

Revision : ----	Document Code: WI- ML-2250	Standard Operating Procedure (SOP) for Optical Microscope Operation	 وادی علم و تحقیق و خدا بختی و درانی آستان خدا و اسلام و سرشتی
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Standard Operating Procedure (SOP): Zeiss Binocular Light Microscope

1. Objective:

To describe the operation, maintenance, and general principles for using a German-made Zeiss binocular light microscope.

2. Scope:

The scope of this procedure pertains to the operational capabilities of the microscope, defining the types of objects and structures that can be observed. This varies based on the microscope type, magnification, and resolution. Magnification and resolution are the primary factors determining a microscope's operational scope.

3. Responsibility:

The responsibility for implementing this procedure lies with the respective laboratory experts.

4. Operating Procedure:

1. Select the 10X objective lens.
2. Focus on the slide.
3. Ensure the condenser iris diaphragm is at its lowest setting.
4. Using the two side knobs of the condenser, center the light source.
5. Adjust the condenser until a mild orange or faint red halo appears around the light source.
6. Open the light diaphragm source until the light fully illuminates the area under observation.
7. Remove the eyepiece, look into the microscope eyepiece tube, and open the condenser iris diaphragm until the light adequately covers the observed area. Adjust the light intensity to a suitable level.
8. Select the 40X lens and position it correctly.
9. If necessary, open the diaphragm further or increase the lamp intensity.
10. Using the coarse and fine focus knobs, along with the mechanical stage control, move, track, observe, and study any desired point on the slide and specimen.
11. Upon completion of work, turn off the microscope and clean the objective lens with lens cleaning paper.

5. Safety Guidelines:

- **Electrical Safety:** Ensure all power sources and cable connections are secure and stable to prevent any risk of electric shock.
- **Ergonomics:** Use the microscope in an ergonomic position to avoid neck and back strain.

6. Maintenance Guidelines:

- **Placement:** Place the microscope on a flat, stable, and vibration-free table. At high magnifications, even the slightest vibration can cause significant image instability.

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- **Workspace:** Ensure there is sufficient legroom under the table and use an adjustable chair. Avoid placing the microscope facing a bright window; it is preferable to face a wall or a dark window.
- **Handling:** When moving the microscope, hold the metal arm with one hand and support the base with the other. Never lift the microscope by the stage or the eyepiece holder.
- **Focusing:** When switching objective lenses, lower the stage as much as possible. Then, use the coarse or fine adjustment knobs to slowly focus the image, always monitoring the distance between the lens tip and the slide. When using the high-magnification (100X) objective, always use the fine adjustment knob instead of the coarse one. Always return the objective to the lowest magnification after use.
- **Immersion Oil:** Clean the device immediately after using immersion oil. (Oil immersion is used to increase resolution; the lens and specimen are immersed in a high-refractive-index oil). Not all lenses are designed for oil immersion; typically, only lenses with magnification higher than 40X (marked "OIL") should be used. Clean lenses immediately after use, but **do not** use organic solvents, as they may damage the lens coating.
- **Lens Cleaning:** Clean the lens gently with circular motions from the center to the edge. You may wrap a piece of lens paper around a cotton swab for cleaning. **Never** use alcohol, standard tissues, paper towels, or toilet paper, as they will scratch the lens surface. Never touch the lenses with your fingers, as skin oils can cause surface corrosion.
- **Storage:** Cover the microscope when not in use to prevent dust and mold accumulation. Store it in a clean, dry environment. Humidity can cause metal components to corrode and lead to internal mold growth. Keep the microscope away from corrosive chemical fumes, which can destroy the lens coating and degrade metal parts.
- **Lamp Management:** Always turn off the light source after use. Allow the bulb to cool down before placing the protective cover, as this extends lamp life. Do not turn on the microscope at maximum light intensity (to prevent overheating or lamp explosion). Never touch the bulb with your bare fingers; if handling is necessary, use a tissue. If the device will not be used for an extended period, unplug it to protect it from voltage surges.
- **Post-Operation:** After finishing work, rotate the objective to the lowest magnification and place the protective cover on the unit.

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