

Solvent Resistance of Axygen® MaxRecovery+™ Pipette Tips

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Application Note

Maddie Cannon and Audrey Bergeron
Corning Incorporated, Life Sciences
Kennebunk, ME USA

Introduction

The ability to dispense small volumes accurately is critical when preparing samples for drug discovery, molecular biology, and genomics. This requires minimizing the volume that remains within pipette tips upon dispensing. To achieve this, different coatings and resin additives have been used to create pipette tips with low retention (Figure 1). However, the chemistries used to achieve this attribute have been relatively unpublicized with little regard for compatibility with commonly used solvents, reagents, etc. used in laboratory settings. In addition, these chemistries may come off the pipette tip surface in the presence of different solvents and could contaminate assays such as silicone inhibiting PCR. The Axygen MaxRecovery+ pipette tips address these concerns as a high performing, solvent resistant low retention tip, with no intentionally added PFAS. Here we highlight the solvent resistance of Axygen MaxRecovery+ pipette tips using 3 common solvents compared to 3 comparable brands of low retention pipette tips.

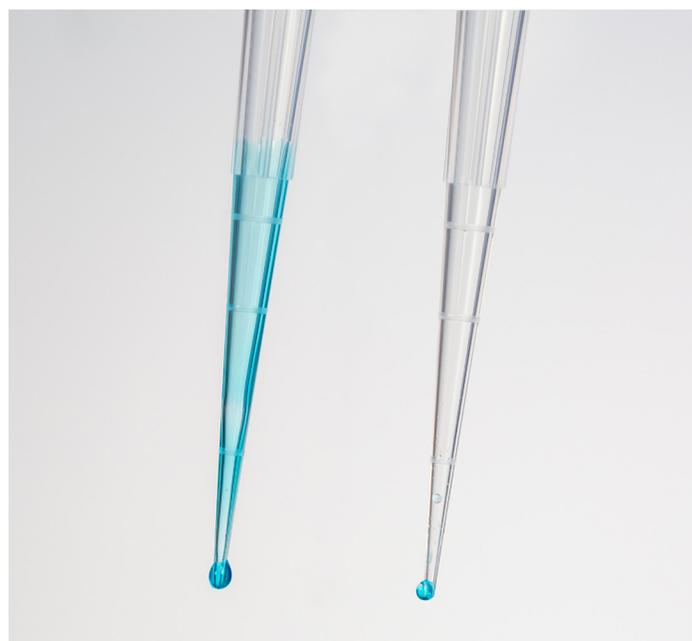


Figure 1. A control polypropylene pipette tip (left) and an Axygen MaxRecovery+ tip (right) after pipetting a blue liquid.

Materials and Methods

Various 200 μ L pipette tips were briefly exposed to common lab solvents before testing low retention performance to directly measure changes in surface chemistry during typical use. The tips included standard polypropylene tips as a control (Corning PP; Corning MRF-200NX-R-S), Axygen MaxRecovery+ tips (Corning MRF-200NX-L-R-S), and 3 comparable low retention tip types from different vendors. The selected solvents were 100% isopropyl alcohol (IPA), 100% ethanol (EtOH), and 100% dimethyl sulfoxide (DMSO). The tips were exposed to the individual solvents by drawing 200 μ L into a tip, holding for 5 seconds, then dispensing and blowing out any excess solvent. Each solvent was tested using 3 tips per tip type. After drying overnight at room temperature, the performance of the tips were tested as described below. Three control tips which had not been exposed to solvent, were included in performance testing for each tip type.

The volume of liquid retained by various pipette tips was measured directly using the Artel MVS® Multichannel Verification System (Advanced Instruments) with the test liquid containing a mix of 50% glycerol (Thermo Fisher J64719.AK), 40% green food color (McCormick®), and 10% high quality cell culture grade water (Corning 25-055-CM). For each test, 200 μ L of the mix was drawn into a tip and dispensed. The fluid remaining in the tip was recovered by rinsing 3 times with 200 μ L of the Artel MVS QualAssure® Diluent (MVS-202) into a 96-well microplate (Corning 3631). The results were quantified by the Artel MVS and subsequently converted from absorbance to volume using the standard curve for the test liquid.

