

# Introduction to Biology 190L and Chemistry 121 Lab Equipment

By

Dr. Steve Carman, Professor of Biophysical Sciences,  
WNC-Carson Campus

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Student Name	Course	Date Completed	Faculty Sign-Off

## Purpose

The purpose of this experiment is to begin your acquaintance with many of the necessary pieces of equipment you'll be using in the lab and to become more acquainted with the lab pods, themselves.

## Introduction

There are many items that you'll be using in the lab. Many are made of glass: this is because glass is less reactive than other substances. Many of these items will be used for measuring volumes of different liquid reagents at/with varying degrees of accuracy and precision.

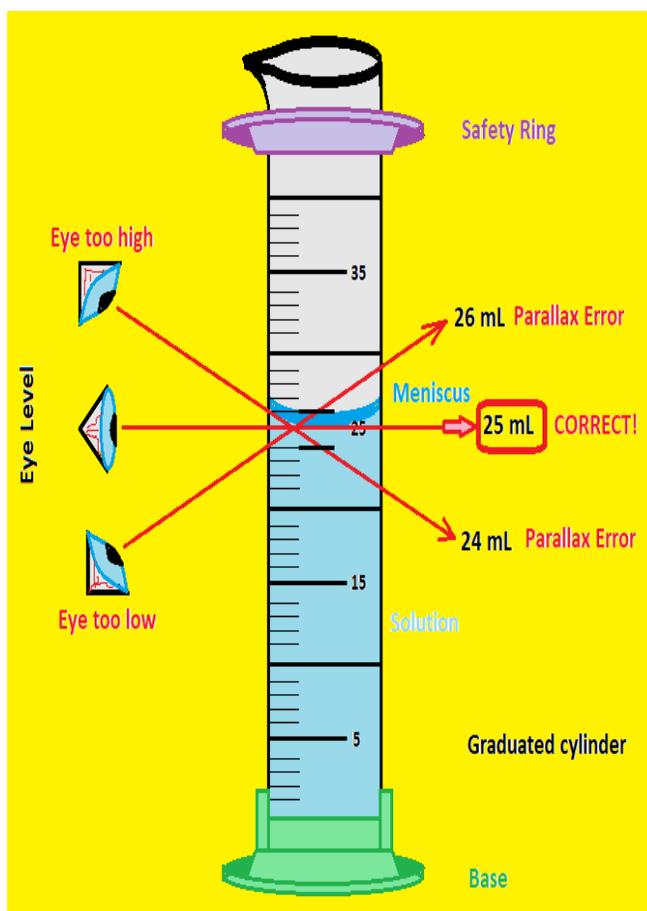
Accuracy is how close a value is to known values. Precision is within test agreement. Precision and accuracy, of necessity, are dependent upon parallax. Parallax is the effect whereby the position of an object appears to differ when viewed from different positions. The table, below, illustrates the concepts of accuracy, precision and deviations from both:

Precise, Accurate -- great	Precise, Inaccurate -- repair instrument; avoidable	Imprecise, Accurate -- Train person; accident	Imprecise, Inaccurate -- Hire new person; sad
Precise and Accurate; Best Choice for Measuring Volume	Precise, Yet Inaccurate; Consistent, However, Negating Error Effects	Imprecise; Accurate; Fraught with Error; Teach Person Proper Technique	Imprecise and Inaccurate; Worst Choice for Measuring Volume
Volumetric flasks; Burets; Micro-pipets	Graduated cylinders	Parallax	Beakers; Erlenmeyer Flasks; Unlabeled Portion of Burets

The following graphic (lower right) illustrates the effect of parallax on reading a meniscus volume in a graduated cylinder (you'll read the volume of your solution in a graduated pipet or buret in the same manner, by the way). Note that if your eye is above the line of level that your value will be read low; conversely, if your eye is below the line of level, your value will read too high.

Eye level to the meniscus is key. While your professor prefers to read the volume at the bottom of the meniscus, **as long as you're consistent**, it doesn't really matter if you read it at the top, middle or the bottom.

As per the accuracy/precision table, above, beakers and Erlenmeyer flasks are the worst choice in which to measure volumes: these are the mixing bowls of biology and chemistry. You can eyeball the volume close, but need to complete the volume with, at minimum, a graduated cylinder. Beakers and Erlenmeyer flasks have " $\pm 5\%$  error" stamped on their walls. It's closer to 25-30% error in lab practice.



