

Pipets

Measuring Pipets

Volumetric Pipets

Types

- Several different types of pipets are used in a wastewater lab
 - Volumetric Pipets
 - Measuring Pipets
 - Serological
 - Serological – Blow Out
 - Mohr
 - Pipets can also be:
 - Wide tip
 - Standard tip

Volumetric Pipets

- Deliver a single specified volume
 - Very accurate
 - Volume is specified on the pipet
 - Typically “TD”
 - Do not need to rinse or “blow out” the tip
- Generally used for chemicals not for samples



10 mL Mark

Volumetric Pipet Specifications

- Typically baked or etched on the pipet.
- Provide
 - Capacity of the pipet
 - Color code
 - 'TD' or 'TC'

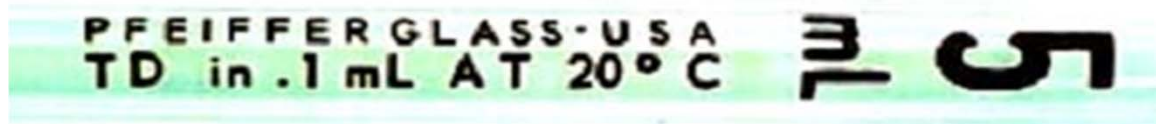


Measuring Pipets

- Graduated to deliver a range of volumes
 - Minor graduations depend on pipet volume
 - > 1 mL capacity
 - Typically use 0.1 mL graduations
 - <1 mL capacity
 - May use 0.01 mL graduations
 - Label on pipet will read “__ mL in 1/10th mL”
- Can be wide or narrow tip
 - Wastewater typically uses wide tip for samples
- Typically are “TD”

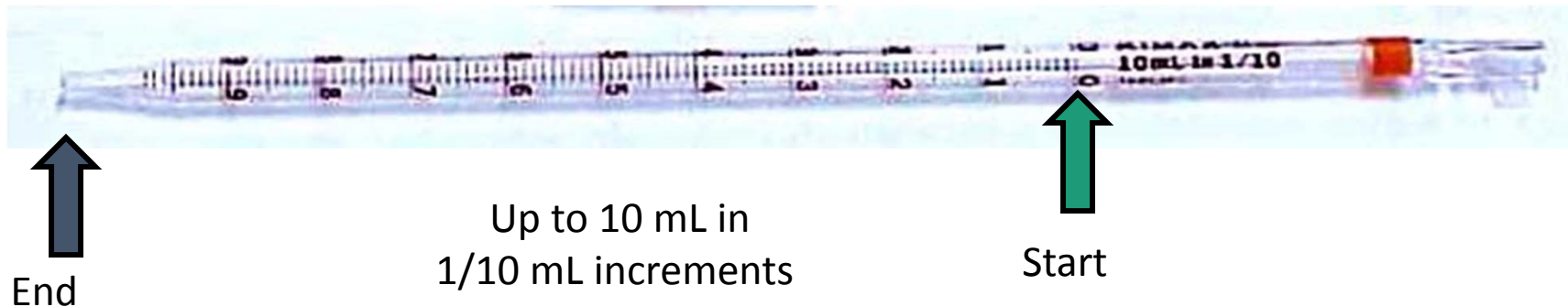
Measuring Specifications

- Each pipet is labeled at the top with the specifications and maximum capacity



Serological Pipets

- Measures volumes from the specified capacity to the pipet tip.
- Specified capacity includes the tip.



Serological Pipets (Blow Out)

