Lab Equipment Proper Procedures and Use

Introduction: A good scientist must be able to use scientific tools to make accurate observations. While studying science in this class, you will be required to use many pieces of lab equipment to help you collect data and to make observations. It is essential that you be able to use each piece of equipment accurately and safely. You must also have the skills to record and analyze the data that you collect while using these pieces of equipment. The best way to become familiar with the tools used by scientists is to handle them yourself. The first lab we perform will be learning to use basic pieces of lab equipment, scientific terms and proper units of measurement. You will also learn that biology is precise and we require detail. When asked for an observation think about your 5 senses, you should usually be able to describe using at least 3 of them. Before the lab you must know proper procedures when using the lab equipment, so you and your partner are safe and the equipment is undamaged.

Define the following terms that you will need to be familiar:

Precipitate-

Meniscus-

General lab rules:

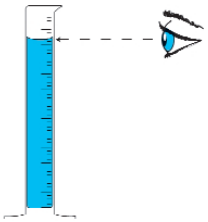
1. Before beginning any lab take a picture of the lab station. You will use the image to leave the station as you found it.
2. Read the board instructions before beginning the lab
3. Upon completion of a lab follow the cleanup procedures that will be on the board.

Lab attire:

1. Unless using the microscope goggles must always be worn.
2. An apron must always be worn
3. Close toed shoes
4. Hair tied back
5. No loose sleeves or loose jewelry.

Proper equipment use and care:

Graduated Cylinder:



1. Graduated cylinders should be stored on the side unless containing a liquid-this reduces breakage from tipping over.
2. Always select the **smallest** graduated cylinder that will hold the sample.
3. Graduated cylinders are named for the amount they hold. For instance a 100mL graduated cylinder can measure 100mL of the substance.

Measure:

1. Place the cylinder on a flat surface.
2. When pouring substances into any glassware you should **NOT** hold the glassware with your hand. (this avoids injury should you accidently spill when pouring).
3. Look at the cylinder from the side at eye level. The top of the liquid should be at eye level. The view of the surface of the liquid will be curved. This curved surface is called the “meniscus”.
4. Read the graduated cylinder at the bottom of the meniscus.
5. The cylinders come in a variety of sizes. The divisions on different sized cylinders can have different values. Here are two examples. The larger one has 1mL divisions, the smaller one has 0.1mL divisions.

100 ml cylinder; each division is 1 ml

10 ml cylinder; each division is 0.1 ml

Read from the bottom of the curved surface.

Electronic Balance:

1. Substances should never be placed directly on the scale. You must use a container of some sort (weighing boat).
2. Substances should never be stored on the electronic balance

Measure:

1. See that the unit sign in the lower right of the display shows **g**
    a. If it does not, press the unit button on the front.
2. Place the container on the balance and the mass of the container will be displayed. By pressing the **Zero** button at this point, the balance will reset to zero and ignore the mass of the container.
    a. The display should read **0.00**
3. Using the scoopula (if a powder) place the substance to be weighed into the container and the balance will show only the mass of the substance.
4. When finished with the electronic balance, press the **On/Off** button and hold it down until the display shows **OFF**.

Cleaning:

1. If something is spilled on the scale gently (DO NOT apply pressure) wipe the scale with a damp (NOT overly wet) paper towel.

Test Tubes:

1. Test tube should be placed in the rack when adding a substance, not held. (This avoids injury if spillage occurs)

Mixing:

1. When mixing substnaces in a test tube gently but quickly roll the test tube between your palms several times to effectively mix.

Heating:

1. When heating a substance in a test tube place the tube in a test tube clamp. Never remove the clamp from the test tube while it is being heated, however you may rest it against the side

Cleaning:

1. The sinks have a nozzle that creates a large high-pressure spray if turned on all the way. This can cause you to drop the object being held and spray surrounding equipment. Gently turn on the water.
2. Use a small single drop of soap and the test tube brush to clean the test tubes. (test tubes are notoriously difficult to rinse, using a small amount of soap makes it less difficult.)
3. Rinse thoroughly and store upside down in the holder to dry.