# Typical Glassware and Other Equipment Used in a General Biology and General Chemistry Laboratory

In the table below are examples of the most commonly utilized supplies in a general biology and/or general chemistry laboratory:

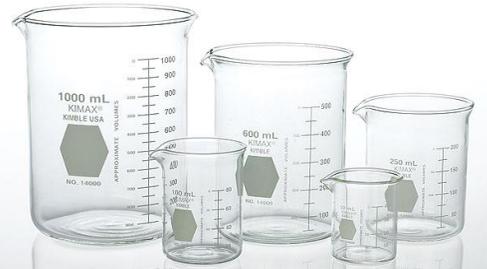
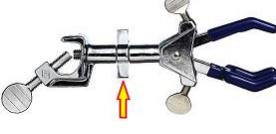
			
<p>Beakers. Note that the volume held by each beaker is stamped above the grey hexagon.</p>	<p>Erlenmeyer flask. Volume is also stamped above the hexagon.</p>	<p>Crucible with lid. Lids do NOT fit tightly.</p>	
			
<p>Electronic pan balance. Make sure it's leveled before use. Record ALL numbers on stabilization.</p>	<p>Fisher burner, sometimes erroneously called a Bunsen burner.</p>	<p>Burner tubing (end); sometimes latex tubing or Tygon tubing is used in its place.</p>	<p>Striker; sometimes called a sparker. When used properly, only requires one squeeze/strike to ignite burner.</p>
			
<p>Beaker tongs. Used to hold hot beakers safely. Arrow pointing to vinyl that grips beaker – do NOT stick in flame!</p>	<p>Crucible tongs. Used to pick up and transport crucibles for optimal analytical determinations.</p>	<p>Ring stand. Used to support a variety of clamps and rings during experiments.</p>	<p>Ring[s]. Come in a variety of sizes to support a variety of pieces of equipment.</p>
			
<p>Buret clamp. Bolts onto ring stand.</p>	<p>Buret. Used for titrations; comes in a variety of sizes.</p>	<p>Three-fingered clamp with butterfly/wing nut (arrow).</p>	<p>Three-fingered clamp (three prong clamp, fixed) without butterfly/wingnut.</p>
			
<p>Test tube rack; comes in a variety of colors. Autoclavable.</p>	<p>Pestle and mortar.</p>	<p>Disposable test tubes. Label on paint strip with pencil.</p>	<p>Evaporating dish.</p>

Table of most commonly utilized supplies in a general biology and/or general chemistry laboratory continues, below:

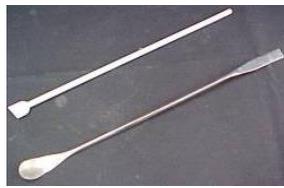
			
<p>Ignition tube. Thicker walls to withstand higher heat from flames.</p>	<p>Ostwald viscometer or Ostwald pipet. Fragile!</p>	<p>Pipet bulb. Does NOT fit snugly on pipet: only makes pressure seal.</p>	<p>Pipet bulb. DOES fit snugly on pipet.</p>
			
<p>Buchner funnel. Used for vacuum filtration. Requires filter paper.</p>	<p>Filter, or filtration, flask. Used with Buchner funnel.</p>	<p>Filter or vacuum tubing. Thicker walled.</p>	<p>Sink aspirators. Sometimes called a "Richard pump". May be stainless steel or synthetic. Screws into sink faucet.</p>
			
<p>Disposable pipet. Often calibrated to 1 or 3 mL.</p>	<p>Ruler. Used to measure length in inches, centimeters or millimeters.</p>	<p>pH Checker. Determines pH; calibrated at pH 7, then 4.</p>	<p>Watch glass. Used to work samples; specifically with magnetic susceptibility balance.</p>
			
<p>Hot plate. Used in place of open flame when necessary.</p>	<p>Scoopula. Transfers solids in larger amounts.</p>	<p>Wire gauze. Sometimes erroneously referred to as a flame spreader. Rests on ring under beaker when heating with Fisher burner.</p>	<p>Policeman (top) – sometimes called "rubber policeman" – for scraping; spoonula (bottom) – for transferring medium amounts of solids.</p>

Table of most commonly utilized supplies in a general biology and/or general chemistry laboratory continues, below:

			
Micro-spatula. Transfers very small amounts of solids.	Gravity funnel. May be used for liquids or to gravity filter mixtures using filter paper.	Powder funnel. Used to transfer powders.	Glass stirring rods. Used to hand stir during experiments; may also be used to transfer one drop for testing purposes.
			
Clay triangle. Used to support crucibles, among other things.	Wooden matches – not for Fisher/Bunsen burners; for oil lamp.	Sharpie pen for labeling.	Filter flask – for vacuum filtration with a Buchner funnel

There will be additional equipment you'll be learning about and using in the lab as time goes by. For now, though, the above table will get you started very well.

