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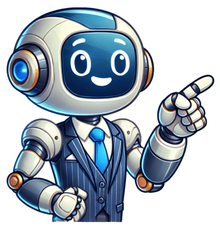

A micropipette is the most essential tool used in a molecular biology laboratory. When paired with disposable plastic pipette tips, a micropipette is used to measure out very small amounts of liquid. To use a micropipette, the user must learn how to properly change the volume setting, add a tip, obtain a sample, dispense a sample, and dispose of the tip. A micropipette can come in one of many standard sizes, and the most common can measure out a volume between 0.1 microliters and 1000 microliters. This is 0.0001 milliliters to 1 milliliter. Just as 1000 milliliters is equal to 1 liter, 1000 microliters is equal to 1 milliliter. Each micropipette only works effectively within a certain range, and each volume variance of pipette looks very similar to each other. To avoid confusion, manufacturers label the plunger of the micropipette with the maximum volume it can accurately dispense. Some also add the minimum volume, but many dont. Due to standardization across manufacturers however, the minimum volume for each micropipette is the same unless otherwise stated. Lets look at a common P200 micropipette. This micropipette will measure between 20 and 200 microliters, abbreviated as L. Most micropipette types will have its minimum range as 10% of its maximum range. Look at the table below for the five most common micropipette types and ranges. Type of Micropipette Typical Range of Use P2 0.1 to 2.0 L P10 0.5 to 10.0 L P20 2.0 to 20.0 L P200 20.0 to 200.0 L P1000 100.0 to 1000.0 LWhen in doubt, the manufacturers website will tell you the exact ranges a micropipette will use.How to Change the Volume Setting: On the body of the micropipette is a small vertical window with three numbers. These numbers, read from the top down, tells the user how much volume the micropipette is currently set at. To change the numbers, grasp the black dial or plunger and gently twist. The numbers will then change. Not all plungers will adjust volume, look at the manufacturers website before trying to twist your plunger. Its important to remember the minimum and maximum set to a micropipette. Twisting the black volume dial too far in either direction can damage or destroy the micropipette. Even though the dial numbers look identical between the different sizes of micropipettes, remember that they will dispense different amounts of solution. On a P2 a reading of 152 will dispense 1.52 L of solution and on a P200 a reading of 152 will dispense 152 L. Some micropipettes will indicate tenths and hundredths of a microliter in red on the lowest number on the body of the pipette.How to Add a Micropipette Tip: If youve looked at several different sizes of micropipettes then you should have noticed that the ends of the micropipette arent the same diameter/circumference. Because of this, different micropipettes will use different size tips. There are three different size tips that can have different colors. White tips fit onto P2 and P10 pipettes. Yellow tips fit onto P20 and P200 pipettes. Blue tips fit onto P100 pipettes. To add the tip to the micropipette, leave the tip in the tip box, then firmly press the end of the micropipette into the wide end of the tip. Pull up, and it should be attached. A firm seal between tip and pipette is important, otherwise the amount of solution that you draw up will be inaccurate. If the tip falls off, throw it away. A sterile tip is necessary for experiments, otherwise contamination will ruin your result.How to Obtain a Liquid Sample: Holding the body of the micropipette in your hand, your thumb should be free to rest on the top of the micropipette i.e. the plunger. Pressing and releasing this plunger draws in and dispenses liquid samples. The amount of solution that you want to obtain will affect how far you have to press the plunger. A larger sample will need a large press, and a small sample will need a small press. Once you have set the volume setting and attached the appropriate tip, you are ready to obtain a sample. Using your thumb, slowly press down on the plunger until you feel some resistance. This spot is known as the first or soft stop. Keep the plunger down and insert your tip into the liquid solution. Slowly release the plunger and remove the tip from the solution. Releasing the plunger quickly will make the volume you sample incorrect, the slow raise action of the plunger helps in keeping the volume drawn accurate.How to Dispense a Sample: Place the tip of the micropipette into the container you wish to dispense the solution into. Using your thumb, slowly press down on the plunger until you hit the soft or first stop. Press a little harder until you cant press down any more. This is known as the hard or second stop. Due to water tension, a little bit of sample may remain in the micropipette tip. Pressing until the second stop pushes a small bit of air out through the tip, forcing the rest of the sample out. Its important when obtaining samples that you dont gather it using the hard stop, as more sample will be gathered than indicated on the volume setting window.To Release a Tip: Once you have finished dispensing your solution, youll need to dispose of your tip. There is a large button on the top of