



ARTEL

Trust Your Results

Dispensing Various Types of Liquids

- Viscosity
- Vapor Pressure
- Surface Tension
- Foaming
- Density
- Infectious
- Radioactive
- Etc.

Dispensing Various Types of Liquids

- Viscosity
- Vapor Pressure

Dispensing Various Types of Liquids

Highly Viscous Liquids

- Glycerol
- Serum
- Blood
- Oil



High Vapor Pressure Liquids

- Ethanol
- Ethyl ether
- DMSO
- Bromine



1. <https://www.amsoil.com/newsstand/auto-and-light-truck/articles/viscosity/>

2. [https://ak6.picdn.net/shutterstock/videos/9386150/thumb/11.jpg?i10c=img.resize\(height:160cc\)](https://ak6.picdn.net/shutterstock/videos/9386150/thumb/11.jpg?i10c=img.resize(height:160cc))

Pipetting Viscous Liquids

- Why is it difficult to pipette viscous liquids??
 - Difficulty Filling Tip
 - Difficulty Emptying Tip

Pipetting Viscous Liquids

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Slow Flow

Pipetting Viscous Liquids

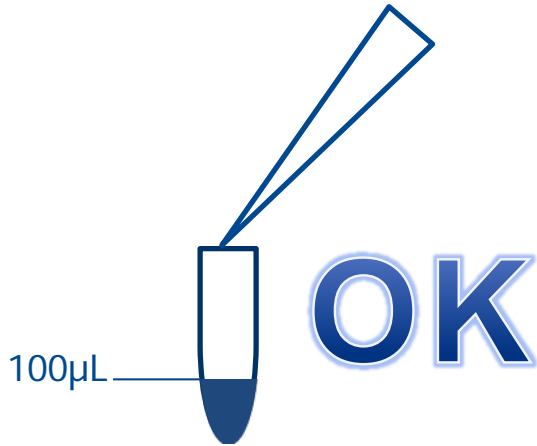
Pipette Slowly!

- That will give the liquid the time it needs to flow into the tip and fill it with the correct volume
- Viscous liquids leave a film on tip walls which flows more slowly than most of the liquid, slow pipetting ensures this film is not left behind.

