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# Laboratory Procedure Guided Notes – Teacher Edition

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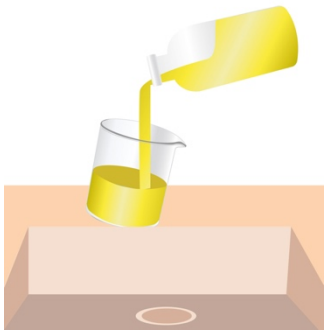
**Laboratory techniques** are processes and practices that are recommended for using the various equipment in the laboratory. Learning the proper techniques and how to use all the equipment can take time; thus, it is important to start with the basics to be gain mastery of these techniques. Some of the basic lab techniques include pouring or transferring, measuring, filtering, and heating.

## Pouring / Transferring Liquids

- Transferring to a wide mouthed container
  - Use the back of your fingers to remove the stopper from the reagent bottle.
  - Hold the stopper between your fingers until the transfer is complete.
  - Grasp the container from which you are pouring with the palm of your hand covering the label.



- Transferring to a narrow-mouthed container
  - Use a funnel when transferring liquids to a narrow-mouthed container.
  - Put it on the top of the container with the tube inserted inside.
  - Take the container with the liquid and hold it above the funnel.
  - Slowly pour the contents into the funnel.
  - When transferring to a test tube or graduated cylinder, the container should be held at an eye level.
  - Pour slowly until the correct volume has been transferred.

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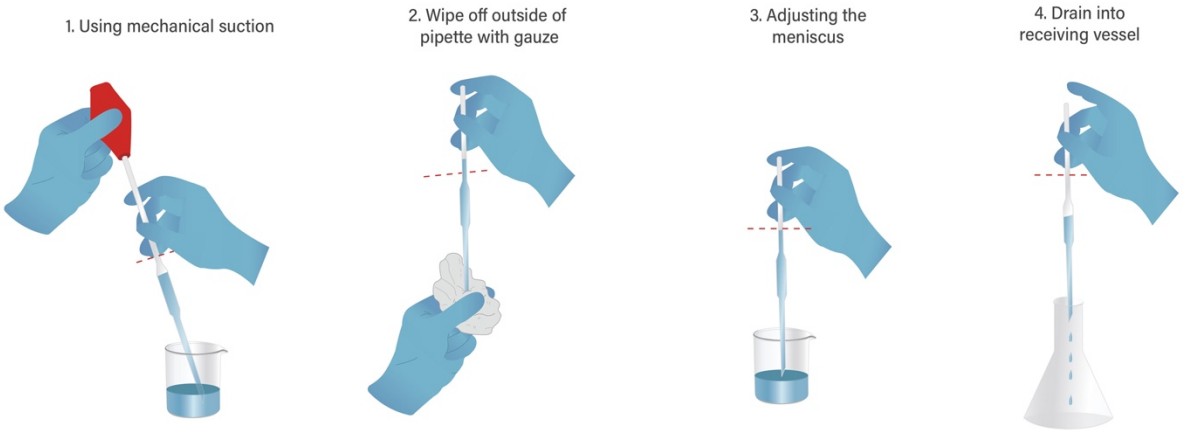
- Transferring using a stirring rod
  - When pouring liquid from a reagent bottle into a beaker, the reagent should be poured slowly down a glass stirring rod.
  - The rod should touch the lip of the vessel from which you are pouring and the inside of the vessel into which the liquid is being transferred.

- Pipetting
  - It is a technique used to transfer liquids using a pipette.
  - Do not pipet directly from the reagent bottle unless you are instructed to do so. Instead, pour some of the liquid first into a container before pipetting the liquid.
  - Be careful not to touch the walls of the container or its contents with the tip of the pipette.
  - Make sure you keep the tip of the pipette elevated from the bottom of the container to avoid creating air bubbles.

  - A mechanical suction may be used to aspirate the liquid. Replace the suction with a finger then wipe off the side of the pipette. Slowly lift the finger to adjust the meniscus. Once the correct measurement is achieved, drain the liquid into the receiving vessel.