your micropipette next to the plunger. Press it, and the tip should come off. If it doesnt, just grab the base of the tip where the liquids didn't touch to pull it off and dispose of it in the garbage. You should always toss your tips in an autoclavable garbage bag or assigned tip disposal box. Residual bacteria in micropipette tips needs to be destroyed or it can present a possible biohazard to other people in your lab, or even people outside the lab.To Practice Pipetting: Learning how to use a micropipette can be harder than it looks. A practice session with your new micropipette is highly recommended before you start with your experiments. By weighing the amount of solution you pipet you can check your accuracy and practice the "soft stop and hard stop difference". You'll need to gather a P200 micropipette, a box of tips, a small container of water, an empty container to pipette into, and a digital scale. Place your empty container onto the digital scale and blank it (i.e. hit toa or 0/t). Blank your digital scale with the empty container. Using your P200 micropipette, you want to obtain 150 L of water. Set the black volume dial to 150 L so it reads 150 from the top down. Attach a tip, press to the first stop, insert the tip into the water, and slowly release the plunger. Place the tip over or gently touching the clean container on the digital scale. Press the plunger to the second stop so all the water is ejected. Check what the scale says. Because water has a density of 1g/mL, 150 L will weigh 150 mg. On most scales this will appear as 0.150 grams. Because the tip only held water, you dont have to throw it away. Clean up the water with a paper towel and blank the digital scale again with a dry empty container. Using your P200 micropipette, you want to obtain 250 L of water. A P200 cannot reach 250 ul and you will break the pipet if you try, so we'll do two measurements that add up to 250. Set the black volume dial to 125 L so it reads 125 from the top down. Attach a tip and gather the water. Dispense it onto the dry empty container. Gather another 125 L of water and also dispense it onto the container on the scale. Check to see if the scale is close to 250 mg. Clean up the water with a paper towel and blank the digital scale again with a dry empty container. Using your P200 micropipette, you want to obtain 375 L. Again, a P200 cannot be set to 375ul, attempting to put the numbers that high will break your pipet, making it unusable; so again, we'll use a combination of volumes to add up to 375. Set the black volume dial to 200 L, attach a tip, and gather the water. Dispense it onto the empty container. Set the black volume dial to 175 L, gather the water, and dispense it in the same container as before. Check to see if the scale is close to 375 mg.Video: To use the micropipette properly, there are a few steps that need to be followed:Set the desired volume of the micropipette.To aspirate, Press and hold the plunger at the first stop.Place the tip in the liquid vertically.Note: The angle should not exceed 20 degrees. With changing angle, the hydrostatic pressure inside the pipette tip varies. As a result, the aspirated volume will be inconsistent. It is best to immerse the pipette tips just below the surface (2-3 mm) of the liquid to allow the desired volume to be aspirated. Immersing the pipette tip too deeply increases the risk of liquid droplets sticking to the outside of the pipette tip. Release the plunger slowly to draw up the liquid into the tip.Pause, and then move the tip out from the liquid container carefully.Insert the tip into the delivery vessel.Make sure that the tip touches the inner wall of the vessel (it is recommended to tilt the tips at 45 degree for proper liquid release) and then press the plunger to the second stop.Pause, and then take the tip out from the vessel.Remove the tip with the help of the tip ejector when done with the experiment. For high precision, remember to change the tip frequently by ejecting into a waste container. Ever wondered how scientists move tiny amounts of liquid with great care? Using a micropipette is key to their work. Its what makes research in labs around the world possible. Knowing how to use a micropipette right can mean the difference between success and failure.Micropipettes are advanced tools for measuring and moving tiny amounts of liquid. They handle volumes from 0.1 to 100,000 microliters. These tools are vital in fields like molecular biology and medical research. They help scientists work with tiny samples accurately.If youre a student, researcher, or lab worker, learning to use a micropipette is important. It takes practice and knowing the basics. This guide will teach you how to use a micropipette well and professionally.Key TakeawaysMicropipettes enable precise liquid transfer in microvolume rangesDifferent micropipette types serve specific scientific research needsProper technique is crucial for accurate liquid handlingRegular calibration ensures consistent performanceErgonomic handling prevents repetitive strain injuriesIntroduction to MicropipettesScientific research needs precision, and micropipettes are key. They help scientists move tiny amounts of liquid with great accuracy. These amounts can range from 0.1 l to 100,000 l.Molecular