The Metric Ruler

1. All of our measurements will be made using the metric system.
2. A meter consists of a 100 centimeters, and 1000 millimeters.
3. When measuring smaller items measure in mm first then convert to cm. This is more precise.
4. In 2 dimensional objects the width is shorter and length is longer.
5. Be sure you begin measuring at the zero line on a ruler not the end.
6. Units of measure **must** be written on all numbers. Leaving this off will cost points.

Erlenmeyer flask and Beakers

1. Erlenmeyer flasks and beakers are used for mixing, transporting and reacting, but **not for accurate measurements**. The volumes stamped on the sides are approximate.

Mixing with an Erlenmeyer flask:

1. The Erlenmeyer flask should be flat on a table not a paper towel. It should not be held while adding substances.
2. After adding substances-swirl to gently mix, the Erlenmyer flask should NOT leave the table while being swirled.
3. Your hand should be at the base of the Erlenmeyer flask and not over the top. (This reduces risk of injury if something should splash)

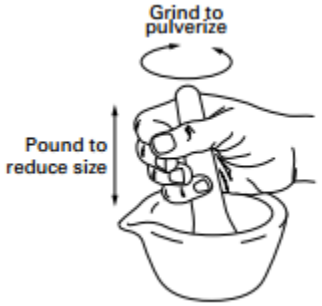
Cleaning:

1. Wash Erlenmeyer flask and beakers with, test tube brush, soap (**use 1 drop**) and water (**rinse thoroughly**).

Mortar/pestle

1. A mortar and pestle should be used for grinding only one substance at a time.
2. **Never** use a mortar and pestle for simultaneously mixing different substances

Using:



1. Place the substance to be broken up into the mortar.
2. Pound the substance with the pestle, and grind to pulverize.
3. Remove the powdered substance with a porcelain spoon (we do not have one so carefully pour).

Pipette

1. It is extremely important in biology to avoid cross contamination. It is important that you select the proper dropper and that the droppers not touch the other substances.
2. When adding substances to the well keep the dropper close enough to the well that you do not create a splash but far enough away that you do not touch the substance with the pipette.

Cleaning:

1. Gently draw a little water into the pipette and squeeze until empty. Repeat until pipette is clear)

Microscope, slide

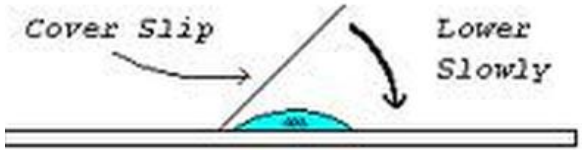
1. Carry the microscope with both hands-one on the arm and the other under the base of the microscope.
2. **NEVER** use the course adjustment knob when using the high power objective.

Storage

1. **NO** slide should be left on the microscope.
2. The eyepiece should be pointing toward the handle
3. The objective should be turned to the scanning power objective
4. Movable parts of the stage should be completely in.

Applying a coverslip:

1. When placing the cover slip you will want to start at an angle to avoid air bubbles.



Use:

1. Turn the microscope on.
2. Pull the stage clip back, place the slide on the stage and gently allow the clip to hold it in place.
3. Using the correct knob (NOT your hands) move the slide left to right. Front to back.
4. Always position the image in the center.
5. View using the scanning power objective (red).
6. Focus using the coarse and fine adjustment knob until the image is completely clear and centered.
7. Increase to the low power objective (yellow). Again, center the image and use the focus knobs until the image is completely clear.
8. Increase to the high power objective and focus until the image is completely clear. (use **only** the fine adjustment know with this objective)
9. Always start on the scanning power. NEVER move to the low power until the image is centered and clear.

Hot Plate

1. Laboratory hot plates present obvious dangers, such as the potential for people to burn themselves or even start a fire
2. Before heating, inspect the glassware for cracks visible to the naked eye.
3. If there is too little moisture and the vessel remains exposed to heat, it will eventually crack.