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INTRUMENTASI BIOTEKNOLOGI

Program Studi Bioteknologi

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Pertemuan Ke 3

Tools and Basic Laboratory Techniques

Glassware and Pipette Methode

Laboratory Tools

- **Beaker glass (Gelas Kimia)**
- **Erlenmeyer Flask (Labu Erlenmeyer)**
- **Test Tube Reaction (Tabung Reaksi)**
- **Measuring glass (Gelas Ukur)**
- **Burette (Buret)**
- **Porcelain disk (Cawan Forselin)**
- **Petri Disk (Cawan Petri)**
- **Volumetric flask (Labu Ukur)**

Beaker glass (Gelas Kimia)



Berupa gelas tinggi, berdiameter besar dengan skala sepanjang dindingnya. Terbuat dari kaca borosilikat yang tahan terhadap panas hingga suhu 200°C (pyrex). Ukuran alat ini ada yang 50 mL, 100 mL, 1L dan 2 L sampai 10L.

Fungsi :

- Untuk mengukur volume larutan yang tidak memerlukan tingkat ketelitian yang tinggi
- Menampung zat kimia/membuat larutan
- Memanaskan cairan
- Wadah penampungan

Beaker glass (Gelas Kimia)



Gelas Kimia Kosong



Gelas Kimia berisi larutan



Gelas Kimia Dengan Berbagai Ukuran



Erlenmeyer Flask (Labu Erlenmeyer)

Berupa gelas yang diameternya semakin ke atas semakin kecil dengan skala sepanjang dindingnya. Ukurannya mulai dari 10 mL-2 L.

Fungsi :

- Untuk menyimpan dan memanaskan larutan
- Menampung filtrat hasil penyaringan
- Menampung titran (larutan yang dititrasi) pada proses titrasi



Test Tube Reaction (Tabung Reaksi)



berupa tabung yang kadang dilengkapi dengan tutup. Terbuat dari kaca borosilikat tahan panas terdiri dari berbagai ukuran.



Fungsi :

- Sebagai tempat untuk mereaksikan bahan kimia
- Sebagai tempat penyimpanan isolat bakteri
- Sebagai tempat media kultur baik cair maupun padat



Measuring glass (Gelas Ukur)



Berupa gelas tinggi dengan skala di sepanjang dindingnya.
Terbuat dari kaca atau plastik yang tidak tahan panas.
Ukurannya mulai dari 10 mL sampai 2 L.

jenis

- Tahan panas (pyrex)
- Tidak tahan panas (gelas biasa)
- Plastik

Fungsi : Untuk mengukur volume larutan tidak memerlukan tingkat ketelitian yang tinggi dalam jumlah tertentu



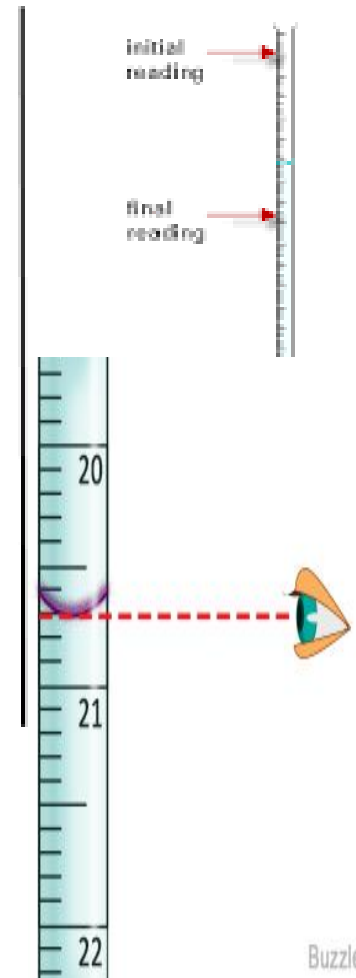
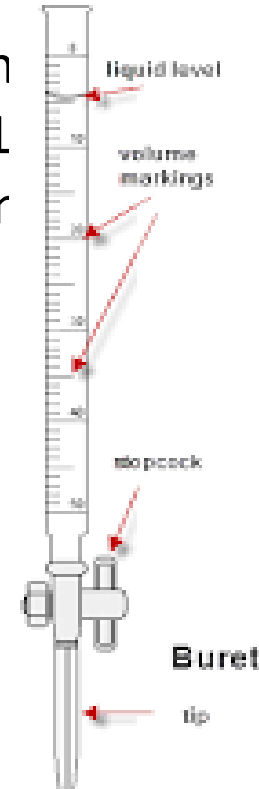
Buret



Berupa tabung kaca bergaris dan memiliki kran di ujungnya. Ukurannya mulai dari 5 dan 10 mL (mikroburet) dengan skala 0,01 mL, dan 25 dan 50 mL dengan skala 0,05 mL.

Aksesoris: Stand dan Clamp

Fungsi : Untuk mengeluarkan larutan dengan volume tertentu, biasanya digunakan untuk titrasi



Porcelain disk (Cawan Porselen)

Cawan yang terbuat dari porselen yang tahan panas dan biasa digunakan untuk menguapkan larutan dan menghancurkan sampel

- **Mortar dan pestle** : terbuat dari porselen, kaca atau batu granit yang dapat digunakan untuk menghancurkan dan mencampurkan padatan kimia.