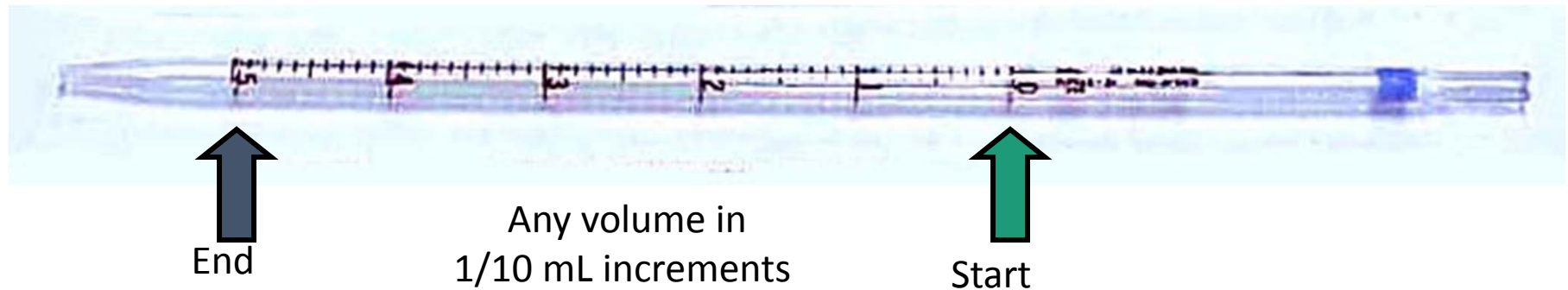
- Measures volumes from the specified capacity to the pipet tip.
- Specified capacity includes the tip.
- Must “blow” the residual liquid from the tip
- Identified by a frosted band or two thin lines at the top



Two thin lines

Mohr

- Measures volumes from specified maximum capacity to specified minimum
- Specified capacity does not include the tip



Wide Tip versus Standard Tip

- Wide Tip
 - Large diameter opening
 - More difficult to control adjustments
 - Typically used only for samples containing solids
- Standard Tip
 - Small diameter opening
 - Will clog easily
 - Typically used for chemicals and liquids containing no large solids

Others

- There are a number of other designs
- Use limited to specific applications
- Include:
 - Auto-pipets
 - Set to deliver a specific volume
 - Typically used for repetitive measurements
 - Can be very expensive
 - Transfer pipets
 - Fancy name for a dropper or dropping pipet
 - Not usually calibrated for precise volume

Pipet Safety

- No oral pipetting (by mouth).
- Always use a pipet bulb or similar device to draw liquid into the pipet.
- Pipets break easily. Be extremely careful when inserting the pipet into a pipet bulb.
- Place used pipets in the appropriate location
 - Pipet washer for reusable pipets
 - Appropriate trash receptacle for disposables
- Never use the same pipet for different samples or chemicals. Always use a clean pipet.

Pipet Safety Devices

- Many different designs
 - Simple Vacuum bulb
 - Pipet safety bulb
 - Pipet pump
 - Pipet aid
- Operation range from simple to complex

Pipet Safety Devices



Pipetting Procedure

General Considerations

- **Never pipet by mouth – use a pipet bulb or other safety device**
- Liquids containing solids require special care
 - Mix the liquid throughout the pipetting procedure.
 - Use a wide tip pipet
- **Never pipet directly from the sample container or chemical storage bottle**
 - Transfer a portion of liquid to a clean, rinsed beaker or flask
 - Use the liquid in the beaker to fill the pipet.

Step 1

- Pour a small amount of the liquid to be measured into a clean beaker
- Swirl the liquid in the beaker to rinse all of the inside surfaces
- Discard the liquid used to rinse the beaker

Step 2

- Fill the rinsed beaker with sufficient liquid to allow the pipet to be completely filled without emptying the beaker.

Note:

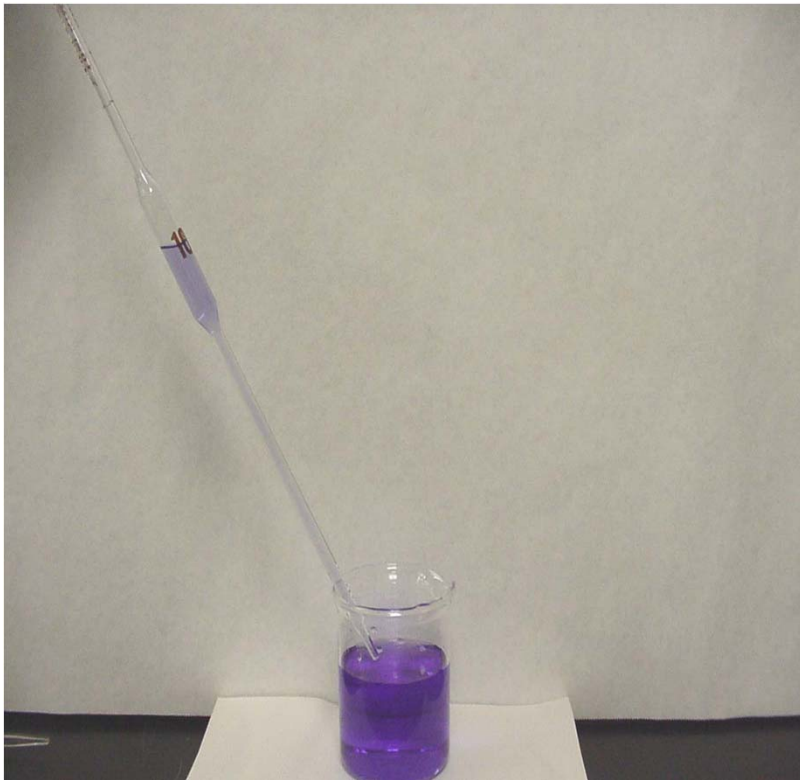
If the liquid contains solids, place the beaker on a magnetic stirrer and stir sufficiently to keep all solids in suspension



