

Axygen® 30 µL Automation Tips in 384-well Format for Beckman Coulter Biomek® FX Laboratory Automation Workstation – Precision and Accuracy



SnAPPShots

A brief technical report from the Corning Applications Group

Srividya Dadi, Audrey Bergeron, and Hannah Gitschier
Corning Incorporated, Life Sciences
Kennebunk, Maine

Introduction

Automated liquid handling and high throughput screening (HTS) are widely used for drug discovery, molecular biology, and genomics. For HTS, reliable sample preparation and delivery methods have become critical to assay performance. Corning has a line of Axygen® 30 µL pipet tips in a 384-well format, which have been specifically designed for applications using the Biomek® FX liquid handling workstation from Beckman Coulter.

The focus of this study was to evaluate the dispensing volume accuracy and precision of the Axygen 384-well 30 µL tips on the Biomek FX automation platform compared to Competitor 30 µL tips. These criteria were measured using the Artel Multichannel Verification System (MVS®), which calculates the volume of dispensed samples using an absorbance-based measurement system. The results demonstrate that Axygen 384-well 30 µL tips are comparable to Competitor 384-well 30 µL tips using the Biomek FX liquid handling workstation to dispense volumes as low as 3 µL and as high as 30 µL.

Materials and Methods

Materials

Tips evaluated: Axygen 384-well 30 µL tips (Corning Cat. No. FX-384-R) and Competitor 384-well 30 µL tips

Methods

The Biomek FX liquid handling workstation (Beckman Coulter Cat. No. A31842) was used to assess accuracy, as percent deviation (% D), and precision, as coefficient of variation (% CV), for Axygen 384-well 30 µL tips and Competitor 384-well 30 µL tips.

To test the ability of each brand of tips to dispense accurately and precisely, 384-well tips were used to aspirate from an Axygen low profile reservoir (Corning Cat. No. RES-SW384-LP) and dispense into a Corning 384-well well black clear bottom microplate (Corning Cat. No. 3711). For the 3 µL test volume, each tip aspirated 3 µL of Range B solution (Artel Cat. No. MVS-204) and dispensed 3 µL into 52 µL of diluent solution (Artel Cat. No. MVS-202) in a single well. For the 30 µL test volume, each tip aspirated 30 µL of Range A solution (Artel Cat. No. MVS-203) and dispensed 30 µL into 25 µL of diluent solution. To determine the volume of liquid dispensed into each well, absorbance readings for the solutions – diluted Range B solution for 3 µL dispense and diluted Range A solution for 30 µL dispense – were measured using an

Artel ELx800NB® plate reader (Artel Cat. No. 1311197). Each study was performed 3 independent times for each brand of tips for a total of 1,152 tip dispenses. Evaluation criteria include percent deviation from the set dispense volume (% D) and the variability in dispense volume (% CV) for the 1,152 tip dispenses.

Results/Discussion

The evaluation criteria for comparing Axygen 384-well 30 µL tips with Competitor 384-well 30 µL tips are listed in Tables 1 and 2. The ability of the pipet tips to dispense 3 µL and 30 µL volumes accurately and precisely was determined through the analysis of the mean volume dispensed across 3 replicates of 384-well tips each. The precision of each brand of tip is represented by the coefficient of variation (% CV) of the replicates. Similarly, the accuracy is represented by the percent deviation (% D) from the target volume of the replicates. It is important to note that the accuracy of liquid dispense may vary depending on the method and liquid chosen when using the automation platform. However, the method and liquid used for these studies was identical for Axygen 384-well 30 µL tips and Competitor 384-well 30 µL tips.

As demonstrated in Figure 1, Axygen 384-well 30 µL tips displayed comparable precision to Competitor 384-well 30 µL tips using the Biomek FX automation system. There was no significant

Table 1. Evaluation Criteria for 3 µL Dispense Volume

3 µL	Axygen	Competitor
No. of Wells	1,152	1,152
Total No. of Outliers	5	10
Target Volume (µL)	3.00	3.00
% CV (n = 3 replicates)	1.95 ± 0.17%	1.64 ± 0.08%
% D (n = 3 replicates)	0.56 ± 0.06%	1.29 ± 0.20%

Table 2. Evaluation Criteria for 30 µL Dispense Volume

30 µL	Axygen	Competitor
No. of Wells	1,152	1,152
Total No. of Outliers	6	4
Target Volume (µL)	30.00	30.00
% CV (n = 3 replicates)	1.50 ± 0.12%	1.53 ± 0.10%
% D (n = 3 replicates)	0.33 ± 0.08%	0.41 ± 0.16%

Data in tables show ± standard deviation.

difference in the precision of each brand of tips when dispensing 3 μL (Figure 1A) or 30 μL (Figure 1B).