- **Spatula** : berupa sendok panjang dengan ujung atasnya datar, terbuat dari stainless steel atau aluminium yang digunakan untuk mengambil bahan kimia yang berbentuk padatan dan mengaduk larutan



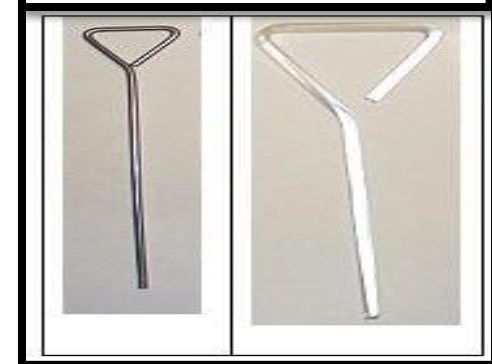
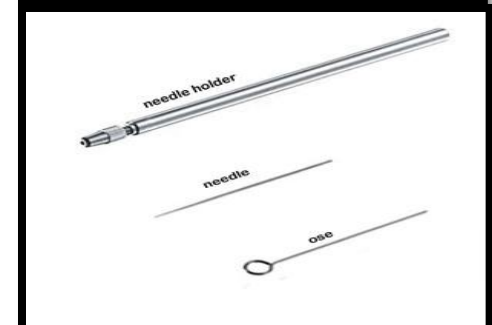
Petri Disk (Cawan Petri)



Cawan Petri adalah sebuah wadah yang bentuknya bundar dan terbuat dari plastik atau kaca yang digunakan untuk membiakkan sel (Bakteri, Yeast, Khamir). Cawan Petri selalu berpasangan, yang ukurannya agak kecil sebagai wadah dan yang lebih besar merupakan tutupnya

Jarum inokulum adalah Bentuk ujung jarum dapat berbentuk lingkaran (loop) dan disebut ose atau inoculating loop/transfer loop, dan berbentuk lurus disebut inoculating needle/Transfer needle. Terbuat kawat nichrome atau platinum sehingga dapat berpijar jika terkena panas.

Batang Penyebar batang kaca segitiga kecil. untuk menyebarkan biakan bakteri yang terdapat pada wadah pembiakan

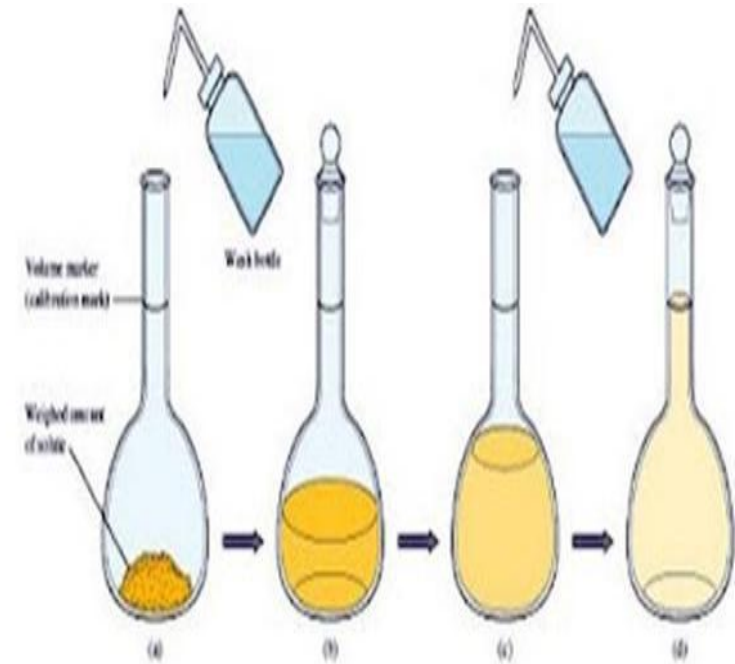


Volumetric Flask (Labu Ukur)



Berupa labu dengan leher yang panjang dan bertutup; terbuat dari kaca tahan panas dan tidak tahan panas karena dapat memuai. Ukurannya mulai dari 1 mL sampai 5 L.

Fungsi : Untuk membuat larutan dengan konsentrasi tertentu dengan akurasi pengukuran serta mengencerkan larutan



Beberapa Alat Pendukung Lainnya



Batang pengaduk



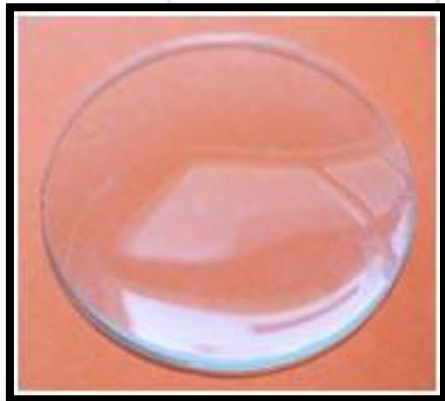
Kaki tiga



Bunsen



Corong



Kaca Arloji



Desikator



Botol cuci



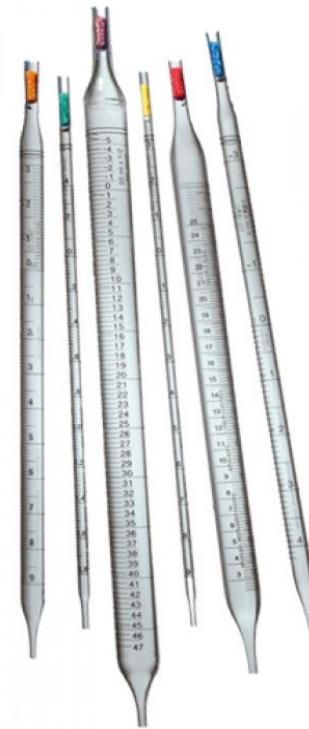
Gunting dan pinset

Pipette

- *Pipette* definition, a slender graduated tube used in a laboratory for measuring and transferring quantities of liquids from one container to another

