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Particle Size Distribution by Microscopy

Experiment 7 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To obtain a calibrated number-based particle size distribution.

Principle

Microscopy measures a stated projected particle dimension. An eyepiece scale must be calibrated at the objective used. Counting particles gives a number distribution; it must not be mistaken for a mass or volume distribution.

Requirements

- Representative powder dispersion, microscope, stage micrometer and eyepiece scale or calibrated imaging system.
- Slides, coverslips, suitable non-dissolving dispersant and counting worksheet.

Procedure

1. Calibrate

Align stage and eyepiece scales at the chosen objective. Calculate micrometres per division and repeat calibration when the objective or image scaling changes.

2. Disperse

Prepare a thin random dispersion without dissolving particles or breaking them unintentionally. Avoid overlapping agglomerates.

3. Define dimension

Choose a projected dimension, for example a stated Feret diameter, and use it consistently for all particles.

4. Count systematically

Use a fixed field-selection and boundary rule to avoid preferentially selecting large particles. Measure the assigned number, commonly at least 100 in teaching work.

5. Group

Place measured dimensions into defined non-overlapping classes and calculate count percentages and cumulative counts.

6. Report

Calculate number mean where appropriate and state the dispersion method, count, calibration and dimension definition.

Observations and Record

Size class / representative d	Particle count n	n × d
20 µm teaching group	5	100 µm
40 µm teaching group	5	200 µm
Total	10	300 µm

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- If 100 µm on a stage micrometer matches 25 eyepiece divisions, calibration = 4.00 µm/division.
- For the short illustrative dataset above, number mean = 300/10 = 30.0 µm. Use the full required count for the actual practical.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Use the instructor's assigned material and apparatus; record actual temperature and units with every measured property.
- Check instrument calibration and use repeat readings rather than a single convenient result.
- Compare a marketed teaching formulation only under the same method and conditions; its excipients can change the property.

Viva Questions and Answers

1. Why recalibrate for each objective?

Image magnification changes the size represented by one scale division.

2. Is the number mean the same as the sieve mass mean?

No. Large particles contribute far more mass but only one count each.

3. Why state a boundary rule?

It avoids counting the same particle twice in adjoining fields.

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