Step 3

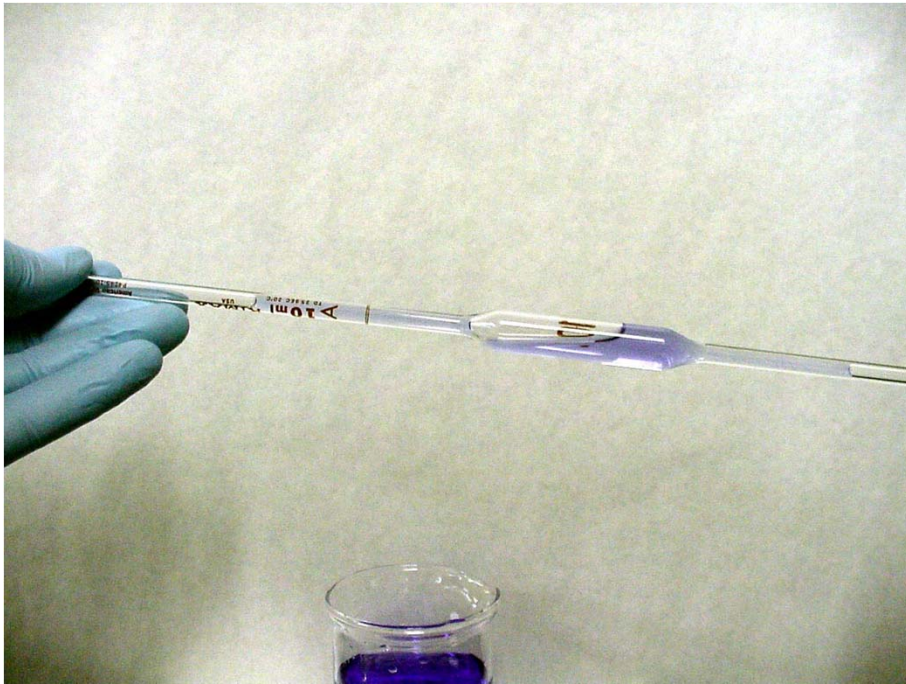
- Insert pipet into the lower end of the safety pipet device
- Never apply vacuum to a pipet unless the pipet tip is below the surface of a liquid.
 - Failure to do this will:
 - Contaminate the liquid being measured
 - Contaminate/destroy the pipet bulb
 - Create unsafe conditions
 - Require repeating the pipetting procedure using clean equipment

Step 4



- Place the tip of the pipet below the surface of the liquid in the beaker.
- Draw liquid into the pipet until it is approximately half full