Types Of Pipette

- Micropipette
- Pipette
 1. Volumetric Pipette
 2. Measuring Pipette
- Serological Pipettes
- Mohr Pipettes
- Another pipette



Use and Maintenance of Micropipets



- Automatic pipettes are used to accurately transfer small liquid volumes
- These are continuously adjustable digital pipettes
- Each pipette can be set to transfer any volume within its own volume range



Parts of the Automatic Pipettor

PLUNGER BUTTON

TIP EJECTOR BUTTON

VOLUME ADJUSTMENT KNOB

DIGITAL VOLUME INDICATOR

PLASTIC SHAFT

TIP EJECTOR ARM

DISPOSABLE TIPS



Parts of the Pipette



Pipette tips box

Tips:

Blue tips (100 -1000 μ L)

Yellow tips (10 - 100 μ L)

White tips (1 -10 μ L)

Accessories

Step-wise Operation of the Micropipet

- Set the volume
- Attach disposable tip
- Depress the plunger to the first stop
- Immerse tip in sample
- Draw up the sample
- Pause
- Withdraw the tip
- Dispense the sample in new tube
- Withdraw the pipette
- Release plunger
- Discard the tip



Operating the Micropipette

Step 1: Set the Volume



Step 2: Attach the Disposable Tip



Step 3: Depress the Plunger to the First Stop



Step 5: Draw up the sample



Step 4: Immerse Tip in Sample



Step 6: Pause

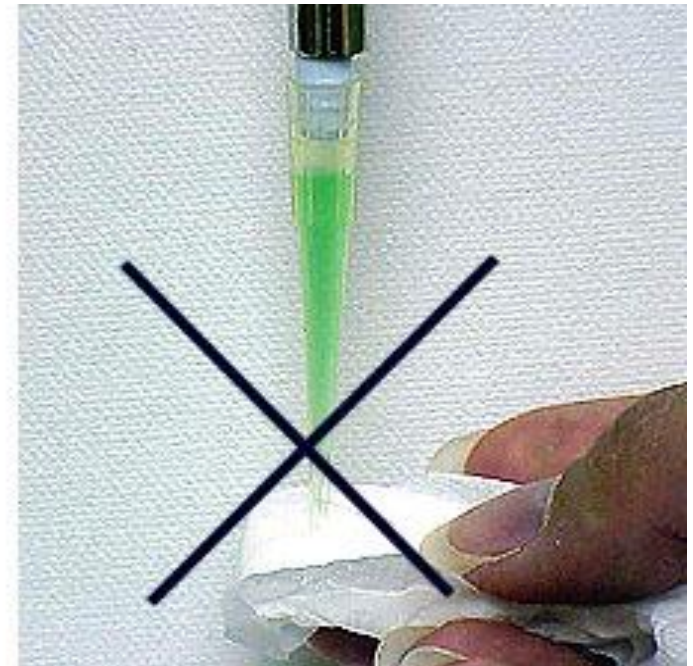
Wait a few seconds to ensure that the full volume of sample is drawn into the plastic tip.

Step 7: Withdraw the Tip

Remove the tip from the sample liquid.
No liquid should remain on the
OUTSIDE of the tip.



