

Reducing Reagent Waste in Multichannel Reservoirs

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Abstract

Reagent reservoirs are commonly used to hold liquid that will be aspirated using multichannel pipettes. Considering the potentially high cost of many reagents, it is highly desirable to employ a reservoir design that minimizes the residual or “dead” volume of reagent that cannot be aspirated from the reservoir. Seven commercially available reagent reservoirs were tested to determine the residual reagent volume when aspirating with an eight channel pipette. Distilled water as well as liquids of varying surface tension were tested. The reservoirs manufactured by VistaLab were shown to have up to 67% less residual volumes than the other reagent reservoirs with distilled water and 54% less with other tested liquids.

Method

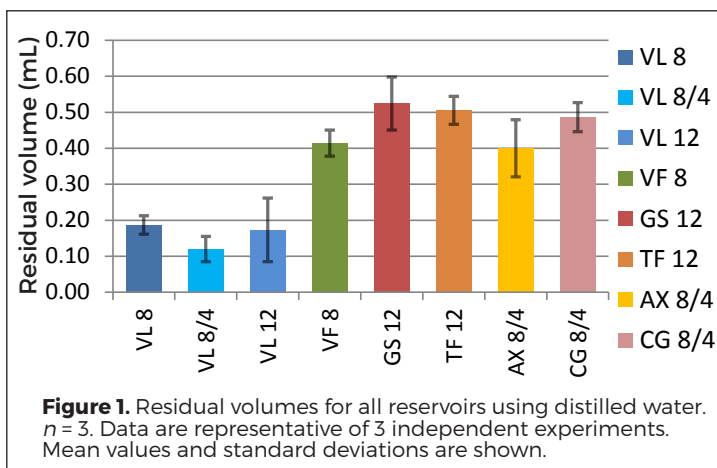
Each test was started with a clean, unused reservoir. An analytic balance was zeroed and the empty reservoir weighed. The reservoir was then removed from the balance and filled with 2.0 mL of distilled water. An 8-channel mechanical pipette was positioned with the tips at the bottom of the reservoir, and the liquid was slowly and carefully aspirated. Aspiration continued until one of the tips began to aspirate air. Aspiration was then immediately stopped and the liquid remaining in the reservoir was weighed. This procedure was repeated three times on three different reservoirs of each type for a total of nine measurements on each reservoir type. The reservoirs tested are shown in **Table 1**.

Table 1. Reservoirs used in this study.

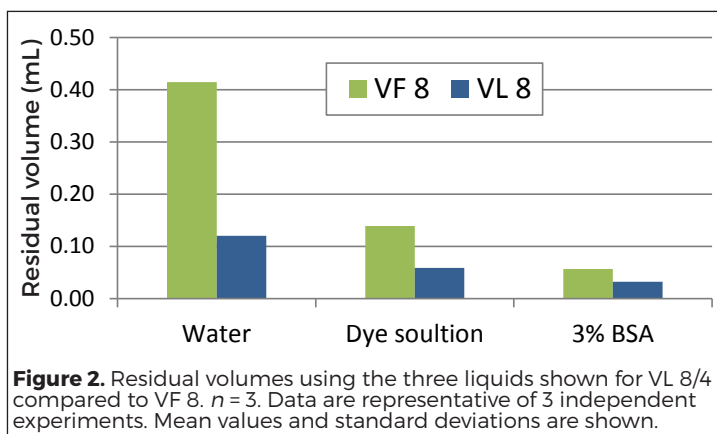
Item	Channels	Size	Brand	Part #
VL 8	8	10ml	VistaLab™	3054-1013
VL 8/4	8/4	25ml	VistaLab™	3054-1005
VL 12	12	25ml	VistaLab™	3054-1003
VF 8	8	10ml	INTEGRA	4331
GS 12	12	25ml	Gilson®	F267660
TF 12	12	25ml	Thermo Scientific™	95128093
AX 8/4	8/4	25ml	Axygen®	RES-2CV-25
CG 8/4	8/4	25ml	Chemglass	CLS-3798-015

Results

The residual volumes for all the tested reservoirs with distilled water are shown in **Figure 1**. The lowest residual volume was 0.12 mL for the 8-channel side of the VL 8/4. The second lowest residual volume was 0.17 mL for the 12-channel VL 12 reservoir. The VL 12 reservoir had residual volume 67% below the next lowest 12 channel reservoir, TF 12. The VL 8 had residual volume 52% lower than the next lowest 8-channel reservoir, AX 8/4.



Additional testing was done using two different liquids: the first was a dilute solution of green dye and the second was 3% BSA. The procedure for measuring residual volume was identical to that above however only reservoirs VL 8/4 and VF 8 were tested (**Figure 2**).



Note that the residual volumes for dye and BSA were considerably smaller than for distilled water. However VL 8/4 reservoir continued to have substantially lower residual volumes than the other reservoir tested, VF 8.

Discussion

As the volume of the liquid in a reagent reservoir is reduced, eventually the remaining liquid beads up into droplets such that the liquid cannot be aspirated consistently by each tip in a multichannel pipette. This determines the residual or “dead” volume of the reservoir.

VistaLab reservoirs have:

1. A trough within a trough design (**Figure 3**).
2. A high wettability (hydrophilic) surface of proprietary, laminated polystyrene.
3. A high energy surface treatment.

These features result in the lowest residual volume, or highest reagent recovery, up to 67% better, than comparable reagent reservoirs.

This reduction occurs with liquids possessing different wetting characteristics such as distilled water, which has a high amount of surface tension and greatest tendency to bead up, as well as dye and BSA solutions.

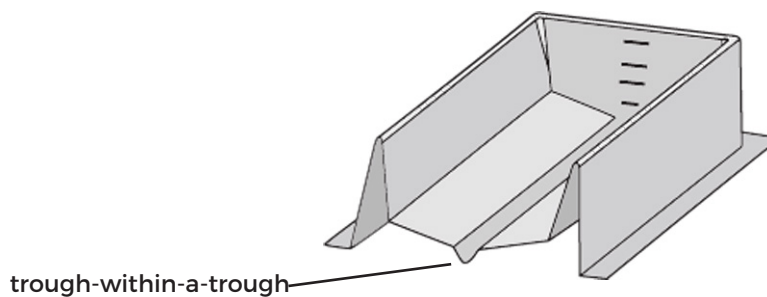


Figure 3. Representation of VistaLab reservoirs, indicating trough within a trough design.