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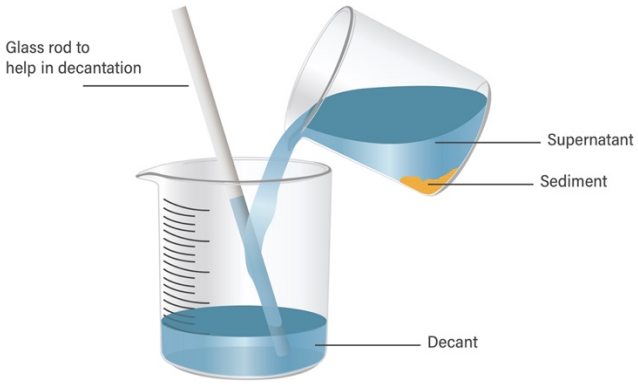
- Decanting
  - It is gradually pouring liquid from one container to another, without disturbing the sediment.
  - In this technique, the lighter component is poured off the top of the mixture.
  - The supernatant is the clear liquid that lies above the solid residue or sediment. This is the liquid being poured off to another vessel.
  - The liquid component that is collected or transferred into a new vessel is known as the decant.




## Transferring Solids

- A solid can be dispensed from its reagent jar directly into a vessel especially if it is wide mouthed container.
- Tip the bottle and slowly rotate the bottle back and forth.
- Do not tip the bottle up high and let the contents pour out.
- If a solid is to be transferred into a narrow-mouther vessel, a powder funnel may be used.
- Alternatively, the solid can be nudged off a creased paper in portions using a spatula.

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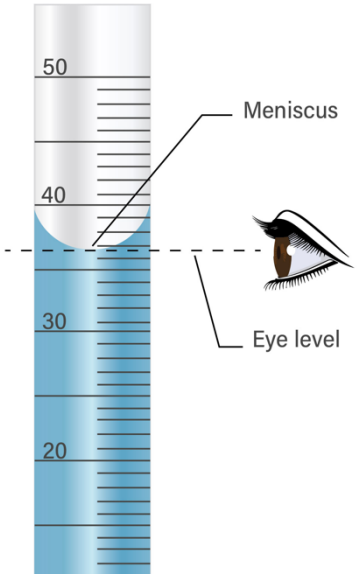
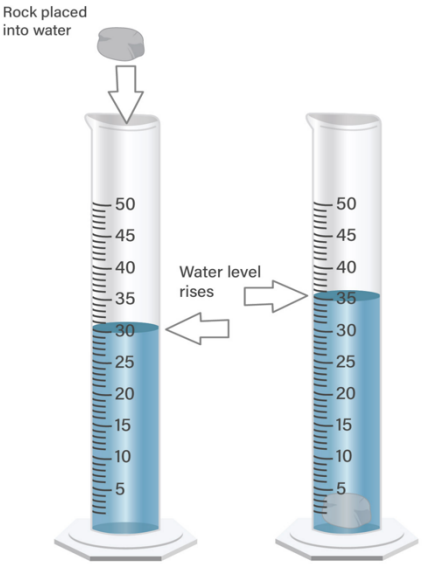
## Measuring volumes of liquids

- Select a cylinder that is large enough to hold the volume of liquid being measured.
- Put the graduated cylinder on a flat surface.
- Vide the height of the liquid in the cylinder with your eyes directly level with the liquid.
- The liquid will tend to curve downward. This curve is called the meniscus.
- Always read the measurement at the bottom of the meniscus.
- Look at the horizontal lines on the side of the cylinder. Ascertain to which line the meniscus is closest.