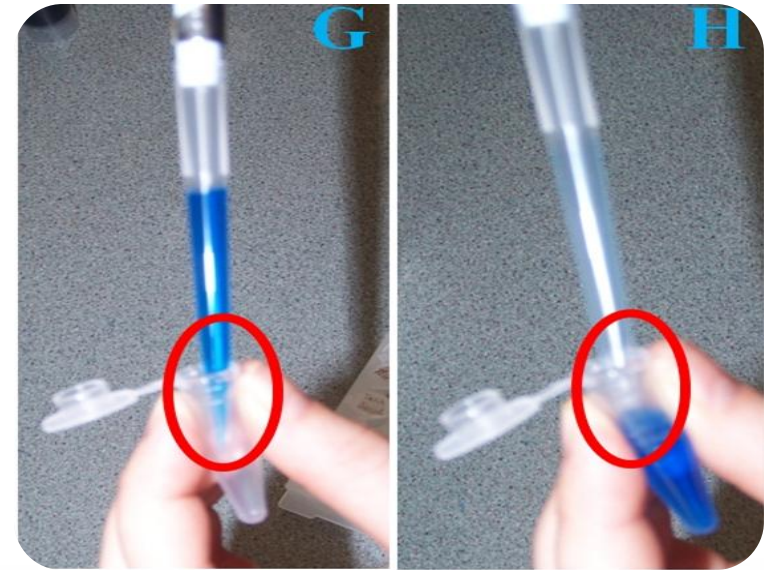
Proper Droplet Removal



WRONG Droplet Removal

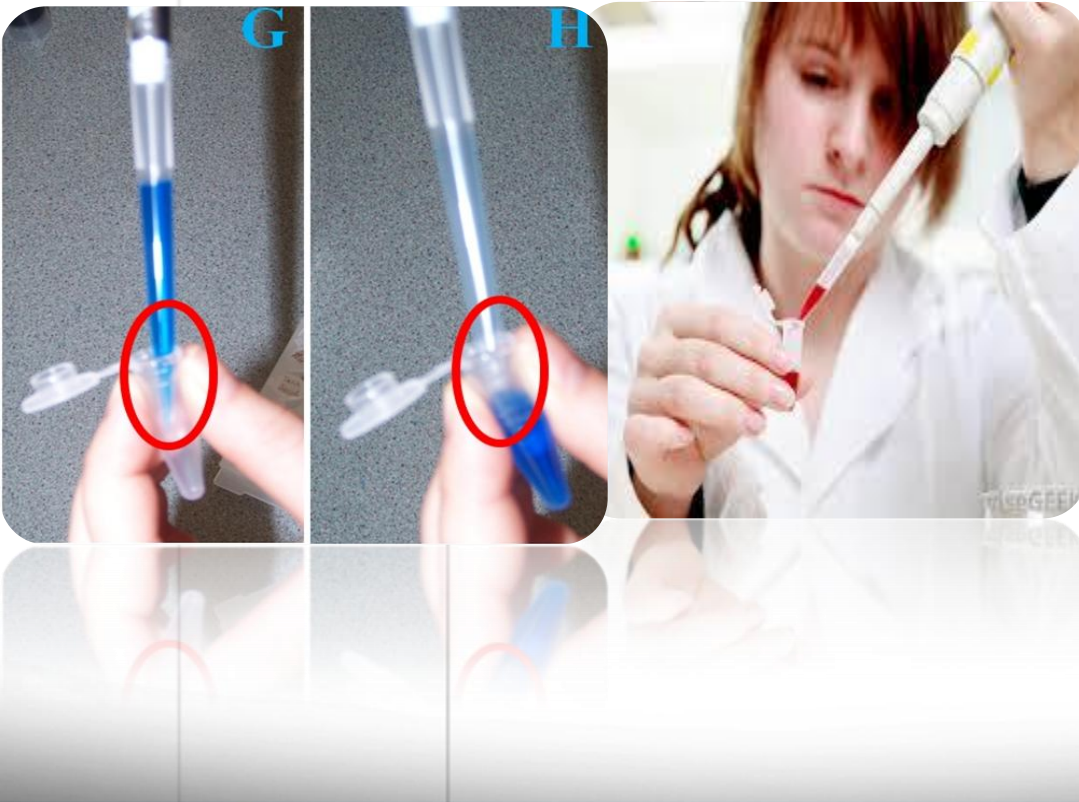
Step 8: Dispense the Sample

- Touch the tip end to the side wall of the receiving vessel
- Depress the plunger to the FIRST STOP.
- Pause
- Press the plunger to the SECOND STOP (the second point at the bottom of the stroke) to expel any residual liquid in the tip



Step 9: Withdraw the Pipette

With the plunger fully depressed, withdraw the pipette from the receiving vessel carefully, sliding the tip along the wall of the tube.



Step 10: Release the Plunger

Gently allow the plunger to return to the UP position. **DO NOT** allow it to **SPRING BACK!**

Step 11: Discard the Tip

Discard the tip by depressing the tip ejector button, as shown below. A fresh tip should be used for each sample to prevent sample carryover



Press ejector button to discard tip. Regardless of micropipette tips

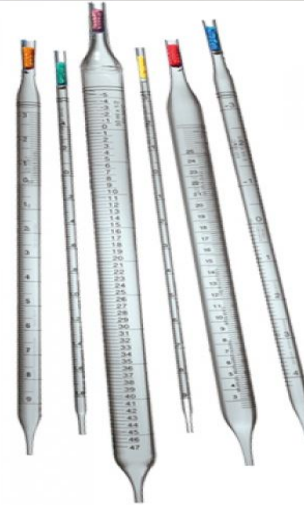


Waste disposal
container.

Pipettes

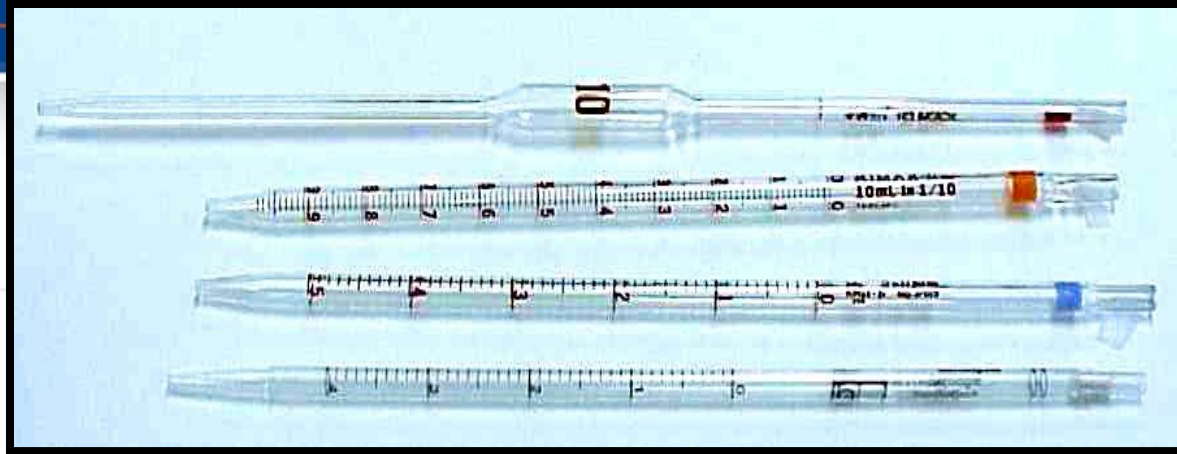
Pipettes are glass or plastic tubes, usually open at both ends, which are used to transfer specific amounts of liquid from one container to another.