BiologyMicrobiologyImmunologyCell CultureAnalytical ChemistryBiochemistryGeneticsUnderstanding MicropipettesA micropipette is a tool for moving tiny liquid amounts. Scientists use it for precise pipetting. It comes in single-channel and multi-channel types.Critical Importance of Precise Liquid MeasurementGetting liquid measurements right is key in science. Even tiny measurement mistakes can change results a lot. Micropipettes help scientists measure and move tiny amounts, making results reliable.Todays micropipettes have amazing features. They can handle volumes from 0.2 to 10,000 l with high accuracy. This technology is a big step forward in handling liquids, helping scientists do more complex research.Types of MicropipettesMicropipettes are key tools in molecular biology labs. They help scientists handle liquids with great precision. Knowing the different types helps pick the right tool for each experiment.There are several ways to classify micropipettes. These characteristics affect how well they work in labs.Single-Channel MicropipettesSingle-channel micropipettes are basic but crucial. They let researchers move liquids with high accuracy. They come in various sizes:P2: 0.2 2 L rangeP10: 1 10 L rangeP20: 2 20 L rangeP100: 20 100 L rangeP1000: 100 1000 L rangeMulti-Channel MicropipettesMulti-channel micropipettes make work faster by handling samples at once. They come in different sizes:8-channel models12-channel models16-channel modelsAdjustable Volume vs. Fixed VolumeThere are two main types of micropipettes:Fixed Volume Micropipettes: Dispense a set amount of liquidVariable Volume Micropipettes: Adjust the amount of liquidEach type has its own benefits for lab work. They help get accurate and reliable results.Basic Components of a MicropipetteTo use a micropipette, you need to know its parts. These tools are key for precise liquid handling in science. Each part is vital for accurate measurements and keeping things clean.Micropipettes are advanced for moving tiny liquid amounts with high accuracy. Knowing its main parts is key for using and keeping it in good shape.Pipette Body StructureThe pipette body is the main part with important parts inside. It has:An ergonomic grip for easy handlingA digital or analog display for volumeA mechanism for adjusting volumeA plunger for sucking and pushing liquidsPrecision Tip DesignMicropipette tips are made for specific tasks. Choosing the right tip is key to avoid contamination and get accurate results. Tips come in different sizes for different volumes, which is important for keeping your micropipette in good shape.Volume Adjustment MechanismThe volume adjustment lets you control how much liquid is moved. You can change volumes by:Turning the adjustment ring anti-clockwise to increase volumeTurning clockwise to decrease volumeKeeping the volume within the instruments rangeUnderstanding and using these parts right is crucial for good scientific work and keeping your micropipette working well.How to Set Up a MicropipetteSetting up a micropipette is key to using it right. Lab experts know that getting liquids right depends on the setup. To get precise measurements, you need to follow a few important steps.Choosing the Right TipPicking the right micropipette tip is vital. Each task needs a specific tip:Match tip size to micropipette volume rangeEnsure secure and airtight connectionConsider sterility requirementsCheck compatibility with sample typeSetting the Desired VolumeAdjusting the volume needs precision. Heres how to do it right:Rotate the volume adjustment knob carefullyTurn anti-clockwise to increase volumeTurn clockwise to decrease volumeVerify the displayed volume matches experimental needsPre-Usage CalibrationCalibrating micropipettes keeps measurements accurate. Labs should check them often for reliable results.Micropipette TypeVolume RangeAccuracyCalibration FrequencyP202-20 L0.8%MonthlyP20020-200 L0.6%Every 3 monthsP1000100-1000 L0.6%Every 3 monthsUsing a micropipette well takes practice and focus. By following these steps, scientists can get more accurate results in their work.Mastering the Pipetting TechniquePrecision micropipetting needs careful technique and a good grasp of basic skills. Lab workers must use consistent methods for accurate liquid handling and reliable experiments.Good pipetting techniques rely on several key factors that affect research results. Researchers should focus on these elements to perform well.Holding the Micropipette CorrectlyCorrectly holding the micropipette is key to precision micropipetting. Scientists should:Grip the pipette comfortably near the topMaintain a relaxed but stable hand positionKeep the pipette vertical during liquid transferAvoid excessive pressure on the plungerProper Liquid Aspirating TechniqueLiquid aspiration needs careful attention. There are two main techniques for effective liquid transfer:Forward Pipetting: Standard method for most liquid transfersPress plunger to first stop for aspirationImmerse tip slightly into liquidRelease plunger smoothlyReverse Pipetting: Ideal for viscous or challenging liquidsPress plunger to second stop for aspirationUseful for minimizing air bubble formationRecommended for challenging liquid typesEffective Liquid Dispensing StepsDispensing liquids needs