

Study of Colloid Mill, Planetary Mixer, Fluidized-Bed Dryer and Freeze Dryer

Practical 10 | Pharmaceutical Engineering

Aim

To study Colloid Mill, Planetary Mixer, Fluidized-Bed Dryer and Freeze Dryer, and interpret the recorded observations.

Principle

- These devices illustrate shear-driven dispersion, planetary mixing, convective drying and sublimation-based drying respectively.
- The construction and operating principle determine the function of the equipment.
- The practical distinguishes the input, working zone, controlled variables and output.
- Colloid mill: a close rotor-stator working zone provides high shear for dispersion and emulsification.
- Planetary mixer: the mixing tool rotates while travelling around the vessel; this combined movement can process viscous materials.
- Fluidized-bed dryer: a gas distributor supports an agitated particle bed for convective heat and mass transfer, with suitable exhaust filtration.
- Freeze dryer: freezing precedes primary drying by sublimation under reduced pressure; secondary drying removes remaining bound moisture. The condenser collects water vapour.

Materials and Apparatus

- Instructor demonstrations or labelled working diagrams of the four devices.
- Assigned equipment demonstration, labelled schematic or manufacturer-approved training material.
- Observation sheet and any instructor-supplied performance readings.

Method

1. Identify the major components on the actual equipment or training diagram.
2. Trace the material, energy or signal path through the system.
3. Observe the instructor demonstration and note the purpose of each control.
4. Record the operating variables and the output relevant to the exercise.
5. Relate the equipment principle to its pharmaceutical application.
6. Summarize the variables that influence performance and the checks required before operation.

Observation Record

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

Observation / parameter	Record / finding
Device	_____
Working zone	_____
Energy input	_____
Controlled variable	_____
Application	_____

Calculations and Interpretation

- Calculate a performance metric only when a suitable set of demonstration readings is supplied.

Result

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

Finding: _____

Conclusion: _____

Precautions

- Use equipment demonstrations and trained operation for moving, hot or pressurized components.
- Do not bypass guards, interlocks or the assigned operating limits.
- Distinguish operating performance from the appearance of the machine.

Viva Questions

1. Why trace the material or energy path?

It connects the equipment construction to the process it performs.

2. Why are operating variables recorded?

They are needed to explain or reproduce the observed performance.

Continue Learning with FirstHope

Complete Notes on the FirstHope App

Complete subject and semesters are available on FirstHope app only.

- Get complete subject and semester notes in the FirstHope app.
- Available for B.Pharm, D.Pharm, M.Pharm and Pharm.D students.

[Click here to get the FirstHope app](#)

Join the FirstHope Telegram Channel

Join FirstHope Notes and keep up with channel updates.

[Click here to join Telegram](#)

Instagram

@firsthope.official

[Click here to follow Instagram](#)

YouTube Channel

FirstHope-Pharmacy / Live streams

[Click here to watch the YouTube channel](#)

WhatsApp Channel

Follow FirstHope on WhatsApp.

[Click here to join the WhatsApp channel](#)

FirstHope Website

firsthopenotes.com

[Click here to visit the website](#)