

Performance of Axygen® Maxymum Recovery® Pipet Tips

Application Note



With the emergence of high-throughput PCR and DNA sequencing, reliable sample preparation and delivery methods have become a critical issue. While much has been written about sample preparation, the reproducibility and accuracy of sample delivery has been largely overlooked.

Accurate sample delivery is a function of both pipet and tip performance. A carefully calibrated and maintained pipet is capable of delivering fluids within 1% of the targeted value. Variations introduced as a result of tip performance however are often far greater than 1% and overall performance can be seriously compromised.

Axygen Maxymum Recovery pipet tips have been specifically designed for applications requiring high accuracy and reproducibility.

Pipetting DNA Sequencing Reactions

Enzyme containing mixtures such as the PerkinElmer® Applied Biosystems® BigDye® Terminator Ready Reaction Mix contain high concentrations of glycerol or other cryoprotectants which dramatically increase the viscosity of the liquid. The delivery of such mixtures is problematic as significant amounts of residual liquid typically remain in the tip after the pipetting operation is complete. This systematic loss of accuracy contributes greatly to the variability in complex reactions such as PCR and DNA sequencing.

Liquid Retention Test

The amount of liquid retained by various pipet tips was measured directly using the PerkinElmer Applied Biosystems BigDye Terminator Ready Reaction Mix as a test liquid. For each test, 100 µL of the mix was drawn into a tip and discarded. The fluid remaining in the tip was recovered by exhaustive rinsing with a wash solution. The results were quantified by spectroscopic analysis of the wash solution at 260 nm.

Results

From the data shown in Figure 1, the fluid retained by the Axygen Maxymum Recovery pipet tip is 4 to 6 times lower than other tips tested. The data also shows that siliconized tips do not offer improved delivery over conventional tips.

When compared under a scanning electronic microscopy (SEM), Axygen Maxymum Recovery tips are free of occlusions and cavities which can cause sample retention and sample denaturation in conventional polypropylene pipet tips and siliconized pipet tips. (Figures 2, 3, and 4).

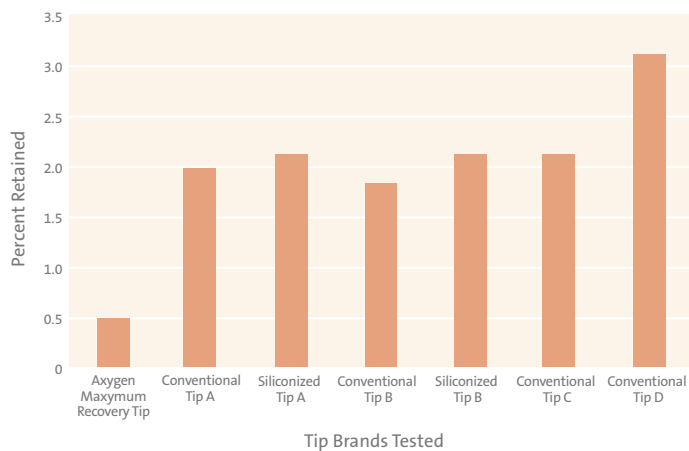


Figure 1. Comparison of fluid retention by various pipet tips. Fluid retained is shown as a percentage of the total amount that was aspirated. Data provided by Teknova, Inc.

Scanning Electron Microscopy (SEM) Photographs of the Axygen® Maxymum Recovery® Pipet Tip Surface Compared to Conventional Polypropylene and Siliconized Pipet Tip Surfaces

