

Axygen® 50 µL Automation Tips in 96-well Format for Beckman Coulter Biomek® FX – Precision and Accuracy



SnAPPShots

A brief technical report from the Corning Applications Group

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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 50 µL pipet tips in a 96-well format specifically designed for Beckman Coulter Biomek® FX liquid handling workstations.

The focus of this study was to evaluate the dispensing volume accuracy and precision of the Axxygen 96-well format 50 µL tips on the Beckman Coulter Biomek® FX automation platform, compared to Competitor 96-well format 50 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 Axxygen, 50 µL tips are comparable to Competitor, 50 µL tips using the Beckman Coulter Biomek FX liquid handling workstation to dispense volumes as low as 5 µL and as high as 50 µL.

Materials

Tips evaluated: Axxygen 96-well format 50 µL tips (Corning Cat. No. FX-50-R) and Competitor 96-well format 50 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 Axxygen 50 µL tips and Competitor 50 µL tips.

To test the ability of each brand of tips to dispense accurately and precisely, 96 tips were used to aspirate from an Axxygen low profile reservoir (Corning Cat. No. RES-SW96-LP) and dispense into a Corning® 96-well black clear bottom microplate (Corning Cat. No. 3631). For the 5 µL test volume, each tip aspirated 5 µL of Range C solution (Artel, Cat. No. MVS-205) and dispensed 5 µL into 195 µL of diluent solution (Artel Cat. No. MVS-202) in a single well. For the 50 µL test volume, each tip aspirated 50 µL of Range A solution (Artel Cat. No. MVS-203) and dispensed 50 µL into 150 µL of diluent solution. To determine the volume of liquid dispensed into each well, absorbance readings for the solutions – diluted Range C solution for 5 µL dispense and diluted Range A solution

for 50 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 288 tip dispenses. Evaluation criteria include percent deviation from the set dispense volume (% D) and the variability in dispense volume (% CV) for the 288 tip dispenses.

Results/Discussion

The evaluation criteria for comparing Axxygen 96-well format 50 µL tips with Competitor 96-well format 50 µL tips are listed in Tables 1 and 2. The ability of the pipette tips to dispense 5 µL and 50 µL volumes accurately and precisely was determined through the analysis of the mean volume dispensed across 3 replicates of 96 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 liquid handling platform. However, the method and liquid used for these studies were identical for Axxygen 50 µL tips and Competitor 50 µL tips.

Table 1. Evaluation Criteria for 5 µL Dispense Volume

	Axygen	Competitor
No. of wells	288	288
Total No. of outliers	0	0
Target Volume (µL)	5.00	5.00
% CV (n = 3 replicates)	0.48% ± 0.01%	0.63% ± 0.002%
% D (n = 3 replicates)	2.77% ± 0.20%	2.92% ± 0.21%

Table 2. Evaluation Criteria for 50 µL Dispense Volume

	Axygen	Competitor
No. of wells	288	288
Total No. of Outliers	2	4
Target Volume (µL)	50.00	50.00
% CV (n = 3 replicates)	0.23% ± 0.02%	0.33% ± 0.01%
% D (n = 3 replicates)	1.41% ± 0.16%	1.68% ± 0.18%

Data in tables show ± standard deviation (SD).

As demonstrated in Figure 1, Axygen® 50 µL tips displayed lower % CV, and thus better precision, than Competitor 50 µL tips using the Beckman Coulter Biomek® FX automation system to dispense 5 µL (Figure 1A) or 50 µL (Figure 1B).

As demonstrated in Figure 2, Axygen 50 µL tips displayed comparable % D to Competitor 50 µL tips using the Beckman Coulter Biomek FX automation system. There was no significant difference in the accuracy of each brand of tips when dispensing 5 µL (Figure 2A) or 50 µL (Figure 2B).

