



## The microscopes

### Microscope

A microscope is a high precision optical instrument that uses a lens or a combination of lenses to produce highly magnified images of small specimens or objects especially when they are too small to be seen by the naked (unaided) eye. A light source is used (either by mirrors or lamps) to make it easier to see the subject matter.

#### A microscope can be used for numerous things:

- 1- hobbyists have an interest in microscope worlds from learning and having fun to using a microscope for the study of stamps, coins, gems, insects, etc .
- 2- medical uses from analysis to advanced research in many and varied disciplines .
- 3- students have an interest in pursuing knowledge anywhere from middle school through the university level.
- 4- industrial uses as inspection and measurement tools.
- 5- imaging of whatever you are looking at.

### Parts of the microscope

- 1. Ocular Lens (Eyepiece):** where you look through to see the image of your specimen. Magnifies the specimen 10X actual size.
- 2. Body tube:** the long tube that supports the eyepiece and connects it to the objectives.
- 3. Nosepiece:** the rotating part of the microscope at the bottom of the body tube, it holds the objectives.
- 4. Objective Lenses:** (low, medium, high). Depending on the microscope, may have 2, 3 or more objectives attached to the nosepiece; they vary in length (the shortest is the lowest power or magnification; the longest is the highest power or magnification).



4 × (very low power objective)

10 × (low power objective)

40 × (High power objective)

100 × (Oil immersion objective)

It also contains a fixed ocular (eye piece) lens, usually of 10 × or 5×.

**5. Arm:** part of the microscope that you carry the microscope with, connects the head and base of the microscope.

**6. Coarse Adjustment Knob:** large, round knob on the side of the microscope used for "rough" focusing of the specimen; it may move either the stage or the upper part of the microscope. Location may vary depending on microscope; it may be on the bottom of the arm or on the top.

**7. Fine Adjustment Knob:** small, round knob on the side of the microscope used to fine-tune the focus of specimen after using the coarse adjustment knob. As with the Coarse Adjustment Knob, location may vary depending on the microscope.

**8. Stage:** large, flat area under the objectives; it has a hole in it (see aperture) that allows light through; the specimen/slide is placed on the stage for viewing.

**9. Mechanical stage knobs:** Consist of 2 knobs, used for movement of the stage on the (x,y) direction .

**10. Stage Clips:** clips on top of the stage which holds the slide in place.

**11. Aperture:** the hole in the stage that concentrates light through the specimen for better viewing.

**12. Diaphragm:** controls the amount of light going through the aperture; may be adjusted.



**13.Light or Mirror:** source of light usually found near the base of the microscope; used to direct light upward through the microscope. The light source makes the specimen easier to see.



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### Types of objective lenses



**OBJ009**



**OBJ010**



**OBJ011**



**OBJ012**



**OBJ033**



**OBJ034**



**OBJ035**

### Types of Eyepiece lens



**E012**



**E013**



**E014**



**E015**



Medical Laboratory Instrument  
MSc. Safa Hammodi Lafta  
Safa.hammodi@uomus.edu.iq



### **Method of magnification**

A-Direct illumination: where the light bulb is located inside the base directly below the condenser, usually neutral filter or colored filter is put just on the light source.

B- Indirect illumination: where we have a mirror in place of the light bulb, light strikes the mirror and the light reflected through the condenser to the specimen.

### **Type of condenser:**

- 1-Bright – field condenser
- 2- Dark – field condenser