Step 5



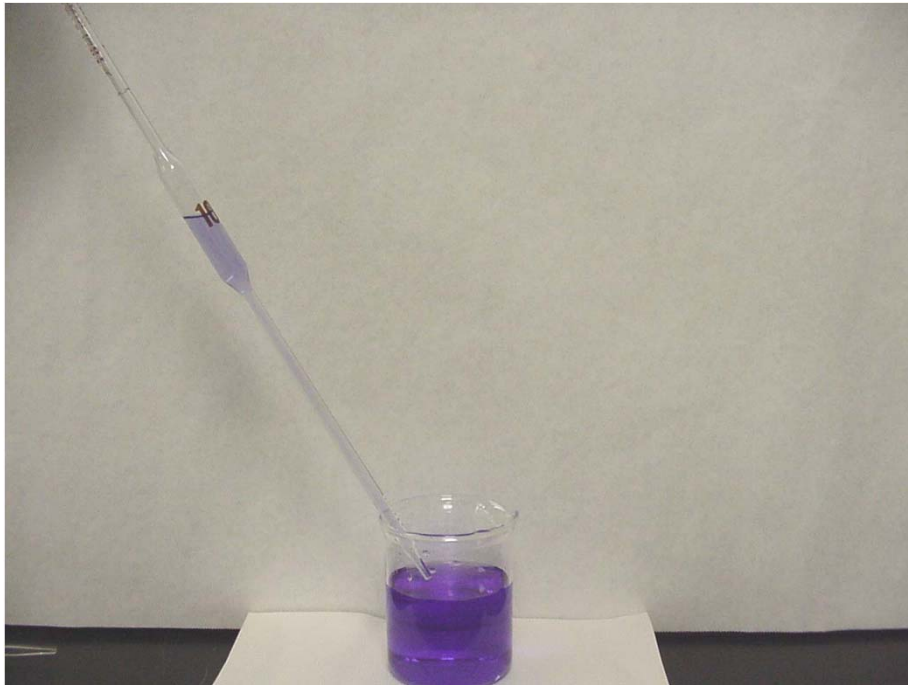
- Tilt the pipet and carefully allow the liquid to flow up the pipet until the interior is fully wetted.

Step 6



- Place the pipet over the waste container
- Allow the pipet to drain by gravity
- Follow appropriate draining procedure to remove remaining liquid.

Step 7



- Place the pipet below the surface of the liquid in the beaker
- Draw liquid into the pipet.

Step 8



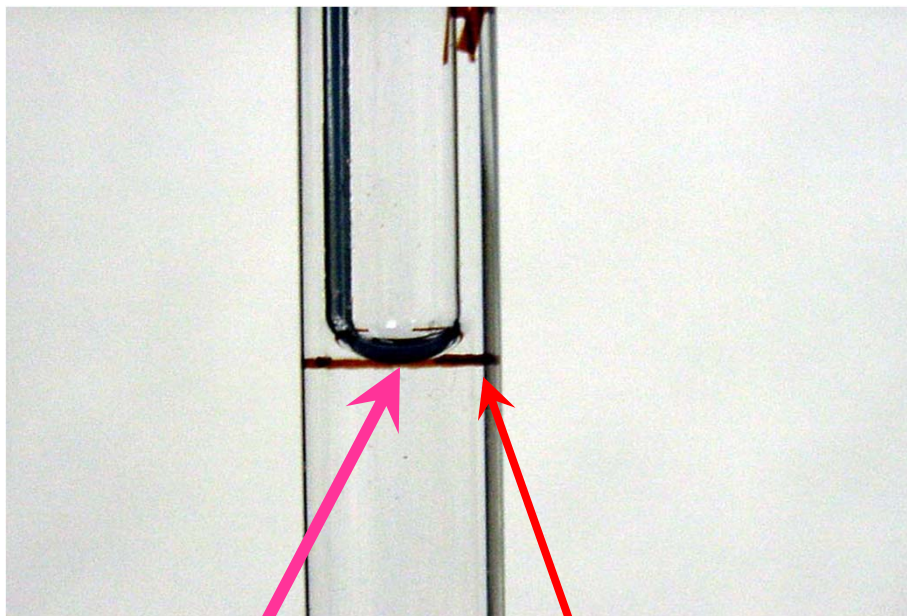
- Fill the pipet with liquid to a point 1 - 2 inches above the graduation.

Step 9



- Remove the pipet from the beaker containing the solution
- Carefully wipe the excess liquid off the outside of the pipet with a lab tissue

Step 10



Meniscus

Fill Line

- Carefully drain the pipet into the waste beaker until the meniscus is just touching the line.