They are usually used for volumes between 1 and 100 milliliters



Types Of Pipettes

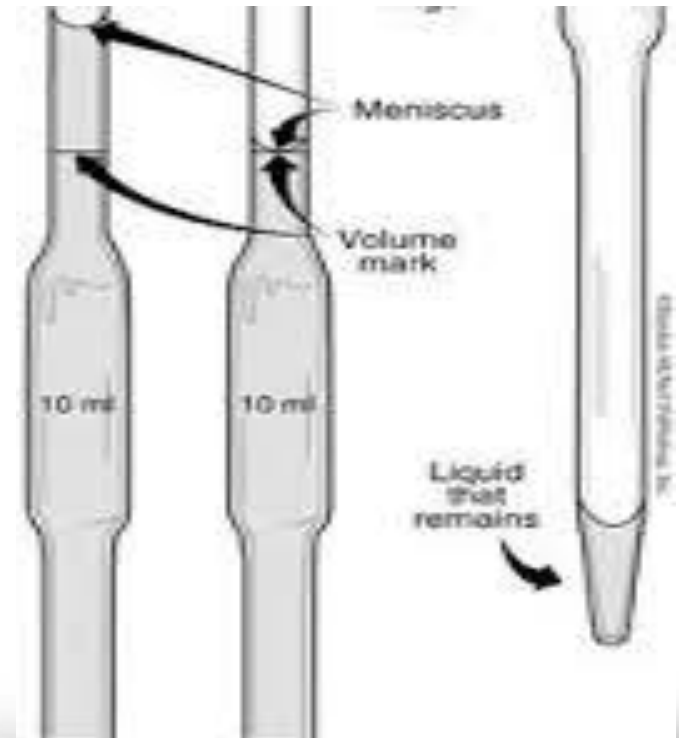
- Volumetric Pipette
- Measuring Pipette
 - Mohr Pipette
 - Serological Pipette



Volumetric Pipettes

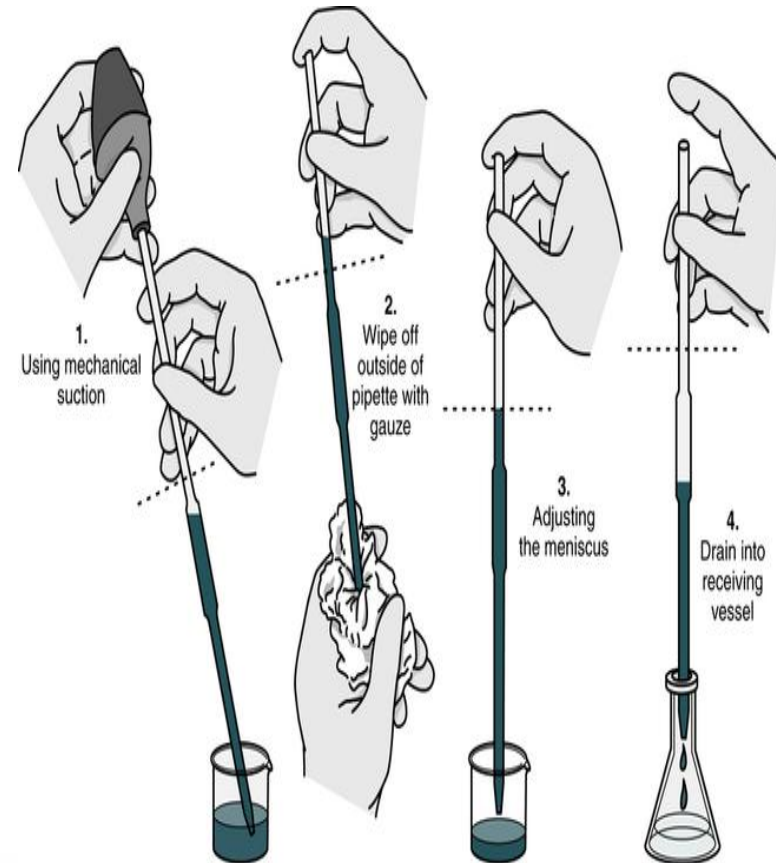


- Used Bulb pipette
- Used to deliver a single specific volume of liquid, usually between 5 and 100 ml.
- Shaped like rolling pins with a large belly, one blunt end, the neck, and one tapering end the tip.



Volumetric Pipettes

- Used for accurate measurements, since it is designed to deliver only one volume and is calibrated at that volume.
- When emptying a volumetric pipette, the liquid is allowed to drain out. It is NOT forced out.
- After it is emptied, the small amount of liquid which remains in the tip should not be blown out.