controlled and consistent motion. Follow these steps:StepActionPurpose1Position tip against container wallMinimize liquid residue2Release plunger smoothlyEnsure complete liquid transfer3Touch tip to surface brieflyRemove remaining liquid dropletsMastering these pipetting techniques takes practice and focus. Regular training builds muscle memory and boosts lab performance.Common Micropipette Errors to AvoidBeing precise with liquid handling means knowing and stopping common micropipette mistakes. Scientists and lab workers must spot errors that can mess up their results.When it comes to sterile pipetting, every detail matters. Researchers often face big errors that can ruin their findings.Improper Volume SettingGetting the volume right is key to pipetting well. Here are some important tips:Dont go below what your pipette can handleDont go over what your pipette can handleKnow how your micropipette is calibratedPrecision begins with proper volume selection Laboratory Safety ExpertIncorrect Tip AttachmentHow you attach tips affects your work. Watch out for:Seals that arent tightLeaks that can mess up your samplesAccuracy thats off because of bad tipsContamination RisksTo avoid contamination, follow these steps:Change tips for each new liquidClean your pipettes with 70% ethanolStick to strict clean pipetting rulesKnowing these common mistakes can make your lab work much better and more reliable.Maintenance and Care of MicropipettesKeeping micropipettes in good shape is key for accurate science and reliable lab results. Experts know that well-kept micropipettes are vital for precise liquid handling and success in experiments.To keep your micropipettes in top condition, you need a detailed care plan. Its not just about cleaning them sometimes. Its a thorough process that keeps your scientific tools safe.Regular Cleaning ProtocolHaving a strict cleaning routine is vital for micropipette care. Here are some important steps:Wipe the outside with a 70% alcohol solutionUse cleaning solutions suggested by the makersStay away from harsh chemicals that could harm the partsClean the outside after every useImportance of Calibrating MicropipettesCalibrating micropipettes is crucial for accurate measurements. Regular checks help spot any problems early, so your results stay reliable.Check calibration every 3-6 monthsUse gravimetric methods for exact checksKeep records of all calibration stepsStick to ISO 17025 standardsStoring Micropipettes ProperlyStoring micropipettes right helps avoid damage and keeps them precise. Heres how to store them:Place them uprightKeep them in a cool, dry spotAvoid sunlight and extreme heatUse protective cases or standsBy sticking to these care tips, scientists can make their micropipettes last longer and work better in important research.Best Practices for Accurate PipettingPrecision micropipetting needs skill and careful technique. Molecular biology lab techniques require attention to detail. This ensures accurate and reproducible results.Laboratory professionals must master several critical techniques. These are essential for optimal pipetting performance:Maintain a consistent aspiration and dispensing speedMinimize air bubble formation during liquid transferKeep pipette tips hydrophobic for precise volume controlConsistent Speed MattersAchieving uniform pipetting speed is crucial. Rapid or inconsistent movements can introduce significant variations. Researchers should practice a smooth, controlled motion.Consistency is key in precision micropipetting Laboratory Best Practices GuidePreventing Air Bubble ChallengesAir bubbles can dramatically compromise experimental results. Techniques like reverse pipetting help minimize bubble formation. By controlling the aspirating technique, scientists can reduce volume inaccuracies.Maintaining Tip HydrophobicityHydrophobic pipette tips prevent liquid retention and ensure accurate volume transfer. Regular maintenance and proper storage help preserve the tips surface properties. This is critical for molecular biology lab techniques.By implementing these best practices, researchers can significantly improve their precision micropipetting accuracy and experimental reliability.Conclusion and Final TipsLearning to use a micropipette well takes time and effort. Its key for scientists and lab workers to handle liquids with precision. This skill is vital for research and medical tests.Getting good at using micropipettes needs patience and a methodical approach. Scientists must keep their speed steady, avoid air bubbles, and know how different sizes work. They should also check their tools often and practice to get accurate measurements.Lab work stresses the need for ongoing training in using micropipettes. Researchers can improve by going to workshops, watching videos, and getting advice from experts. Keeping up with new methods and tools in liquid handling is also important.Using a micropipette well is like an art that mixes technical skills with real-world experience. By always learning and paying close attention to details, lab workers can improve their research. This helps them make important discoveries in science. A micropipette is a tool for measuring and moving tiny amounts of liquid. Its used in science to handle small amounts of liquid with great care. This