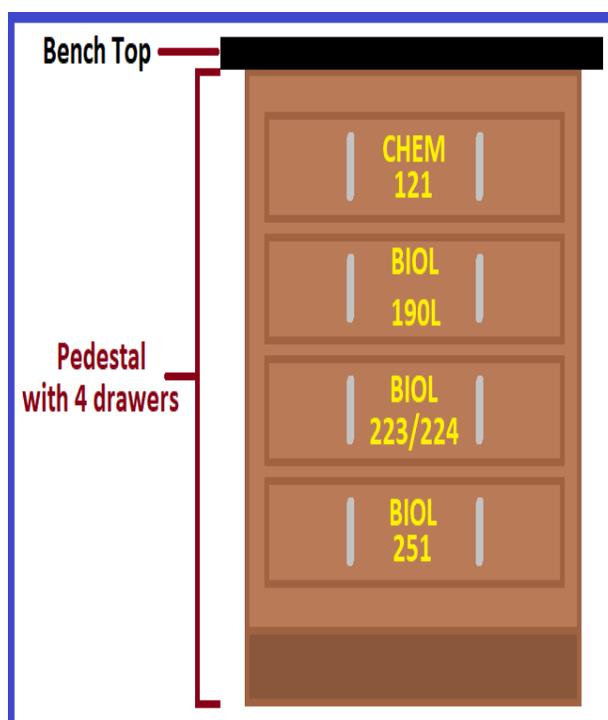
## Orientation to The Lab Pod

With the re-model of 201-203 ASP now complete (end December 2017), lab drawers from which you will be working will be assigned during your first lab period. When students enter the lab on the first day, they may go to whichever pod they desire and choose whichever top drawer they desire: that will be the drawer, basic equipment and bench space that students will use for the duration of the course (lecture and lab).

Students will generate their own inventory form in Excel, **example on next page** below, e-initial and date it, and turn it in to their lab faculty member via Canvas – **please alphabetize the items**. Students are responsible for the care of the equipment and notifying the faculty member if any equipment has been lost or broken so as to get the damaged equipment replaced in a timely manner.

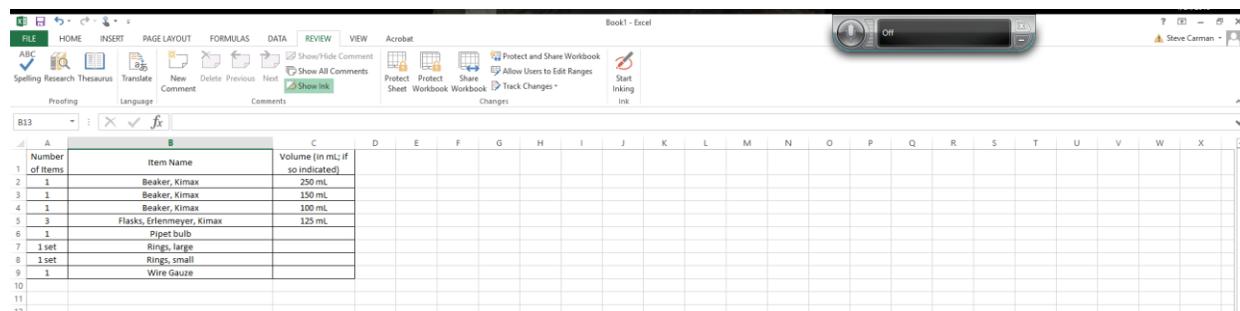
Students are discouraged from loaning the equipment in the drawer each student will be using for the experiment to their classmates: that action may impede a student's own experimental progress to the point of losing points for the experiment, which will contribute to a lower grade.

The pods are octagonal and consist of four (4) pedestals that support 4 students at the lab bench. As one may observe in the lower right graphic, each pedestal has four (4) drawers.



Students enrolled in specific courses will have access to ONLY those indicated drawers (per the image at right).

Brief (incomplete) example of the Excel Spreadsheet layout follows:



There will be times that students will not have some equipment in their drawers. That equipment will be made readily available to the class for each student to access for use at his/her bench/work space.

Likewise, any solutions that are prepared for student use are to be dispensed at each student's work space and the bottle[s] returned to the origination source.

In addition, one NEVER returns excessive amounts of solids or liquids to the bottles of origination: safely dispose of the excess as directed by your lab faculty member.

## Finis

After you have generated your list on paper, clean up your area, put everything away, have the experiment signed off and head home to complete the Excel Spreadsheet for turn-in.