

MICROMETRY

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Aim: To measure the size of microorganisms using micrometer.

Requirements: Ocular micrometer, stage micrometer, compound microscope and specimen.

Introduction: Micrometry is the measurement of microscopic objects (microorganisms). Since microorganism can be seen only under a microscope, a suitable scale for their measurements should be somewhere in the microscope itself. For this, an ocular micrometer (eye piece micrometer) and a stage micrometer is used.

Ocular micrometer is simply a disc of glass upon which etched lines. There are usually etched 100 equally spaced divisions, marked 0 to 100 upon an ocular micrometer. However, the scale on the ocular micrometer does not have any standard value.

Stage micrometer is simply a microscope glass slide having in its centre a known (one millimeter) distance etched in to 100 equally spaced divisions. Thus each division of the stage micrometer equals to 0.01 mm or 10 μm .

Principle: Ocular micrometer is calibrated under different objective lens systems of the microscope by superimposing the graduations of stage micrometer. By determining the how many divisions of ocular micrometer superimpose a known distance on the stage micrometer, we may find out the exact value of one division of ocular micrometer in the microscope field. Once calibrated, the ocular micrometer can be used to measure the size of various microbes in terms of length, breadth and diameter.

Procedure:

1. Replace the regular ocular lens with ocular eye piece lens with ocular micrometer and observe. There will be seen scale lines of ocular micrometer in sharp focus. This lines and distances will remain unchanged under different objectives.
2. Mount the stage micrometer on the microscope stage and bring its scale in the center of microscope field under a sharp focus. This is done first with low-power objective and thereafter also with high-power objectives.
3. Adjust the scales of ocular micrometer and stage micrometer in such a way that the lines of former superimpose upon those of the latter. If necessary the ocular micrometer may be rotated or stage micrometer be moved on the stage so that lines of ocular micrometer superimpose upon the stage micrometer. The scales of both micrometers are to be adjusted in such a way that the lines of the two coincide at one end of the microscope field. Now count the spaces of each micrometer to a point where the lines of the two micrometers coincide again. In this way we can find out how many divisions of ocular micrometer (unknown scale) are equals to how many divisions of stage micrometer (known scale).
4. Replace the stage micrometer with the slide bearing the microorganisms whose measurements to be taken.

Calculations:

$$\begin{aligned} \text{One division of ocular micrometer (C)} &= \frac{\text{No. of divisions of stage micrometer (A)}}{\text{No. of divisions of ocular micrometer (B)}} \times 100 \\ &= \dots\dots \mu\text{m} \end{aligned}$$

Calibration of ocular micrometer for 10 x objective

Trial No.	A	B	C $\left(C = \frac{A}{B} \times 10 \right)$
1.			C ₁ =
2.			C ₂ =
3.			C ₃ =
			Average (C) =

One division of ocular micrometer (C) = ----- μm .

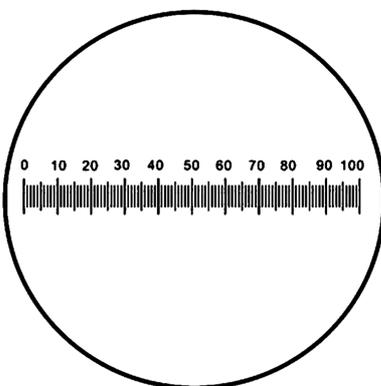
For calibration of 40/65/100 x eye pieces follow the above procedure.

Dimension of the given specimen = Length (L) x Breadth (B) μm .

Trial No.	L	B	Dimension (L x B)
1.			D ₁ =
2.			D ₂ =
3.			D ₃ =
			Average (D) =

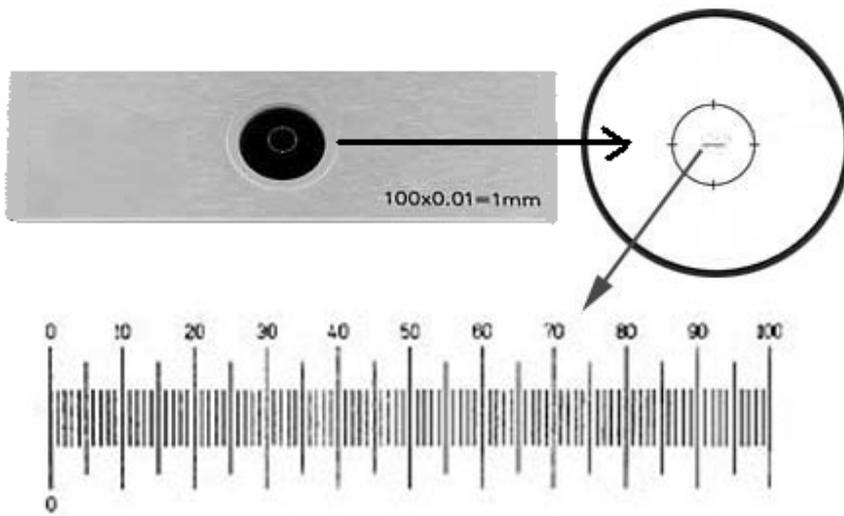
Average Size of the given specimen (D) = ---- μm .

Ocular Micrometer



Scale-arbitrary units usually 100 divisions

Stage Micrometer on the glass slide



Scale with known units