is key in fields like molecular biology and biochemistry.Choosing depends on your research needs. Single-channel micropipettes are good for one sample at a time. Multi-channel ones are better for many samples at once. Think about the volume range and if you need adjustable or fixed volume.Common mistakes include setting the wrong volume and using the wrong tip size. Also, not using the right technique and risking contamination. These errors can mess up your results by making measurements wrong and possibly mixing up samples.Experts say to calibrate micropipettes every year or 6-12 months, based on how often you use it. But, do daily checks and calibrate right away if you see any issues.Forward pipetting is for most liquids, where you take and give out a set amount. Reverse pipetting is for thick liquids or small amounts. You take more than you need and then give out the exact amount.To keep it in good shape, clean it often and avoid extreme temperatures. Store it upright and use the right tips. Clean the outside with 70% alcohol and get it checked by a pro every year.Yes, temperature can change how well a micropipette works. Extreme temps can mess with volume accuracy. Make sure its at room temperature before using and keep the environment steady.If you think its off, weigh the liquid youre using. Compare the weight to what you expect based on the liquids density. If its not right, get help from your labs tech support or the maker.Put the tip 3-4 mm below the liquids surface at a slight angle. Dont touch the sides or bottom to keep accuracy. For thick liquids, you might need to adjust the depth to get all the liquid. Pick the appropriate micropipette for the volume of liquid you need to transfer. Common micropipette sizes include 20, 100, 200 and 1,000 microliters. The size marked on a micropipette indicates the maximum volume you should transfer with it; a micropipette can transfer as little as 1/10 the marked volume. Use a 20-microliter micropipette for 2 to 20 microliters, a 100-microliter micropipette for 10 to 100 microliters, and so on. Move the micropipette, the box of micropipette tips, the liquid to be transferred, the microcentrifuge tubes and an empty container for tip disposal under a laminar flow hood. Turn the knob near the top of the micropipette to adjust it to the volume you need; turn right to increase the volume and left to decrease it. All micropipettes display 3 digits on the volume dial. For a 1,000-microliter micropipette, the top digit is the 1,000s place, the middle digit is the 100s place and the bottom digit is the 10s place. For a 100- or 200-microliter micropipette, the digits are the 100s, 10s and 1s places. For a 20-microliter micropipette, the digits are the 10s, 1s and tenths places. Open the box of micropipette tips, taking care not to touch any of the tips. Insert the end of the micropipette into a tip and press down firmly, then lift the micropipette. Close the tip box. Grasp the micropipette in your dominant hand with your thumb above the plunger and your fingers around the barrel. Depress the plunger until you feel resistance. Insert the micropipette tip just below the surface of the liquid you are transferring. Slowly release the plunger, keeping the tip completely submerged. Remove the micropipette from the liquid, and check to ensure there are no air bubbles in the tip. Insert the micropipette into a microcentrifuge tube or other container you want to transfer the liquid to. Press the tip gently against a side wall near the bottom of the container. Depress the plunger until you feel resistance, pause briefly, then press the plunger down the rest of the way. Hold the plunger down as you slide the tip up the wall and out of the container. Release the plunger smoothly don't let it snap back. Hold the micropipette over your tip-disposal container, and press the button beneath the plunger to eject the tip.Sterile micropipette tipsContainer with the liquid to be pipettedEmpty microcentrifuge tubesSmall glass or plastic container Some micropipettes have 3 "stops" on the plunger and no button to eject tips. If you have this type of micropipette, press the plunger only to the second stop to eject the liquid. Press it down completely to remove the tip.If you get air bubbles when collecting the liquid, eject the liquid back into the container and try again, making sure to release the plunger slowly and smoothly. Try with a new tip if you still get air bubbles.If you are using a micropipette to load a gel for electrophoresis, place the tip at an angle into 1 end of a well in the gel without allowing it to puncture the gel. Press the plunger down slowly to gradually release the liquid into the well and prevent it from mixing with the buffer solution.Store micropipettes on a micropipette rack. Don't use a micropipette without a tip.Never lay a micropipette on its side while the tip contains liquid.Use a micropipette only for its intended range of volumes. A micropipette dial can often be adjusted beyond this range, but avoid turning the dial out of the appropriate range.Dispose of pipette tips in the appropriate waste container. Home Micropipette Product Guide View 299114 Enquire Now What is a micropipette?A micropipette is a common yet essential laboratory instrument used