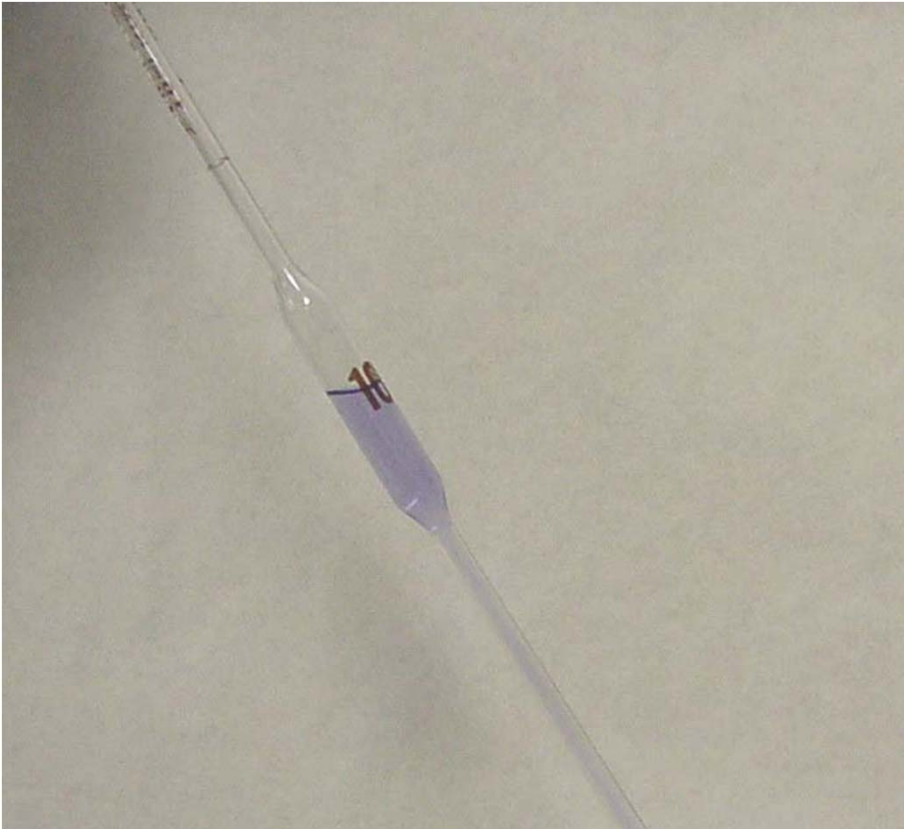
Step 11



- Remove any drops adhering to the tip by gently wiping with a lab tissue

Be careful – wiping too hard may act as a wick and draw liquid out of the pipet!!!

Step 12



- Transfer the pipet to the delivery container and drain.
- Draining procedure is determined by the type of pipet being used.

To Deliver (TD) Pipets

- Allow the pipet to drain by gravity
- When draining is complete, touch the tip of the pipet to the inside of the container

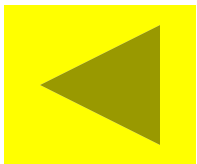
Do not blow the remaining liquid out of the pipet.

To Deliver (TD) – Blow out Pipets

- Allow the pipet to drain by gravity
- When draining is complete, use the pipet bulb to force the remaining liquid out of the pipet.
- Touch the pipet to the inside of the container to remove any remaining liquid

To Contain (TC) Pipets

- Not frequently used
- When used they may require rinsing to remove the remaining sample or solution.



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Pipets



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DEQ

Problems

Little things that cause big problems

Dirty Pipets

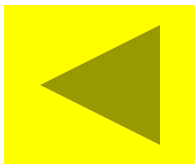
- Always check to make sure the pipet drains uniformly and completely
- Liquid adhering to the inside walls of the pipet
 - Indicates the pipet is not clean
 - Will cause inaccurate volumes
- Correction
 - Clean the pipets
 - Discard any volumes measured with a dirty pipet

Liquid is lost in transfer

- Liquid drips from the pipet while moving from one point to another
 - Loss of volume during transfer means the volume is not accurate
- Correction
 - Discard previously measured volume
 - Repeat measurement using clean equipment.

Excess liquid is transferred

- Liquid is not removed from the outside of the pipet
 - When the pipet touches the side of the test container extra liquid is added
- Correction
 - Discard previously measured liquid
 - Repeat measurement using clean equipment.



Department of Environmental Quality

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