A visual comparison was also completed using the same method as above through reagent mix dispense to qualitatively measure performance.

Results and Discussion

From the data shown in Figure 2, the Axygen MaxRecovery+ pipette tip is the only tip that demonstrated no change in performance after a 5-second exposure to common solvents IPA, EtOH, and DMSO. The volume of test reagent retained within each tip after dispensing closely matches the retained volume in the control tip ($<1 \mu$ L). Although the 3 comparable brand tips show some low retention properties with the control testing, they lose these properties after exposure to at least 2 of the 3 pipetted solvents, resulting in retained test reagent volumes nearly as high as a standard polypropylene tip ($>20 \mu$ L). This suggests that they all contain additives that interact with common solvents and undergo changes in surface chemistry after pipetting, potentially contaminating samples.

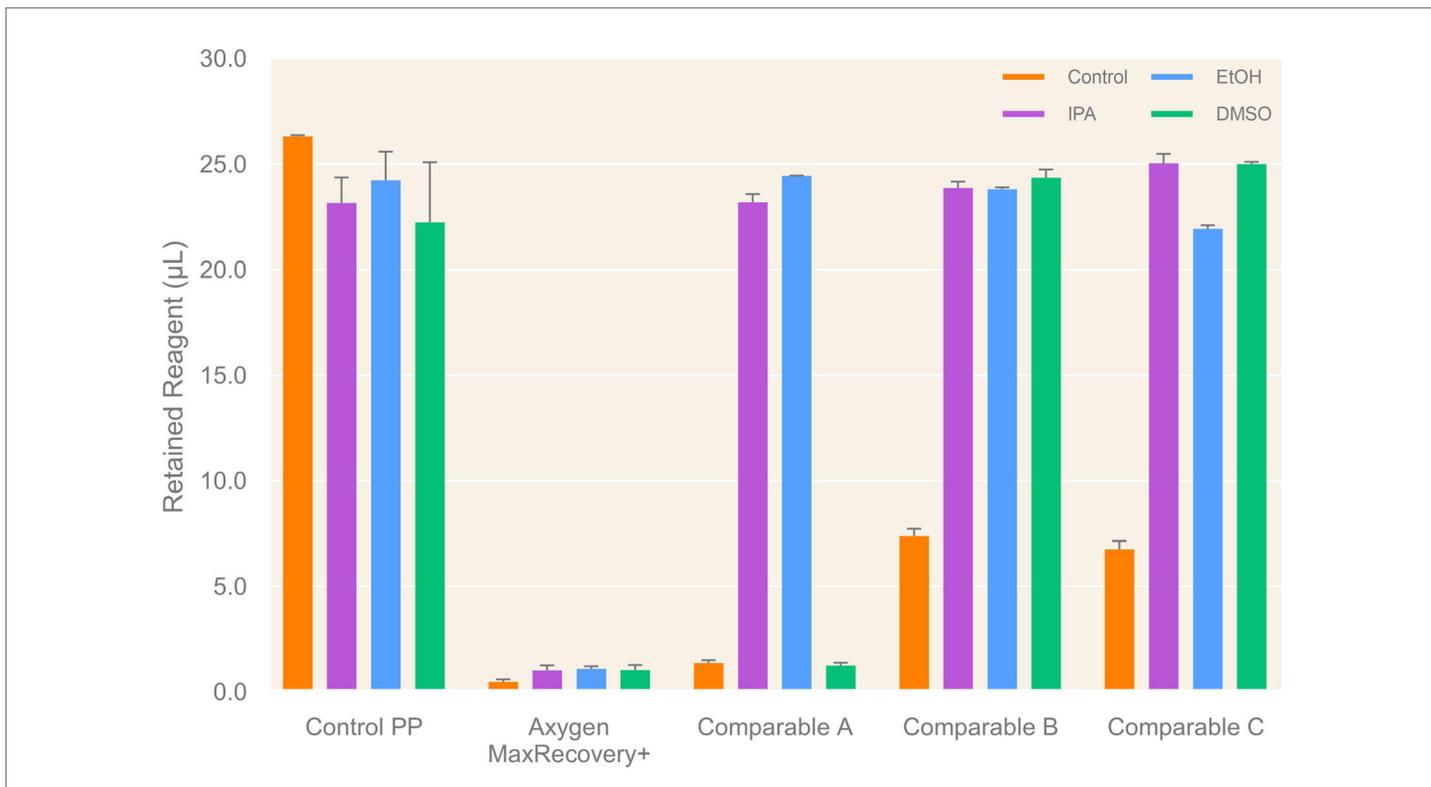


Figure 2. Comparison of liquid retention by various pipette tips after a 5-second solvent exposure (drying overnight). Retained reagent is shown in μL . $N = 3$ per condition.