Measuring Pipettes

- They are straight glass or plastic tubes with one tapering end.
- Calibrated into small divisions so that various amounts of liquid can be measured with the same pipette.
- Usually used to measure any amount between 0.1ml and 25.0ml.
- They are not as accurate due to the fact that any imperfection in their internal diameter will have a greater effect on the volume delivered



Measuring Pipettes

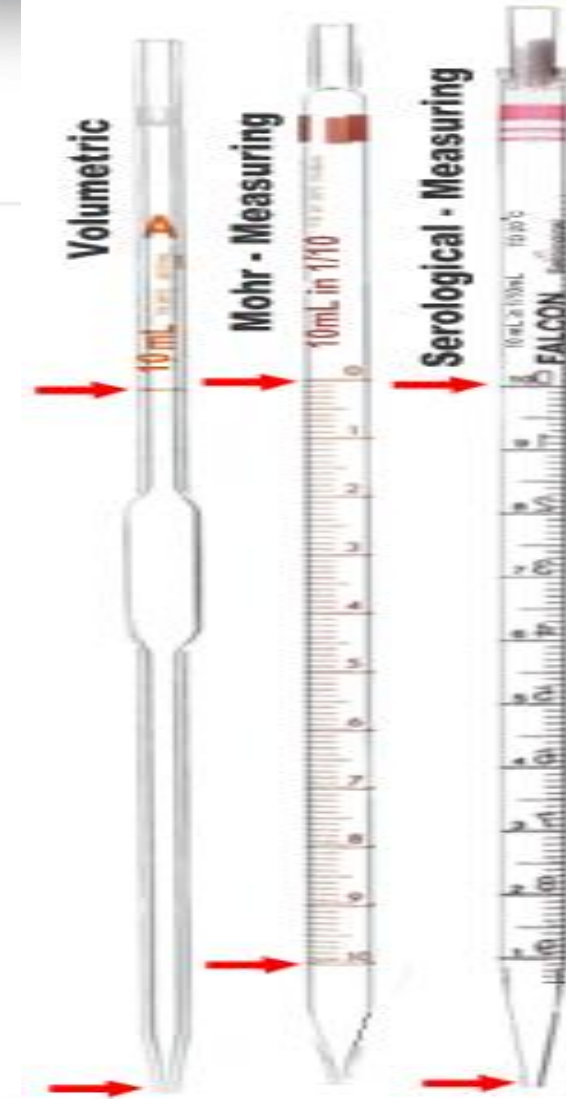
Measuring pipettes are divided into:

Mohr Pipettes

- the graduations on these always end before the tip
- These pipets have a single painted or frosted ring at the top

Serological Pipettes

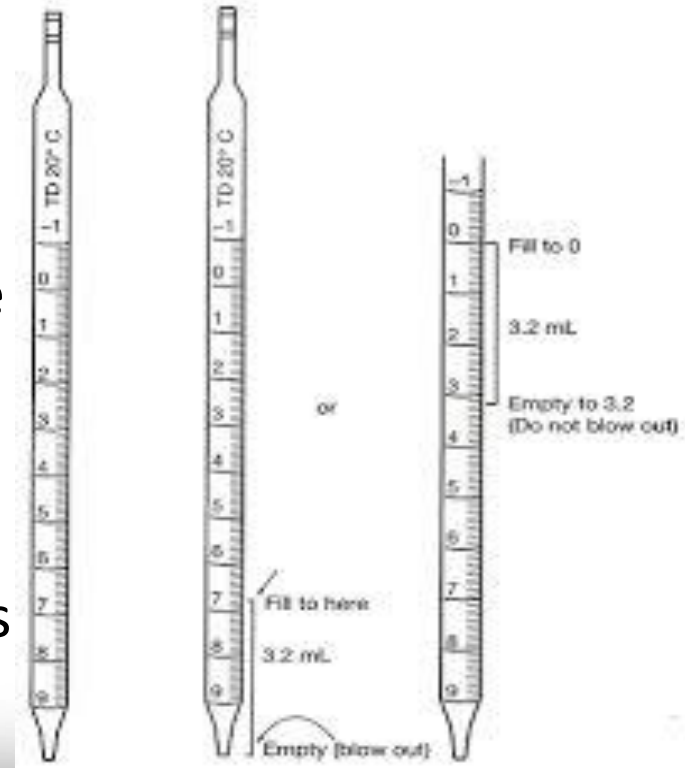
- the graduation marks continue to the tip which means that all the measured liquid in the pipet must be delivered.
- Pipets with double rings are designed to be "blown out" by pushing a small amount of air out of the pipet, completely emptying it



Proper Use



- When filling a pipet, the tapered end is held beneath the surface of the liquid at all times.
- The liquid is drawn into the pipet by suction until the level is equal to or greater than the volume of liquid to be delivered
- For example if you are going to pipet 6.5 mL using a 10 mL pipet you would fill the pipet to the 3.5 mL mark. To determine the total volume of the pipet look near the top of this type of pipet