to accurately and precisely transfer volumes of liquid in the microliter range. Micropipettes are available in single-channel and multi-channel variants. While the single-channel micropipettes are used in labs that perform research related to molecular biology, microbiology, immunology, cell culture, analytical chemistry, biochemistry and genetics, the multichannel micropipettes are recommended for ELISA (diagnostic test), molecular screening, kinetic studies and DNA amplification.Components of a micropipette:Micropipettes are available in different designs and sizes. However, there are certain components that are basic and common to all micropipettes. These include the plunger, digital display, tip cone, tip ejector and grippy. Certain micropipettes are provided with a calibration tool and a micropipette stand as an accessory, Micropipette Diagram:Plunger:The plunger performs the following two functions- Rotate the plunger clockwise/ anticlockwise to decrease/ increase the volume setting. A distinct click sound at every volume change ensures perfect volume setting and prevents any accidental volume change. Press and depress the plunger to aspirate or dispense liquid.Tip Ejector:The internal mechanism of the micropipette does not come in direct contact of the sample/liquid. Instead, a disposable micropipette tip is used to draw the liquid into and dispense from the micropipette. So in order to allow the safe, effortless and quick ejection of tips, micropipettes are provided with a tip ejection system. The tips can be easily removed from the micropipette by pressing the tip ejector button.Volume Display:This shows the volume of the liquid to be aspirated or dispensed.Tip Cone:The tip cone provides fitment to the tips. A pipette with a universal tip cone is preferred as it enhances the compatibility of the instrument with most of the standard tips.Micropipette Uses in LaboratoryMicropipettes are vital in labs for precise liquid handling Reading micropipette measurements ensures consistent accuracy in experiments. Their uses in microbiology and molecular biology are extensive. From measuring tiny liquid volumes to conducting ELISA tests, micropipettes are indispensable. They come in various types, like single-channel or multi-channel, each serving specific lab needs. Their accuracy makes them essential for experiments in genetics, cell culture, and biochemistry.In laboratories, micropipettes are used for accurate liquid transfer. They are crucial in tasks like DNA amplification and kinetic studies. Different pipette types, including automatic and manual, cater to diverse uses. In microbiology, micropipettes ensure precision, which is key for successful experiments. Their versatility extends to various fields, making them a fundamental tool in any lab setting.Types of micropipette:Micropipettes can be classified depending upon: The plunger performs the following two functions- This type of micropipette works on the air displacement principle. It consists of a piston that aspirates and dispenses liquid samples as the air pocket moves up and down, respectively. The internal mechanism of the pipette does not come in direct contact of the sample/liquid. Instead, a disposable micropipette tip is used to draw the liquid into and dispense from the pipette. In these pipettes, the piston comes in direct contact of the sample. The disposable tip in a positive displacement micropipette is a microsyringe composed of a capillary and a piston (movable inner part) which directly displaces the liquid. These pipettes are operated manually based on a piston-shaft spring mechanism. An electronic micropipette is mostly automated. The aspirating and dispensing of liquid is performed by the one-touch buttons instead of manual plunger pressing and depressing. Electronic pipettes also often enable the user to create custom programs on the device allowing the pipettes to suit diverse application needs. A single-channel micropipette is one that has a single channel to aspirate or dispense the liquid. A multi-channel micropipette has multiple channels to aspirate or dispense the liquid. The commonly available multi-channel pipette variants are the 8-channel, 12-channel and 16-channel. Multichannel micropipette reduces the workload of a single-channel micropipette when working with large volumes of samples. In a Fixed Volume Micropipette, the volume of liquid to be aspirated or dispensed remains fixed. These pipettes are used when the same volume of liquid is to be dispensed multiple times. This micropipette comes with a specific minimum and maximum volume range. The volume of the liquid to be aspirated or dispensed can be adjusted (within the instruments volume range) depending on the requirement of the user.Micropipette Size and Range / Technical Specifications:Micropipettes are available in different volumes ranging from 0.1 l to 10,0000 l. The commonly used variants of single-channel variable volume micropipettes are listed below along with their permissible error limits as specified in the ISO 8655-2 standard.They are sometimes referred to as P10, P20, P1000, P5000 pipettes based on the maximum volume that can be aspirated/dispensed using the pipette. For instance, a 0.5-10ul Micropipette may be commonly referred to as a P10 