## Measuring volumes of irregularly shaped solids

- Water displacement method is used to determine the volume of an irregularly shaped solid.
- To do this, find a graduated cylinder that is large enough to hold the object being measured.
- Fill the graduated cylinder with adequate water. This means that when the object is place in the cylinder. it must be fully submerged.
- Be careful not to put so much water that the water level will rise past the cylinder's markings when the object is submerged.
- Record the volume of the water prior to submerging the object. Label it as initial volume.
- Place the object in the graduated cylinder and record the resulting water volume as final volume.
- Subtract the volume of the water alone from the volume of the water plus the object. This will be the volume of the irregularly shaped solid.

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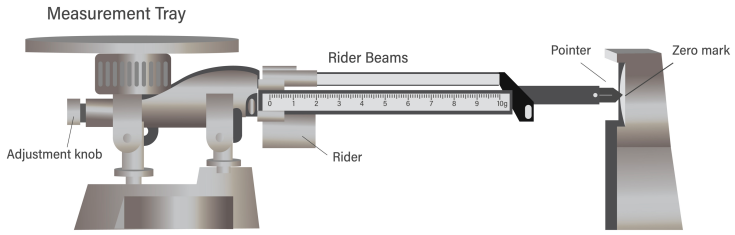
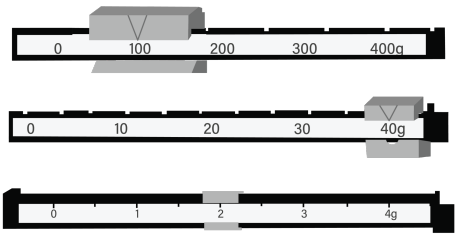
## Measuring mass

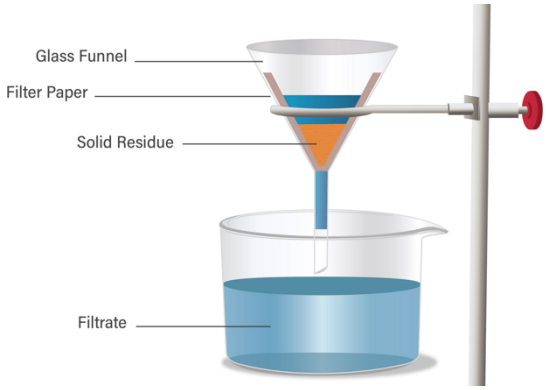
- The triple beam balance is used measure masses very precisely.
- With the pan empty, move the three sliders on the three beams to their leftmost positions. This will make the balance pointer equal to zero.
- If the pointer is not aligned with the zero mark, then calibrate the balance by turning the adjustment knob on left side, under the pan.
- Once the balance has been calibrated, put the object to be measured on the pan.
- Move the 100-gram slider along the beam to the right until the pointer drops below the zero mark. The notched position immediately to the left of this point indicates the number of hundreds of grams.
- Now move the 10-gram slider along the beam to the right until the pointer drops below the zero mark. The notched position immediately to the left of this point indicates the number of tens of grams.
- The beam in front is not notched and the slider can move anywhere along the beam. The boldface numbers on this beam indicate the grams and the tick marks between boldface numbers indicate tenths of grams.




## Filtering

- **Filtration** involves separation of a solid from a liquid by passing the mixture through a porous material.
- In filtration, the porous filtering material is usually a paper inserted in the funnel. The liquid collected is called filtration while the solid collected in the filter paper is called residue.