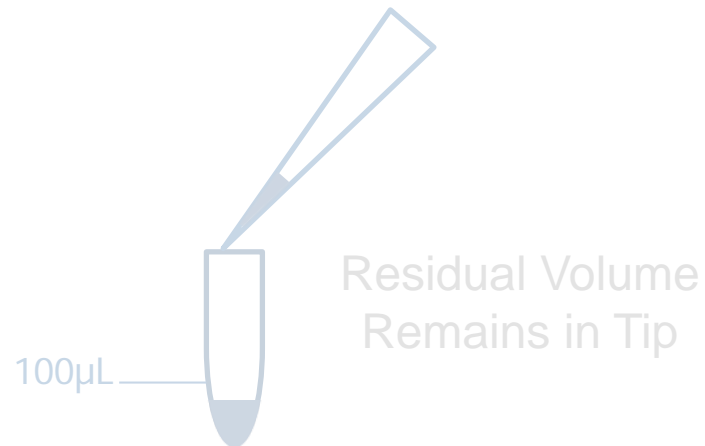
Pipetting Viscous Liquids

Forward Pipetting

Non Viscous Liquid



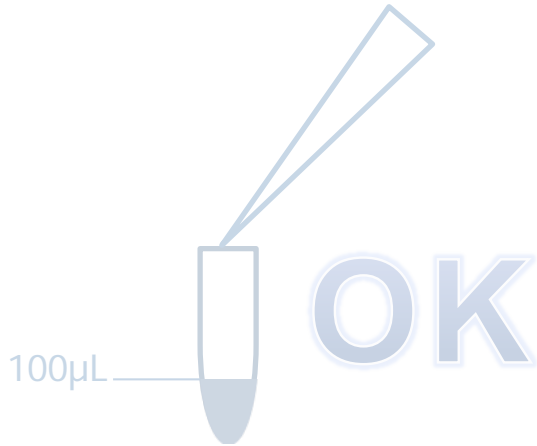
Viscous Liquid



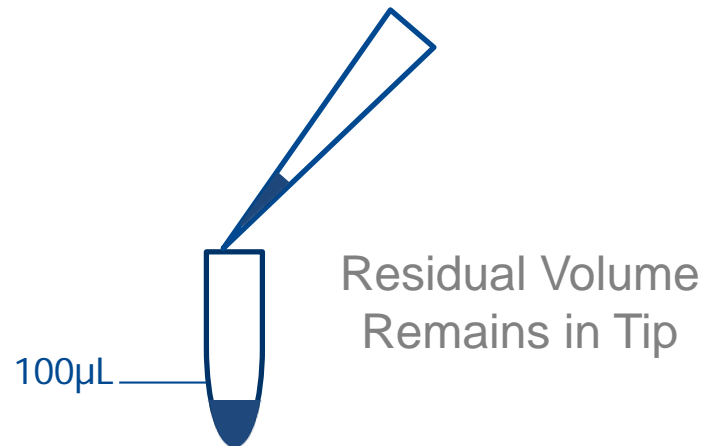
Pipetting Viscous Liquids

Forward Pipetting

Non Viscous Liquid

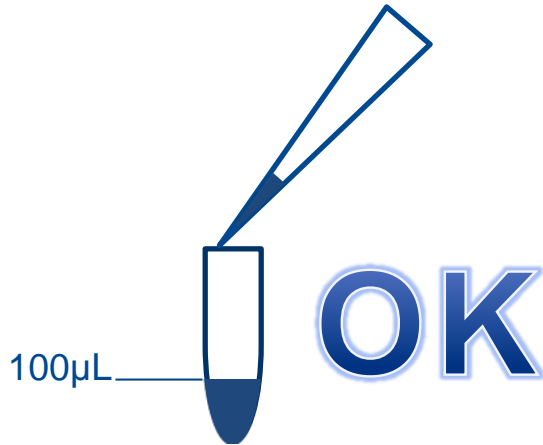


Viscous Liquid



Pipetting Viscous Liquids

Reverse Pipetting- Viscous Liquid



Residual volume
remaining in tip is not
part of the set
dispensing volume!

Pipetting Viscous Liquids

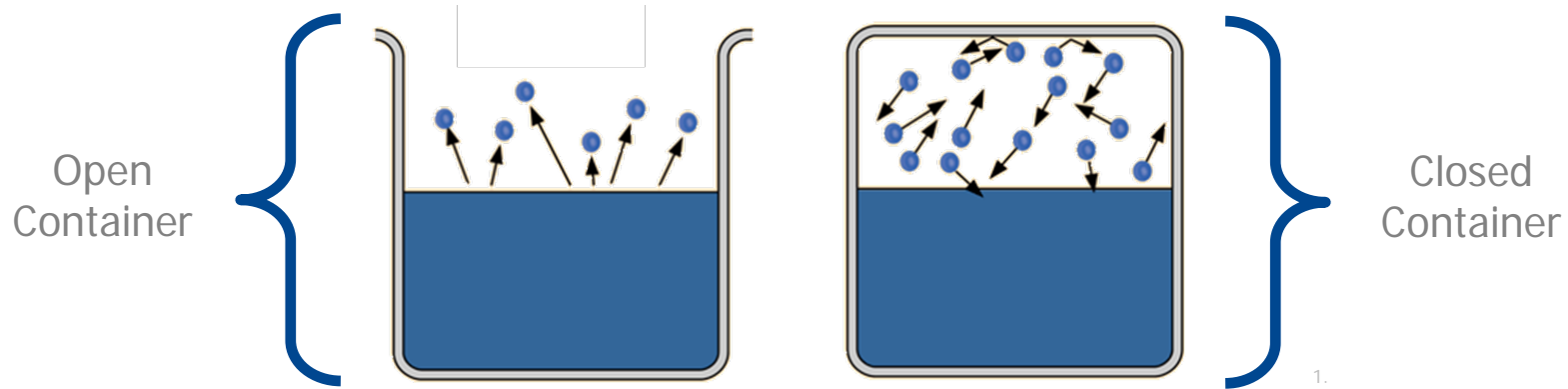
Additional Tips

- Wide orifice tips – allow liquid to flow more freely
 - Still must aspirate/dispense slowly
 - Still must use reverse pipetting
- Positive Displacement- ensures liquid is completely removed from the tip
 - Still must aspirate/dispense slowly

Pipetting High Vapor Pressure Liquids

- What is vapor pressure?

