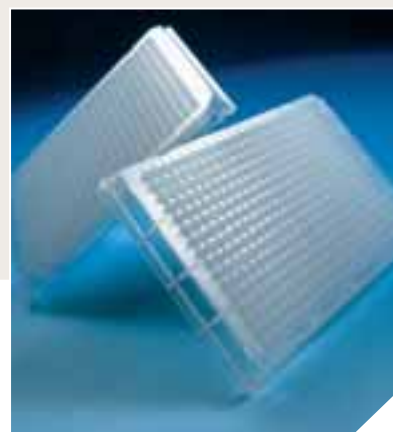


Optimised High-Throughput Liquid Handling using the ABgene® Flat-V-Well Microarray Plate



In high throughput, low-volume liquid handling applications, plate choice is crucial. Well geometry can affect minimum drop size and assay success. As a result, accurate pipetting of volumes less than 2µl into empty reaction wells presents a major challenge for automated working procedures.

Procedure

In the experiments described below, ABgene® 384 V-Well Microarray Plates (AB-1056) were tested against 384 pyramidal-well plates (available from a number of suppliers). A comparison of the well geometries is shown in figure 1.

a) Flat-V Round Well b) Pyramidal Square Well

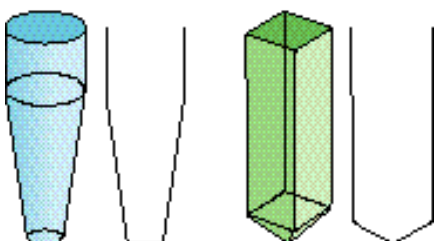


Figure 1: Well geometries of (a) the flat-V-well ABgene® plate and (b) the pyramidal-well plate.

Pipetting accuracy in the two plate types was compared by means of signal intensity tests. A chosen volume of 150µM fluorescein was dispensed into each plate well using a Beckman Biomek® FX Laboratory Automation Workstation and disposable tips. The fluorescent signal from each well was subsequently read and recorded using a Perkin Elmer Victor II Fluorescence Reader. The actual dispensed volume was calculated from the recorded signal and compared to the intended volume as an indication of pipetting accuracy. Pipetting variance was calculated from the well-to-well signal variance.

Tests were performed using dispensed volumes of 2µl and 0.9µl. Four plates of each type were assessed.

Results

Plates were read after 2µl volumes were dispensed into each well. While signals could be obtained from both plate types, the

coefficient of variance (%CV) of the dispensed volume was consistently lower in the ABgene® V-well plates (figure 2a). The V-well shape of the ABgene® plates ensures a streamlined drop release into the centre of each well, minimising well-to-well variation, as demonstrated by the lower %CV.

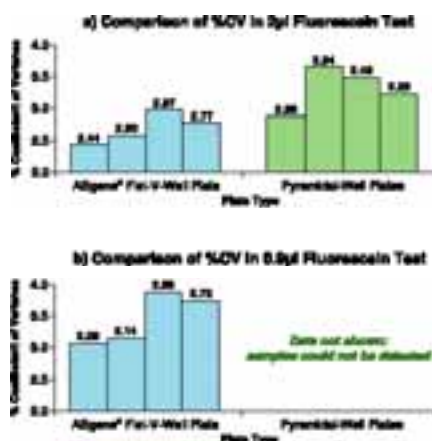


Figure 2: Coefficient of Variance (%CV) of dispensed volumes in four plate samples of each type. Plates were loaded with (a) 2µl or (b) 0.9µl of fluorescein (150µM in DMSO) using disposable tips. %CV was calculated using the following formula:

$$\%CV = (\text{standard deviation})/(\text{mean}) \times 100.$$

Results of the 0.9µl test are particularly significant because, to date, it has not been possible to guarantee accurate automated pipetting of volumes under 2µl into 384-well plates. As can be seen in figure 2b, a defined volume of 0.9µl could still be readily placed and detected in the ABgene® plate.

**Mr. S. Leikefeld, Roche
Diagnostics GmbH, Pharma
Research, Im Nonnenwald, 82377
Penzberg, Germany**

However, such a small volume could not be properly placed into the pyramidal-well plates; drops were sometimes deposited in the corner of the wells (figure 3). This prevented the fluorescent signal from reaching the samples and therefore hindered analysis of the data.



Figure 3: Close-up of 0.9µl drop placement in pyramidal-well plate. Drops are often placed in the corner of the well rather than in the centre.

Conclusion

This study confirms that volumes as low as 0.9µl can be accurately dispensed into ABgene® 384 V-Well Microarray Plates. As the drops are precisely placed into the centre of the wells, samples can be easily detected and accessed for downstream applications. Conversely, the pyramidal well shape found in many common low-volume assay plates is not optimised for dispensing and detecting volumes smaller than 2µl. Laboratories using ABgene® plates can therefore reduce their sample volumes and, as a result, lower laboratory reagent expenditure significantly. As accuracy, consistency and cost are all vital considerations for research applications, the ABgene® V-Well Microarray Plate is the plate of choice when working with small samples.

Cat. No.	Description	Quantity
AB-1056	384-Well Microarray Plate, V Wells	50 plates
AB-1056/w	384-Well Microarray Plate, V Wells, white	50 plates
AB-1056/k	384-Well Microarray Plate, V Wells, black	50 plates