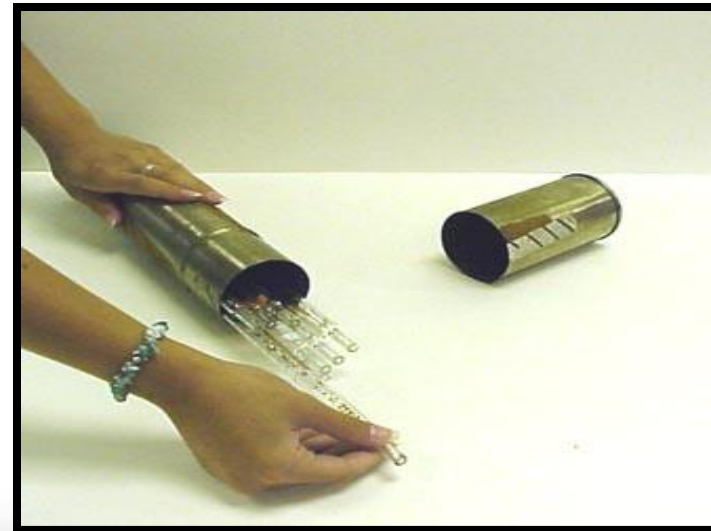
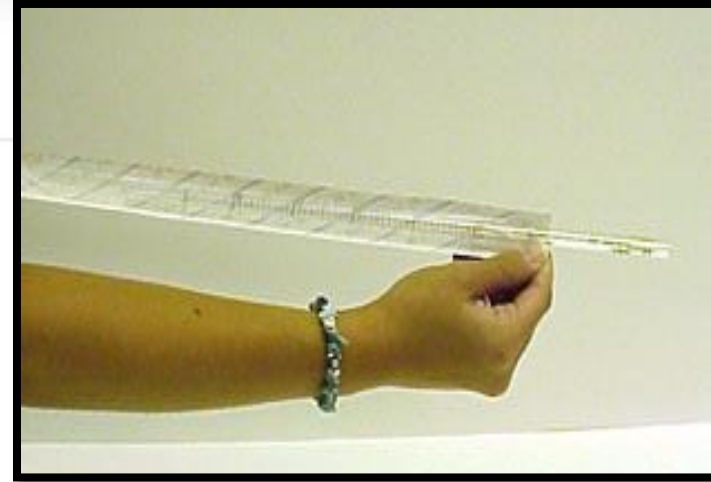
HANDLING AND DISPOSING OF PIPETTES

- Chipped and cracked pipettes should be replaced as they are unsafe and may affect the accuracy of measurements.
- **NEVER mouth pipette.**
- Keep the tip from touching anything



HANDLING AND DISPOSING OF PIPETTES

- When using sterile pipettes, be sure to use proper sanitary techniques. If you have a sterile package of disposable pipettes, tear only a small corner of the package open and push one pipette out of this opening, then immediately close the package to prevent contamination.
- If you are using sterile pipettes in a pipette canister, place the canister on its side, slide off the cover, pull out one pipette and replace the cover immediately.



Transferring a precise volume of liquid

- A **pipette bulb** is used to draw liquid up into the pipette. There are many types of pipette bulbs
- Hold the pipette about 8 cm below the mouthpiece with one hand. Then with your other hand squeeze the bulb and touch the opening to the mouth of the pipette.
- Insert no more than one-half cm of the pipette into the bulb



Transferring a precise volume of liquid

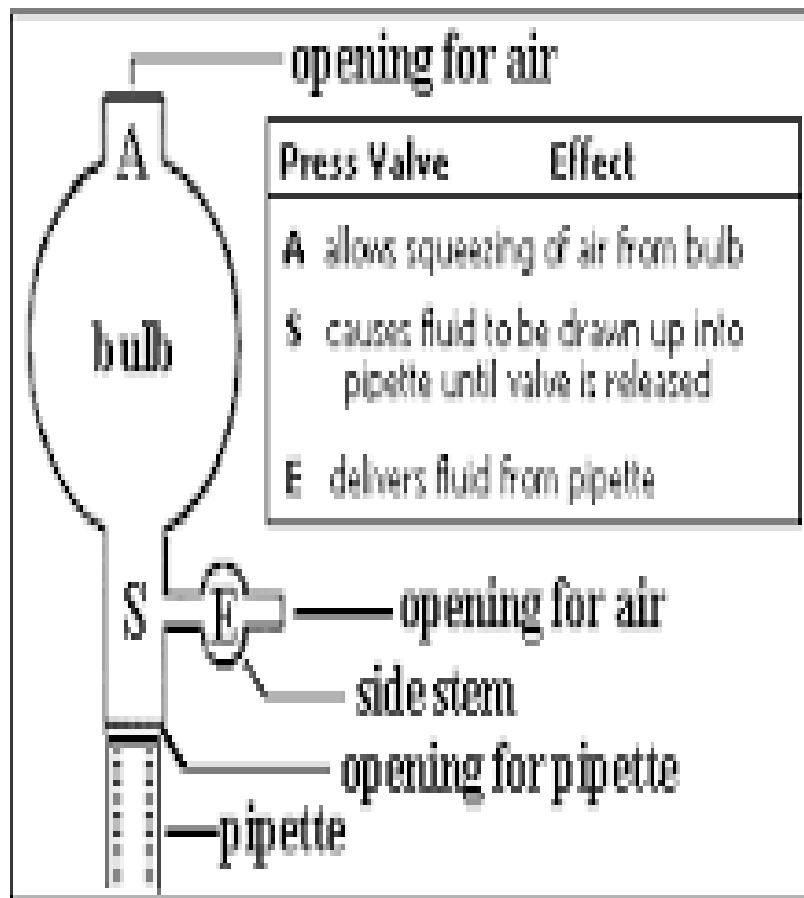
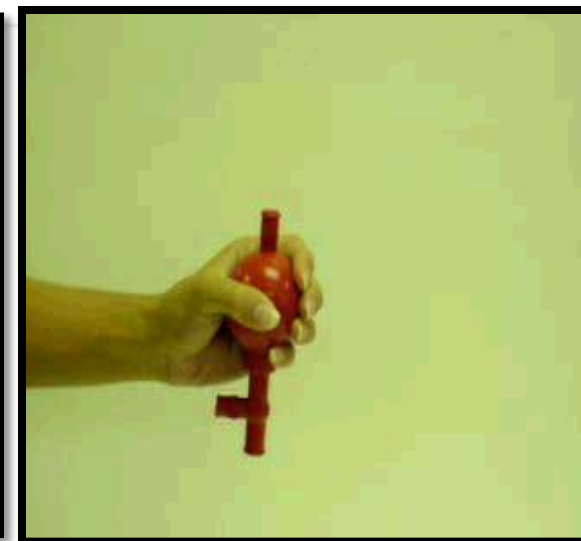