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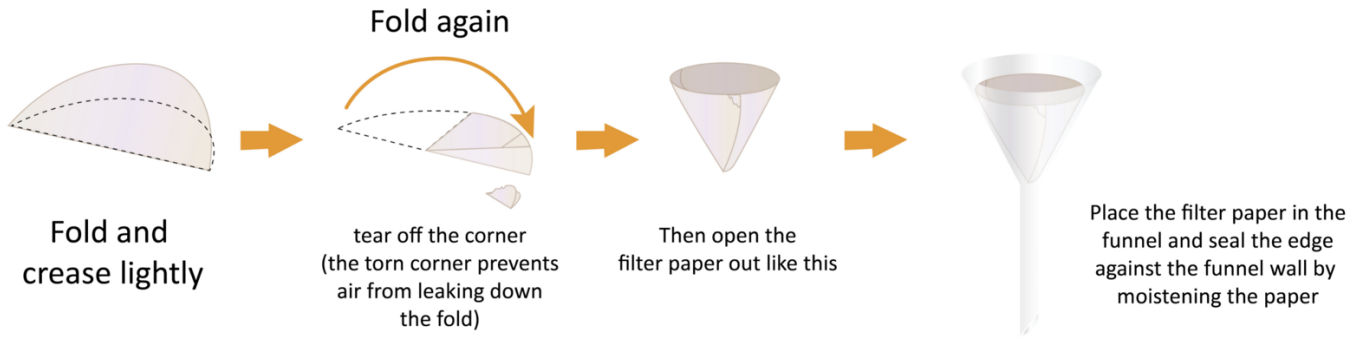
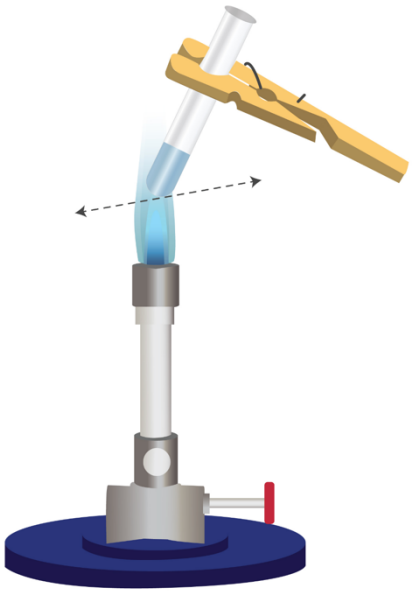
- Fold the filter paper to fit in the funnel as shown in the image below.




- Wet the paper with the solvent, which is usually water.
- Adjust it so that the entire cone tightly fits on the inner surface of the glass funnel.
- Pour the contents of the solution to be separated onto the funnel with filter paper. Use a stirring rod when pouring to avoid spillage.

## Heating

- Heating in a test tube
  - Hold the test tube with the help of a test tube holder at an angle.
  - Heat just below the surface of the liquid but not at the bottom.
  - While heating, the move the test tube back and forth.
  - If the test tube is heated at the bottom, a bubble may form causing the entire content to spill out of the test tube violently. This is called bumping. This can cause a serious accident, if the mouth of the test tube is pointing towards you or someone working near you.



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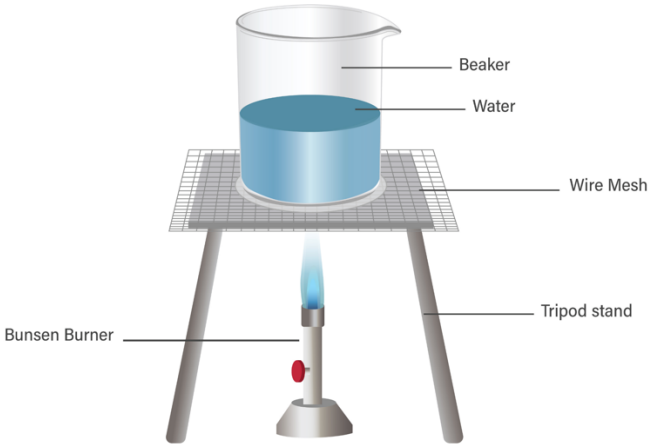
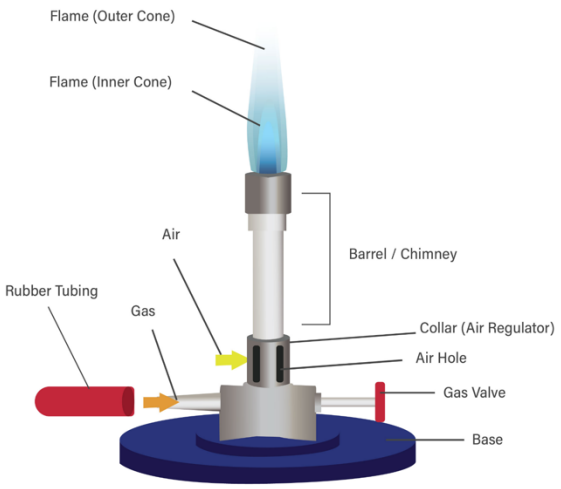
- Heating in a beaker
  - If the liquid is to be heated in a beaker or a flask, the beaker or the flask is placed on a wire gauze which in turn is placed on a tripod.
  - For safe boiling, it is advisable to add a chip of broken china dish or a piece of any other non-reacting tiny material like pumice stone to avoid bumping.