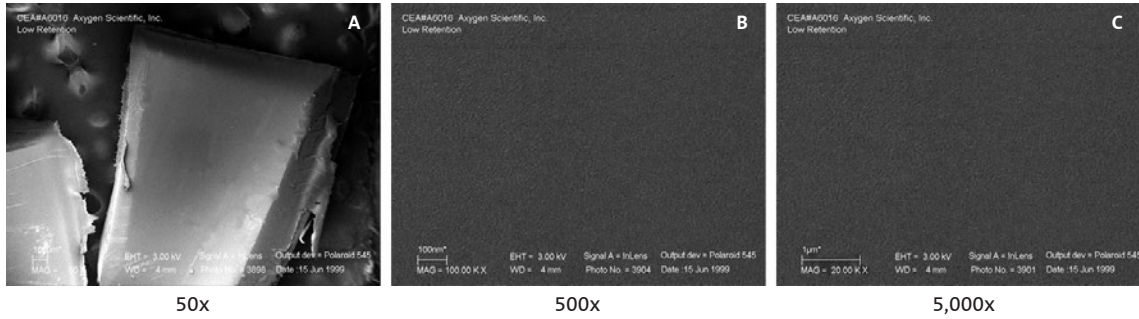


Figure 2. Axygen Maxymum Recovery Pipet Tips
The Axygen Maxymum Recovery ultra-smooth surface, even at the highest magnification level, is visibly free of occlusions and cavities which can cause sample retention and sample denaturation in conventional polypropylene.

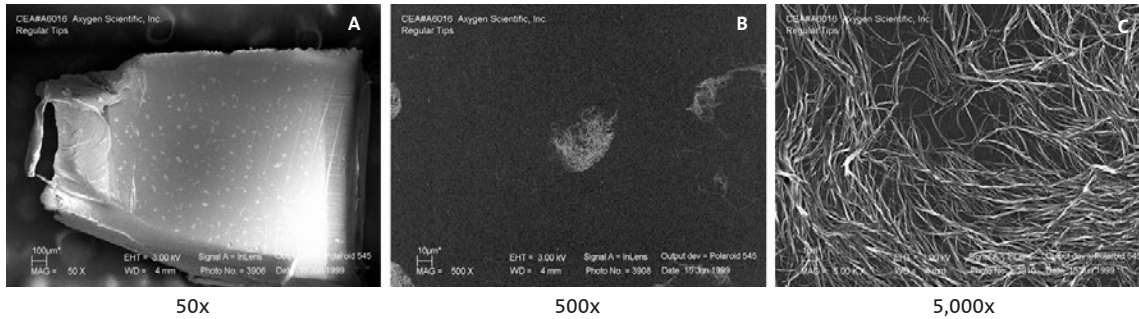


Figure 3. Conventional Polypropylene Pipet Tips
The internal surface of a standard polypropylene pipet tips shows occlusions and cavities. At the highest magnification, surface strands which cause samples to stick are clearly visible.

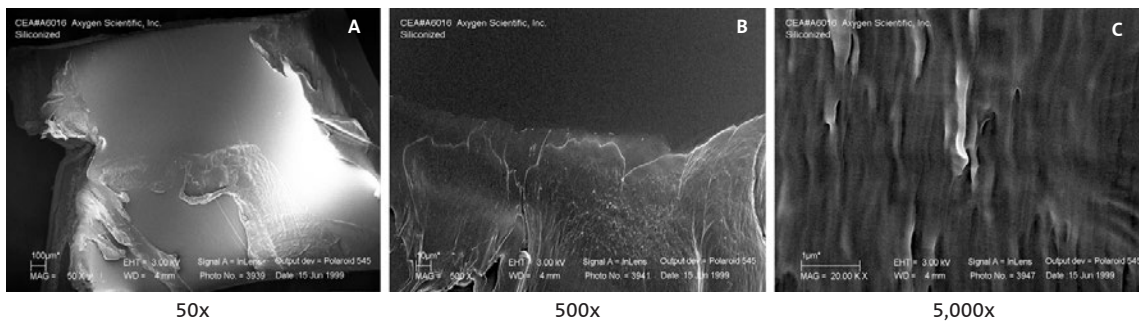
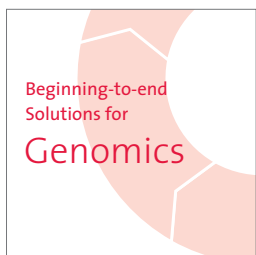


Figure 4. Siliconized Pipet Tips
The siliconized pipet tip shows a lack of smoothness of the walls created by an inconsistent and uneven flow of silicone upon the surface. Sample retention occurs even with siliconized pipet tips.

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