Where quantitative retention testing is not possible, a visual test method can be used to compare the efficacy of tips side by side. Axygen[®] MaxRecovery+[™] tips performed better than all 3 comparable brands with little to no residual dye remaining on the tips (Figure 3).

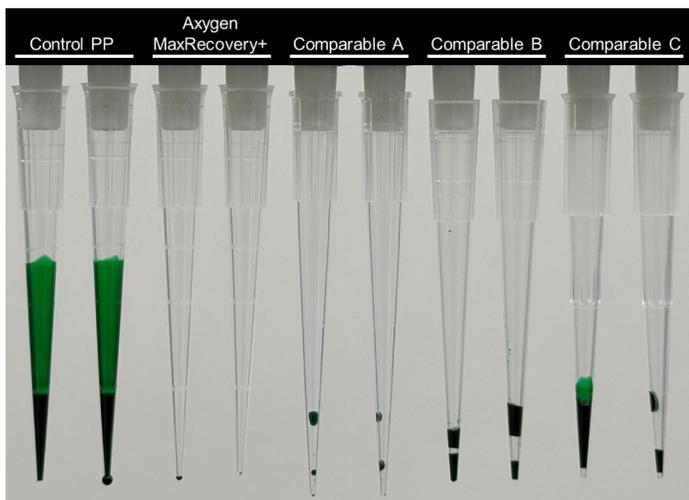


Figure 3. Visual comparison of liquid retention by various pipette tips without solvent-exposure. From left to right in sets of two: Control PP, Axygen MaxRecovery+, Comparable A, B, and C.

The visual test method previously described was also used to compare the performance of solvent exposed tips. Axygen MaxRecovery+ tips are the only tips of the comparable brand tips tested that showed no change in performance post solvent exposure, with the comparable brands performing as poorly as the control PP tips (Figure 4).

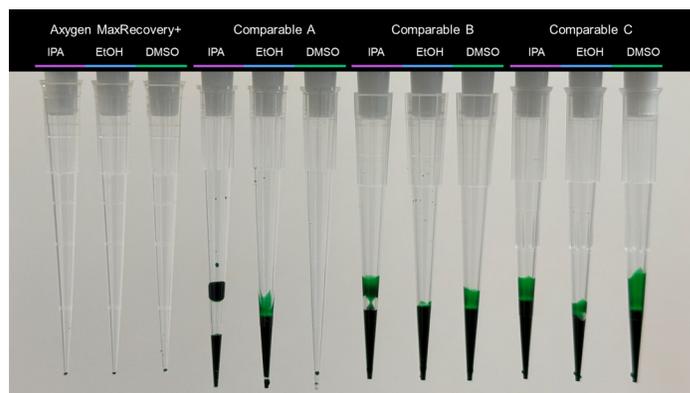


Figure 4. Visual comparison of liquid retention by various pipette tips after a 5-second solvent exposure (drying overnight).

Conclusions

Axygen MaxRecovery+ pipette tips effectively reduce the volume of residual solution remaining within the tips with a retained volume of less than 1%, making it an excellent choice for assays requiring high precision and accuracy or for minimizing sample loss during liquid handling. Additionally, the benefit of solvent resistance demonstrated via a 5-second exposure to common solvents alleviates concerns over contamination of samples through liquid handling steps.

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Life Sciences

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India

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t 886 2-2716-0338

EUROPE

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France

t 0800 916 882

Germany

t 0800 101 1153

The Netherlands

t 020 655 79 28

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t 0800 376 8660

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t +31 (0) 206 59 60 51

LATIN AMERICA

grupolA@corning.com

Brazil

t 55 (11) 3089-7400

Mexico

t (52-81) 8158-8400

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