- The pressure exerted by the gas in equilibrium with a liquid in a closed container
- The tendency of molecules to evaporate



1. <http://hyperphysics.phy-astr.gsu.edu/hbase/Kinetic/vappre.html>

Pipetting High Vapor Pressure Liquids

- Why is it difficult to pipette liquids with high vapor pressure?
 - Once the tip is filled, the liquid may drip out

Pipetting High Vapor Pressure Liquids

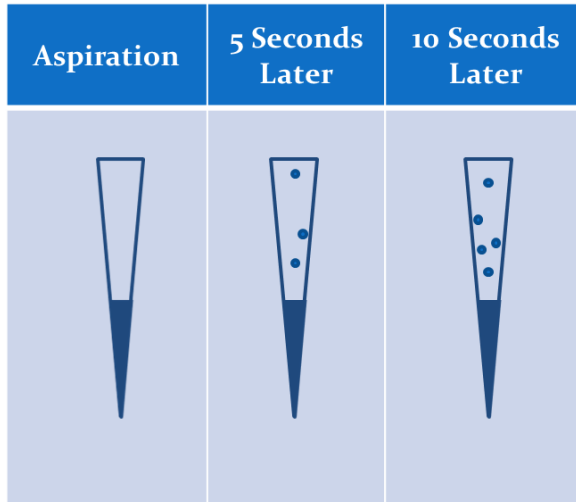
- Why is it difficult to pipette liquids with high vapor pressure?
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Drops Drip