Conclusions

- ▶ Axygen 96-well format 50 µL tips demonstrate improved precision to Competitor 96-well 50 µL tips using the Beckman Coulter Biomek FX liquid handling workstation to dispense volumes as low as 5 µL and as high as 50 µL.
- ▶ Axygen 96-well format 50 µL tips demonstrate comparable accuracy to Competitor 96-well format 50 µL tips using the Beckman Coulter Biomek FX liquid handling workstation to dispense volumes as low as 5 µL and as high as 50 µL.

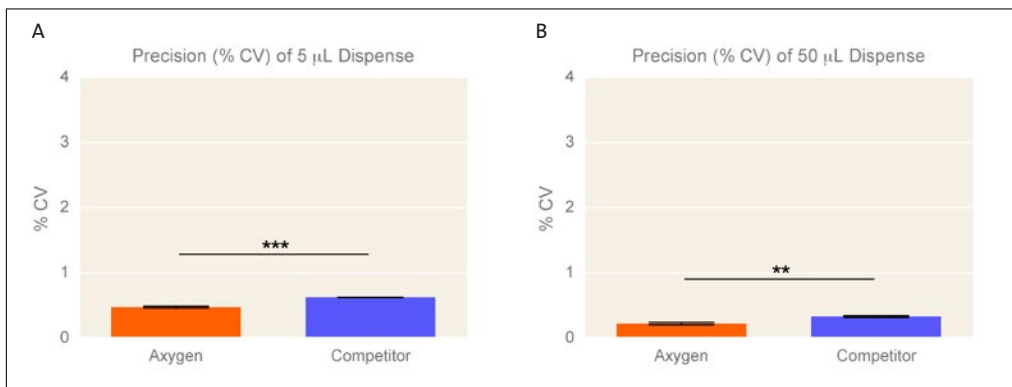


Figure 1. Precision (% CV) analysis of 96-well format, 50 µL tips. The % CV of Axygen and Competitor 50 µL tips dispensing (A) 5 µL and (B) 50 µL volumes using the Beckman Coulter Biomek FX liquid handler was determined using the Artel MVS system. (A) Axygen tips displayed significantly lower % CV, and thus higher precision, than Competitor tips dispensing 5 µL. ***P<0.001. (B) Axygen tips displayed significantly lower % CV, and thus higher precision, than Competitor tips dispensing 50 µL. **P<0.01. Data shown with SD for 3 independent experiments of 96 wells each.

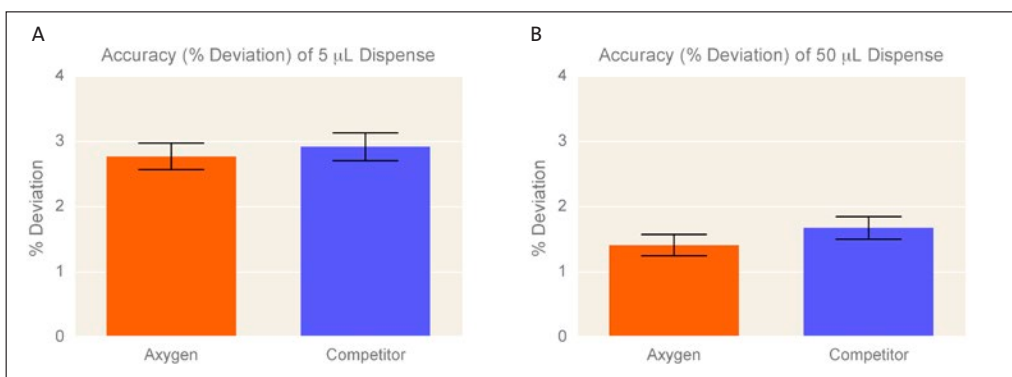


Figure 2. Accuracy (% D) analysis of 96-well format 50 µL tips. The % D of Axygen and Competitor 50 µL tips dispensing (A) 5 µL and (B) 50 µL volumes using the Beckman Coulter Biomek FX liquid handler was determined using the Artel MVS system. There was no significant difference in % D between each brand. Data shown with SD for 3 independent experiments of 96 wells each.

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