Figure 2

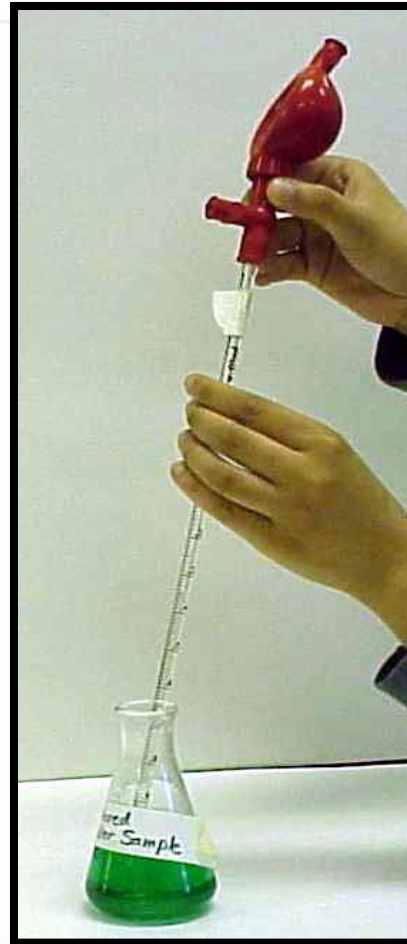


To produce a vacuum for aspiration, squeeze valve “A” with your thumb and index finger of one hand while using your other hand to squeeze the bulb. “A” stands for “air” or “aspirate.”

Transferring a precise volume of liquid

To “pull” the liquid up into the pipette place the pipette into the liquid and squeeze the “S” or “suction” valve until the liquid reaches the desired level.

Touch the tip of the pipette to the side of the vessel containing the liquid to remove any adhering drops.



If the last drop of liquid that remains in the tip must be expelled, squeeze valve “E” with your thumb and forefinger, cover the opening in the small bulb with your middle finger and squeeze the small bulb.

Transferring a precise volume of liquid



Pipette aids

The pipetting aid has Liquid suction device which can be fitted with a measuring pipette. Pipette-aid work using the electric motor is controlled via two buttons namely the suction and blow button



Transferring a precise volume of liquid

When the pipette is filled to the desired level, touch the tip against the side of the beaker and move the pipette over the waste beaker.

Lift your finger off of the hole in the plunger, and allow the pipette to drain.

If you need to blow-out the last drop of liquid in the tip, place your finger over the hole in the plunger and depress it again.



OTHER PIPETTE TYPES (Drop Pipette)

Pipet Tetes (*Drop Pipette*)



Berupa pipa kecil terbuat dari plastik atau kaca dengan ujung bawahnya meruncing serta ujung atasnya ditutupi karet.

Fungsi:

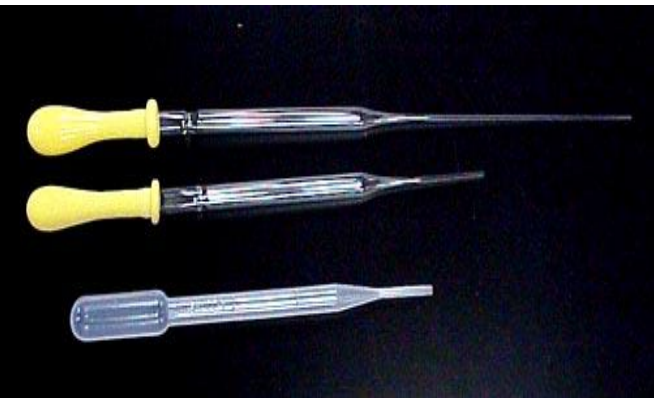
- Untuk mengambil cairan dalam skala tetesan kecil.

Kelebihan :

- Memiliki karet hisap di atasnya, sehingga mudah dalam pengambilan larutan.

Kekurangan:

- Tidak dilengkapi dengan skala, hanya digunakan untuk mengambil cairan dengan ukuran tetesan sehingga pada saat mengambil cairan tidak dapat langsung diukur volumenya





Terima
kasih