.

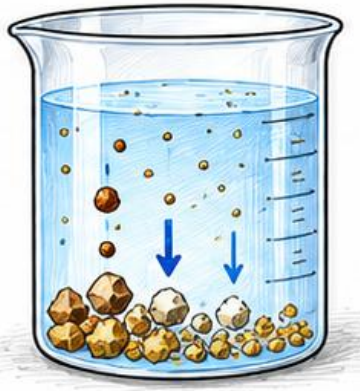


- Cyclone separation: swirling gas drives particles toward the outer wall.



SETTLING METHODS

- Sedimentation: particles settle through a liquid under gravity.



- Elutriation: an upward fluid stream carries particles whose settling velocity is lower than the flow velocity.



- Centrifugation: rotation accelerates separation through centrifugal effects.



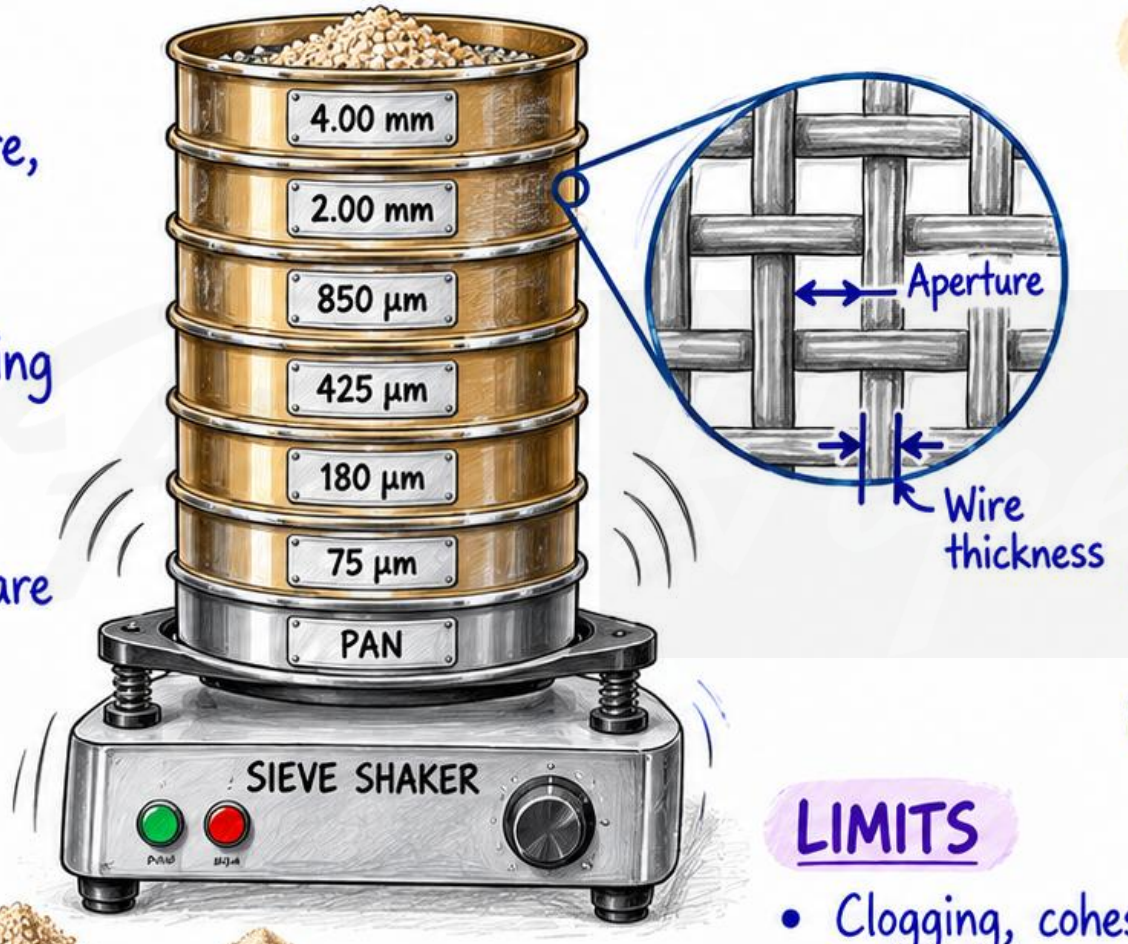
★ Fluid-based separation depends on size, density and shape, not size alone.

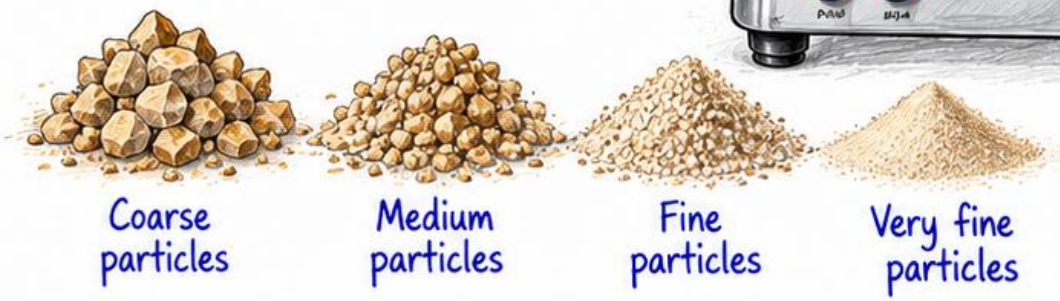
SIEVES AND SIEVE ANALYSIS

A sieve has a rigid frame and a screen with specified openings.

CONSTRUCTION

- Screens may be woven wire, perforated plate or electroformed mesh.
- Aperture is the clear opening through which a particle may pass.
- Mesh number and aperture are not interchangeable across all standards.





ANALYSIS STEPS

1. Weigh a representative powder sample.
2. Stack sieves with decreasing aperture from top to bottom; place a pan below.
3. Add the sample and shake for the specified time.
4. Weigh the fraction retained on each sieve and in the pan.
5. Calculate percentage retained or passing and check the mass balance.

LIMITS

- Clogging, cohesive powder and particle shape can affect results.
- Report the sieve standard, aperture and test conditions.

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