pipette.Volume Range(ul)ClassificationIncrement(ul)Accuracy(%)Accuracy(ul)CV(%)CV(ul)0.2-2P20.0120.041.20.0240.5-10P100.0210.10.50.052-20P200.020.80.160.40.085-50P500.10.80.40.40.210-100P1000.20.60.60.20.220-200P2000.20.61.20.20.4100-1000P10001.00.660.22500-5000P500010.00.6300.2101000-10000P10000020.00.6600.220 How does a micropipette work?Air displacement micropipettes operate by piston-driven air displacement. When the piston is pressed downwards, the air within the sleeve of the micropipette gets expelled out due to the force of which the liquid present in the tip of the micropipettealso gets removed.When the piston moves upwards, a vacuum is created in the space left vacant by the piston. This causes the air from the tip to rise in order to fill the vacant space, and the tip air is then replaced by the liquid, which is drawn up into the tip.Positive displacement micropipettes operate by piston-driven displacement. The piston in a positive displacement micropipette is in direct contact with the liquid. When the piston is pressed downwards, the liquid which is present in the sleeve of the micropipette also moves downwards and gets removed through the tip. When the piston is pulled upwards, it also draws the liquid along with it in the upward direction. Precise measurement of liquid depends on the correct micropipette usage. The air displacement micropipettes work on the common air displacement principle. A plunger is depressed by the thumb and as it is released, the liquid is drawn into a disposable tip. When the plunger is pressed again, the liquid is dispensed. In between these steps, there are several small steps that help in making the liquid dispensing process more precise.Position 1In this, the micropipette is at rest position.Press fit a tip to the micropipette without directly touching the tip.Position 2In this, the plunger is depressed till the first stop.To aspirate the liquid in the tip, press the plunger to the first stop. Immerse the pipette tip vertically in the liquid.Release the plungerSlowly release the plunger while the tip is immersed. The liquid will be aspirated into the pipette tip.The liquid is filled in the tip as per the preset micropipette volume.Position 3Depress the plungerTo dispense the liquid, place the tip on the inner wall of the receiving vessel at a steep angle.Slowly press the plunger to the first stop to dispense the liquid.To empty the tip completely, press the plunger to the second stop.Wipe the tip on the inner wall while taking the tip out of the vessel. Some micropipettes deliver a fixed volume of liquid. However, the majority are adjustable with the variable volume setting. Variable volume micropipette comes with different ranges and upper & lower limits of measurement. In such cases, the error percentage may vary as per the measured liquid. Trying to dispense less than the lower value of the range will result in inaccurate liquid measurements whereas trying to dispense over the upper range will completely fill the tip and allow the liquid to enter into the pipette body. The care and maintenance of a micropipette is an important routine in laboratories. Implementing a proper maintenance schedule can reduce the cost of a new purchase of this expensive equipment. Cleaning the micropipette takes time, focus and practice; otherwise, the micropipette can be damaged. So, it is important to handle the pipette carefully while cleaning. The following is a comprehensive guide for proper cleaning of micropipettes.External Cleaning: Most of the pipette can be cleaned externally with typical laboratory cleaning agents, soaps or alcohol. To ensure full sterilization, let the cleaning solution sit on the micropipette for 10-15 min before wiping it off.Internal Cleaning: Cleaning the interior of the micropipette can be more time-consuming because it requires full disassembly. Also, every part of the micropipette will need to be cleaned properly depending on the liquid used in sampling. Refer to the instructions manual for a specific direction of the micropipette Use a cotton swab with a cleaning solution and distilled water Lightly grease the pistons with the lubricant provided upon purchase Reassemble all parts and check to ensure the micropipette operates smoothlyContamination Cleaning: If the micropipette becomes contaminated with a known substance, there are specific cleaning steps that must be taken depending on the type of substance. The above cleaning routine will not be sufficient if the micropipette is cross-contaminated.Solution TypesProcess to cleanFor aqueous solutions, organic solvents and proteinsRinse the contaminated parts with distilled water or 70 percent ethanol and air dry at approx 60F temperature.For infectious liquidsAutoclave the lower section at a temperature of 120C for 15-20 minutes then allow it to return at room temperature before reassembling.For radioactive substancesPlace the pipette in a solution like Decon and then rinse and air dry.For nucleic acidsBoil the lower parts of the micropipette in glycine/ HCI buffer (pH2) for 10 minutes, rinse with distilled water, and air dry. A well-maintained and clean pipette ensures lab safety from hazardous solutions. It makes the pipette more accurate, reliable, long-lasting and reduces the cost of