Pipetting High Vapor Pressure Liquids

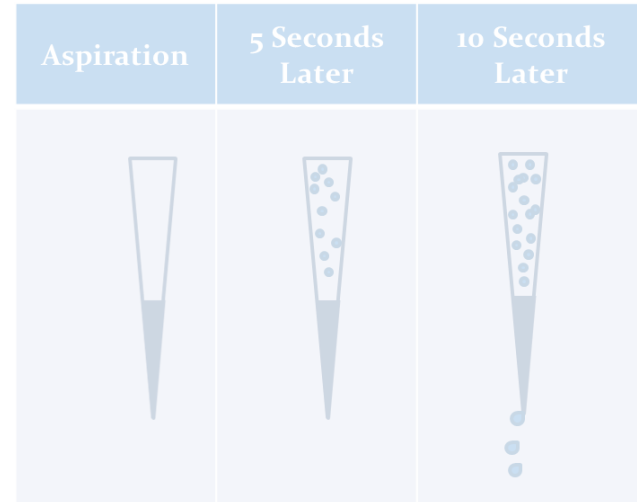
Normal Vapor Pressure

Example: Water



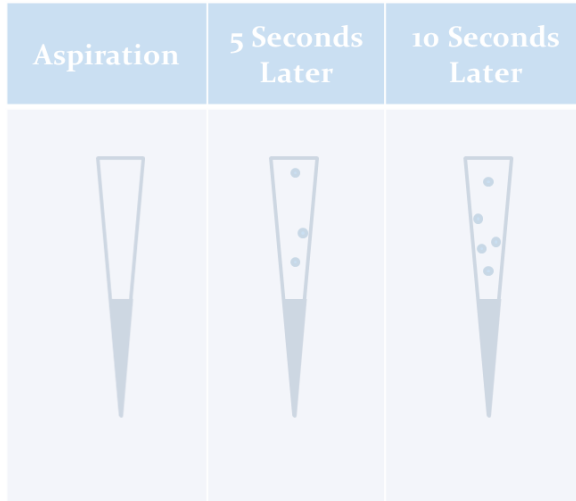
High Vapor Pressure

Example: Ethyl Ether

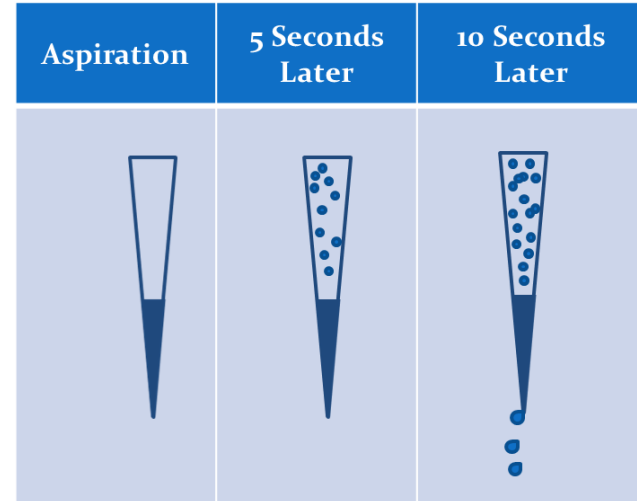


Pipetting High Vapor Pressure Liquids

Normal Vapor Pressure
Example: Water



High Vapor Pressure
Example: Ethyl Ether

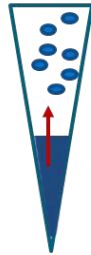


Pipetting High Vapor Pressure Liquids

Without Prewetting Tips



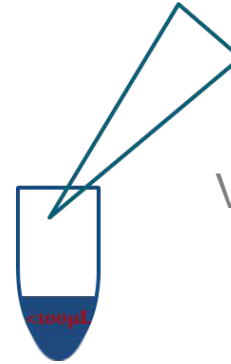
Aspirate
100µL



Evaporation
Begins



Pressure Builds
Liquid Drips

