

Laboratory 2

Metric Measurement and Microscopy

Student Tip Sheet

Metrics

You will need a lot of practice measuring using metric tools and changing units within the metric system to really feel comfortable thinking in metric units. We are all familiar with a 2-liter bottle because of the soft drink industry. But, do you know how to buy fabric or lumber by the meter, understand drug dosages in milligrams, or know how much information our computers will hold? In some situations you may be asked to convert in to and out of the metric system to fulfill a metric studies requirement, but this does little to actually help you think in metric terms. You will use metrics routinely if you learn to measure with the metric tools and change units totally within the metric system. Measure and remeasure all of the exercises in the lab manual to help yourself THINK METRICS!

Microscopes

Do not confuse the types of microscopes. Remember that an electron microscope is a large complex instrument that is usually only available in research institutions and large hospitals. It requires structural considerations to avoid or minimize shaking of upper stories in a building and specially trained technicians to operate the instrument for study and research. It is used for observation of particular cells or sub particles or the surface areas of specially prepared samples.

Read about and carefully observe the equipment available to you. The microscopes for student use in the laboratory are compound or dissecting microscopes (stereoscopes). Slides of small whole organisms or tissue sections are typically studied with the compound microscope, and samples of the external structures of larger specimens are studied with the dissecting microscope.

Please check your microscope and note the comparative size of the objectives. The 4X is the lowest magnification and has the shortest barrel length, whereas the 10X, or “low power”, is essentially the medium power magnification with a somewhat longer barrel. The high power or 40X performs the next higher level of magnification and has an even longer barrel length. Remember, “4-10-40” or “Scanning-Low-High”, in that order!

Microscope Focusing

Remember to begin focusing the compound microscope with either the 4X or 10X objective and the stage as close together as possible. Some styles of microscopes move the stage up and down, while other designs move the body of the microscope and the stage remains in place. In any case, adjust the coarse adjustment to move the stage and the lens of the objective close together. Next, slowly separate the stage and the objective by turning the coarse objective while looking through the eyepiece to locate and clarify the image. It is tempting to simply place a slide on the stage, look into the objective and begin turning the knobs up and down. However, even though this hunt and seek method sometimes works, more often than not it will waste much time and energy. Regardless of the equipment, staining, or magnification, the separation method will *always* work! This is the classic example of “when all else fails, read the instructions.”

Focusing with both eyes open really does prevent eyestrain. You will see double images for only a short time and then this problem will disappear. Thirty seconds to one minute of patience will allow for hours of comfortable study.

Microscopic Measurement

The method of microscopic measurement described in the manual is very helpful when working with microscopes without any sort of micrometer. Remember the following tip to insure as much accuracy as possible. When determining the initial diameter of the field of view, make certain that you use the edge of a translucent ruler placed exactly on the diameter of the circle of light viewed through the low power objective. The markings on the ruler when magnified will appear black and thick. To insure accurate measure of the field, place the *center* of one of these thick bars at the edge of the diameter. It is tempting to use the left or the right edge of the ruler marking, but this will grossly change the measure of the diameter and thus give poor results. To repeat, use the center of the magnified ruler mark to make the initial determination of the diameter of the field of view.

Cell Observation

Iodine stained cheek cells look like yellow potato chips under the microscope. The perfectly round pearl-like objects are probably air bubbles; they're pretty to observe but should be ignored.

Prepare the onion by cutting small sections and placing them in tap water (less onion smell and crisper onion). The thin transparent layer is easier to pull away from the larger layers of onion tissue. After the thin layer is removed, discard that onion section so that the next student will not try to remove a layer of cells that is not there!