

Axygen® 20 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

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 20 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 Axygen 96-well format 20 µL tips on the Beckman Coulter Biomek FX automation platform, compared to Competitor 96-well format 20 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 20 µL tips are comparable to Competitor 20 µL tips using the Beckman Coulter Biomek FX liquid handling workstation to dispense volumes as low as 2 µL and as high as 20 µL.

Materials

Tips evaluated: Axygen 96-well format 20 µL tips (Corning Cat. No. FX-20-R) and Competitor 96-well format 20 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 20 µL tips and Competitor 20 µL tips.

To test the ability of each brand of tips to dispense accurately and precisely, 96 tips were used to aspirate from an Axygen 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 2 µL test volumes, each tip aspirated 2 µL of Range C solution (Artel Cat. No. MVS-205) and dispensed 2 µL into 198 µL of diluent solution (Artel Cat. No. MVS-202) in a single well. For the 20 µL test volumes, each tip aspirated 20 µL of Range B solution (Artel Cat. No. MVS-204) and dispensed 20 µL into 180 µL of diluent solution. To determine the volume of liquid dispensed into each well, absorbance readings for the solutions – diluted Range C solution for 2 µL dispense and diluted Range B solution for 20 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 Axygen 96-well format 20 µL tips with Competitor 96-well format 20 µL tips are listed in Tables 1 and 2. The ability of the pipette tips to dispense 2 µL and 20 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 Axygen 20 µL tips and Competitor 20 µL tips.

As demonstrated in Figure 1, Axygen 20 µL tips displayed lower % CV, and thus better precision, than Competitor 20 µL tips using the Beckman Coulter Biomek FX automation system to dispense 2 µL (Figure 1A). The Axygen 20 µL tips displayed comparable

Table 1. Evaluation Criteria for 2 µL Dispense Volume

	Axygen	Competitor
No. of Wells	288	288
Total No. of Outliers	0	0
Target Volume (µL)	2.00	2.00
% CV (n = 3 replicates)	0.88% ± 0.02%	1.26% ± 0.19%
% D (n = 3 replicates)	2.13% ± 0.25%	2.83% ± 0.27%

Table 2. Evaluation Criteria for 20 µL Dispense Volume

	Axygen	Competitor
No. of Wells	288	288
Total No. of Outliers	0	5
Target Volume (µL)	20.00	20.00
% CV (n = 3 replicates)	0.24% ± 0.01%	0.25% ± 0.05%
% D (n = 3 replicates)	0.47% ± 0.15%	0.72% ± 0.21%

Data in tables show ± standard deviation (SD).

precision to Competitor 20 μ L tips when dispensing 20 μ L, with no significant difference in the accuracy of each brand of tips (Figure 1B).

As demonstrated in Figure 2, Axygen[®] 20 μ L tips displayed lower % D, and thus higher accuracy, than Competitor 20 μ L tips using the Beckman Coulter Biomek FX automation system to dispense 2 μ L (Figure 2A). The Axygen 20 μ L tips displayed comparable accuracy to Competitor 20 μ L tips when dispensing 20 μ L, with no significant difference in the accuracy of each brand of tips (Figure 2B).

Conclusions

- ▶ Axygen 96-well format 20 μ L tips demonstrate comparable precision to Competitor 96-well format 20 μ L tips using the Beckman Coulter Biomek FX liquid handling workstation to dispense 20 μ L and improved precision to dispense 2 μ L.
- ▶ Axygen 96-well format 20 μ L tips demonstrate comparable accuracy to Competitor-96-well format 20 μ L tips using the Beckman Coulter Biomek FX liquid handling workstation to dispense 20 μ L and improved accuracy to dispense 2 μ L.

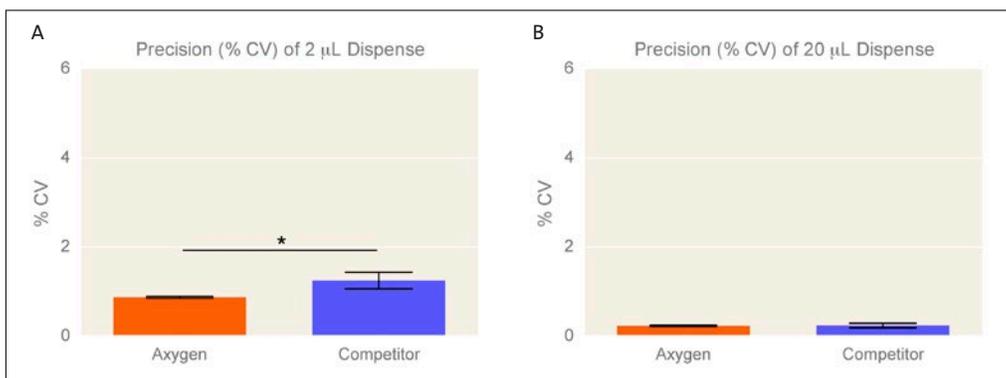


Figure 1. Precision (% CV) Analysis of 96-well format 20 μ L Tips. The % CV of Axygen and Competitor 20 μ L tips dispensing (A) 2 μ L and (B) 20 μ L volumes using the Beckman Coulter Biomek FX liquid handler was determined using the Artel MVS system. (A) Axygen tips displayed significantly lower % CV, and thus higher precision, than Competitor tips dispensing 2 μ L. * P <0.05 (B) There was no significant difference in % CV between each brand dispensing 20 μ L. Data shown with SD for 3 independent experiments of 96 wells each.

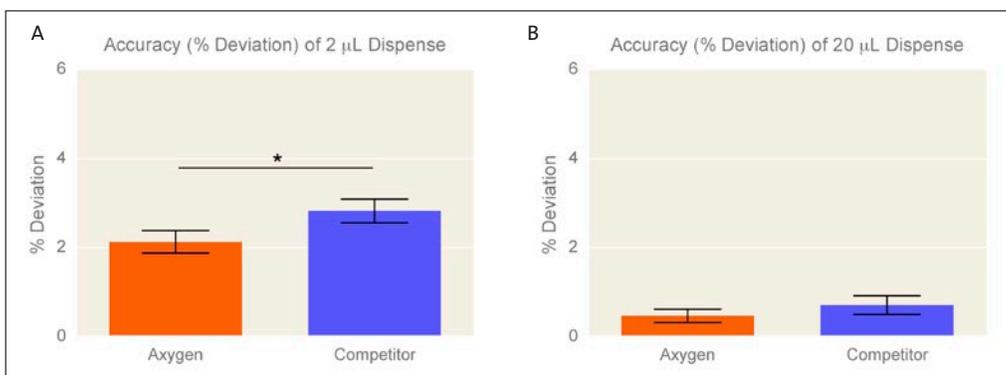


Figure 2. Accuracy (% D) Analysis of 96-well format 20 μ L Tips. The % D of Axygen and Competitor 20 μ L tips dispensing (A) 2 μ L and (B) 20 μ L volumes using the Beckman Coulter Biomek FX liquid handler was determined using the Artel MVS System. (A) Axygen tips displayed significantly lower % D, and thus higher accuracy, than Competitor tips dispensing 2 μ L. * P <0.05 (B) There was no significant difference in % D between each brand dispensing 20 μ L. Data shown with SD for 3 independent experiments of 96 wells each.

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