## Lighting a Bunsen Burner

- A Bunsen burner is a common laboratory instrument that produces a hot, sootless, and non-luminous flame. It allows for precise regulation of the mixing of gas and oxygen before combustion which ignites the flame.
- The following are the parts of the Bunsen burner:
  - Barrel – it is where the gas and air mix for combustion
  - Gas inlet – it is where one end of the rubber tube is connected to the main gas
  - Rubber tube – connects the burner to the main gas
  - Gas valve – regulates the amount of gas that enters the burner
  - Collar – regulates the amount of air entering the barrel
  - Base – supports the burner

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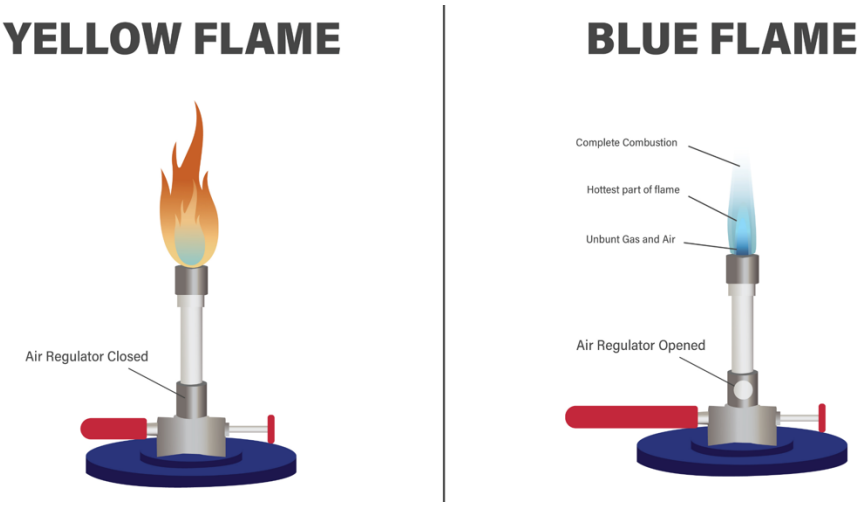
- Luminous vs Non-luminous Flame
  - A luminous flame burns yellow while a non-luminous flame burns blue.




  - This is due to the difference in the available supply of oxygen.
  - Luminous flames have limited access to oxygen. It is a less hot flame, highly visible, and is used whenever you are not heating something.
  - Non-luminous flames have unlimited access to oxygen. It is hotter flame, harder to see, and is used whenever heating is necessary.
- To light a Bunsen burner:
  - Connect the hose securely to gas supply and Bunsen burner.
  - Turn on main gas. If you hear gas, check the valve on the Bunsen burner as it may be open. If it is open, close it by turning it counterclockwise.
  - Turn the valve on the Bunsen burner clockwise about 3 half turns.
  - Hold the striker on top of the barrel and ignite it.
  - Use the **gas valve** to control the flame's size. Take note that more gas will create a larger flame and less gas gives a smaller flame.
  - Twist the **collar** to adjust the flame's temperature. Close the collar so that no air enters the barrel for the coolest flame. Adjust the collar to allow air to enter the barrel and achieve a blue flame.
  - To extinguish the flame, close the needle valve completely by turning it clockwise to cut off the gas supply.

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