As demonstrated in Figure 2, Axygen® 384-well 30 μL tips displayed lower % D and, thus, higher accuracy than Competitor 384-well 30 μL tips using the Biomek® FX automation system to dispense 3 μL (Figure 2A). The Axygen 384-well 30 μL tips displayed comparable accuracy to Competitor 384-well 30 μL tips when dispensing 30 μL with no significant difference in the accuracy of each brand of tips (Figure 2B).

Conclusions

- ▶ Axygen 384-well 30 μL tips demonstrate comparable precision to Competitor 384-well 30 μL tips using the Biomek FX liquid handling workstation to dispense volumes as low as 3 μL and as high as 30 μL .
- ▶ Axygen 384-well 30 μL tips demonstrate comparable accuracy to Competitor 384-well 30 μL tips using the Biomek FX liquid handling workstation to dispense 30 μL and improved accuracy to dispense 3 μL .

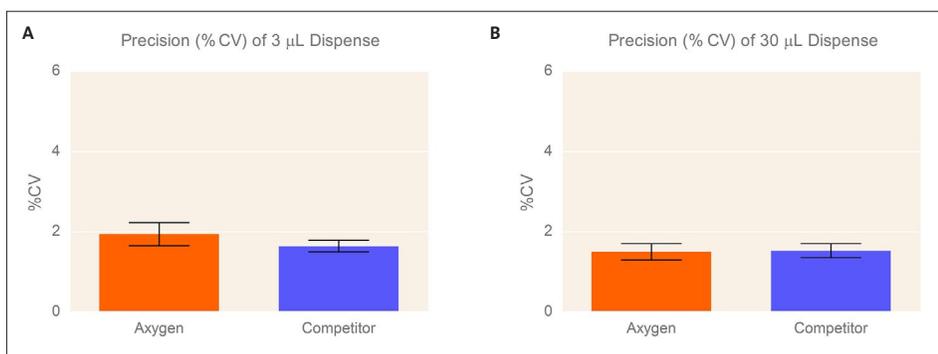


Figure 1. Precision (% CV) analysis of 384-well 30 μL tips. The % CV of Axygen and Competitor 30 μL tips dispensing (A) 3 μL and (B) 30 μL volume using the Biomek FX liquid handler was determined using the Artel MVS System. There was no significant difference in % CV between each brand. Data shown with standard deviation (SD) for 3 independent experiments of 384 wells each.

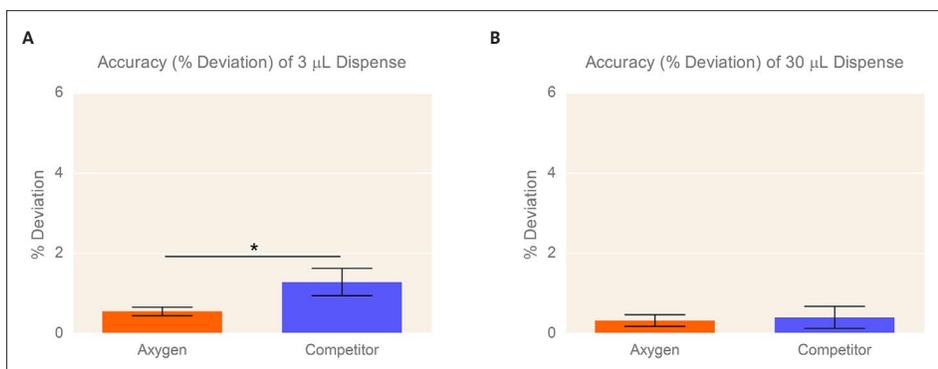


Figure 2. Accuracy (% D) analysis of 384-well 30 μL tips. The % D of Axygen and Competitor 30 μL tips dispensing (A) 3 μL and (B) 30 μL volume using the Biomek FX liquid handler was determined using the Artel MVS System. (A) Axygen tips displayed significantly lower % D and, thus, higher accuracy than Competitor tips dispensing 3 μL . * $P < 0.05$. (B) There was no significant difference in % D between each brand dispensing 30 μL . Data shown with SD for 3 independent experiments of 384 wells each.

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Corning Incorporated
Life Sciences
836 North St.
Building 300, Suite 3401
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t 978.442.2200
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