sampling.Proper storage of micropipettes is as important as cleaning and calibrating them. The micropipette and its accessories should be stored in a clean, cool and dry place. The storage place should have a temperature ranging from -20 C to 50 C (from -4 F to 120 F) with relative humidity between 5% and 95%. Another point to be remembered is that the instrument should be stored in an upright position. To store pipettes, Microlit recommends the use of its carousel stand, Microlit Faveo. What are the different pipetting techniques used?The frequently used pipetting techniques include forward pipetting and reverse pipetting. Before we understand these techniques in detail, the general instructions and micropipette diagram of pipetting listed below would be noteworthy.Press and release the plunger slowly, at all times, particularly when working with high-viscosity reagents/solutions. Make sure that the plunger does not snap.Make sure the tip is rmly attached to the tip cone.Before starting your experiment, ll and empty the tip 2-3 times with the reagent or solution that you will be pipetting.Hold the micropipette in an upright position while aspirating. The Grippy must rest on your index nger.Make sure that the tips, the micropipette and the reagent/solution are at the same temperature.Forward Pipetting Technique:To aspirate the liquid in the tip, press the plunger to the rst stop. Immerse the pipette tip vertically in the liquid.Slowly release the plunger while the tip is immersed. The liquid will be aspirated into the pipette tip.To dispense the liquid, place the tip on the inner wall of the receiving vessel at a steep angleSlowly press the plunger to the rst stop to dispense the liquid.To empty the tip completely, press the plunger to the second stop.Wipe the tip on the inner wall while taking the tip out of the vessel.Reverse Pipetting Technique:The reverse technique is suitable for dispensing reagents/solutions that have high viscosity or a tendency to foam easily. It is also recommended for dispensing very small volumes.To aspirate the liquid in the tip, press the plunger to the second stop and immerse the pipette tip vertically in the liquid.Slowly release the plunger while the tip is immersed. The liquid will be aspirated into the pipette tip.To dispense the liquid, place the tip on the inner wall of the tube at a steep angle.Slowly press the plunger to the rst stop.Wipe the tip on the inner wall while taking the tip out of the vessel.Note: Residual liquid remains in the tip. This does not belong to the dispense volume.How to choose the right micropipette?As micropipettes can be used for a number of applications, the dilemma one faces is how to choose the right micropipette while handling a specific task.For this, you can follow our simple, stepwise guide. The preliminary step includes noting down the details of the experiment you are going to perform with the micropipette. This should ideally include the number of samples, the volume to be transferred, the number of replicates, whether sterile conditions are required and so on. Making a comprehensive list in this manner will make the process of deciding which micropipette to use easier. Types of Micropipettes Air Displacement Micropipettes and Positive Displacement Micropipettes. You can choose the right one by matching their applications to the experiment you wish to perform. After choosing the correct type, lets look at the subtypes available based on criteria like the volume to be handled, quality of tips, manual or electronic pipettes, etc. This is where the more minute details regarding the experiment will come in handy. You can either use a micropipette whose volume is already fixed or one whose volume can be adjusted as per requirement. If you regularly use a single volume such as 100 l for your experiments, go for a fixed volume pipette like MICROLIT RBO Fixed Volume (Single Channel). If your experiment entails you working with a range of volumes, choose the variable or adjustable pipette, like MICROLIT RBO Variable Volume (Single Channel or Multichannel). As a standard rule, it is better to choose the smallest pipette capable of handling the required volume because when the set volume is close to the minimum capacity of the micropipette, the accuracy and precision of the readings decrease. This decision can be made based on the number of samples or replicates you are working with. Single channel micropipettes like the MICROLIT RBO Single Channel (Fixed Volume and Variable Volume) are used when the number of samples is less whereas a large number of samples or well plates can be easily handled by multichannel micropipettes like the MICROLIT RBO Multichannel (8-channel and 12-channel). Once youve selected your micropipette, this is the next crucial decision to make. Micropipette Tips can be graduated or not graduated, universal or pipette specific, with a filter or without filter, sterile or non-sterile etc. If the experiment requires sterile, aseptic conditions, one should use filtered and sterile tips. Universal tips can be used for a wide range of pipettes. It is also important to match the capacity of the tip with the capacity of the micropipette before use. Micropipettes are designed to operate with accuracies within a few percent (generally