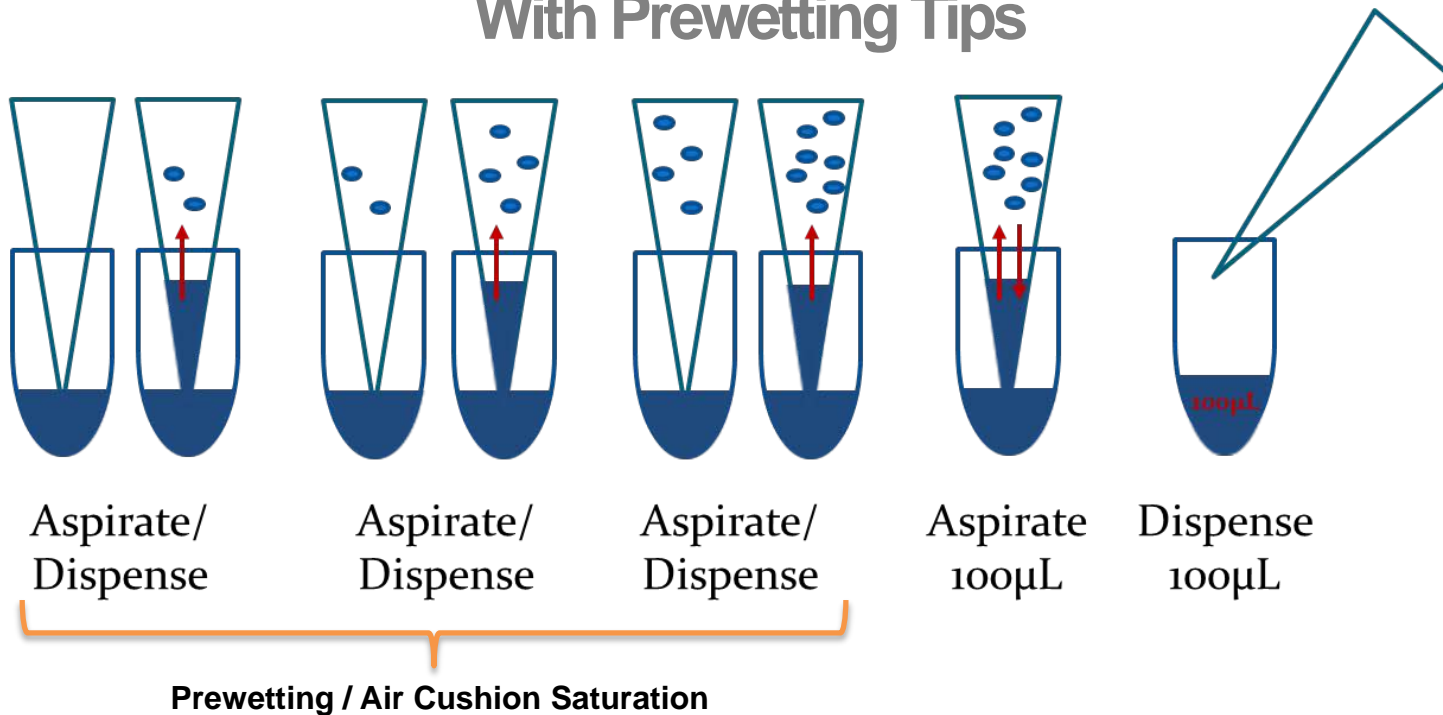


Dispense
<100µL

Dispensed
Volume is Less
Than Set
Volume

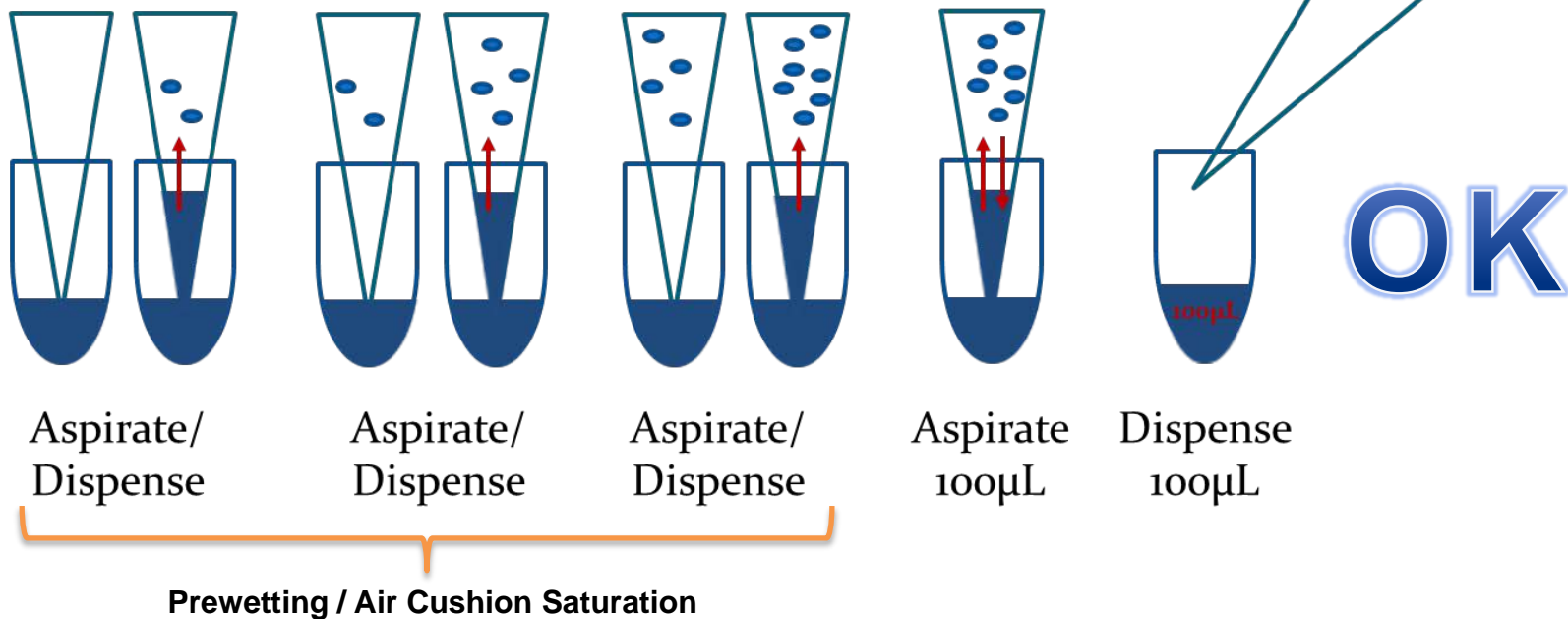
Pipetting High Vapor Pressure Liquids

With Prewetting Tips



Pipetting High Vapor Pressure Liquids

With Prewetting Tips



Pipetting High Vapor Pressure Liquids

Additional Tips

- **Reverse Pipetting**
 - Improved overall accuracy but liquid still drips
 - Prewetting is still recommended
- **Positive Displacement**
 - The lack of air cushion in positive displacement systems prevents evaporation and therefore dripping will be prevented.