

Review of Transfer Pipette performance and attributes

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Introduction

Transfer pipettes can be incorrectly viewed as commodity products. How transfer pipettes are manufactured can affect performance and may interfere with testing and experimental results.

Transfer pipettes are commonly used in a variety of applications from general purpose to sensitive lab research and there are significant differences in these devices between brands. Differences in materials, material residue, ease of sample collection, dispensing, accuracy, and packaging are all important product attributes to be considered in addition to price. The comparative analysis presented in this publication describes the findings of our evaluation and outlines considerations that may be important to the user. Scientists and technicians need to educate their procurement teams on the importance of choosing the right transfer pipette.

Experimental details

Two brands of Transfer Pipettes, Thermo Scientific™ Samco™ pipettes and a competitor product were tested and compared. Thirty of each pipette type were filled to the highest volume graduation on the pipette with distilled water. The water was transferred and expelled into a weigh boat on a scale. The volume was weighed and recorded. For pipettes without graduations, fifteen were filled to the maximum intake with one squeeze. This volume was expelled and weighed. Accuracy was defined as the % difference between the intended volume and the measured volume while reproducibility was defined as the % Coefficient of Variation (CV). A total of one hundred of each different pipette catalog number were examined for any defects or flaws.



A noticeable residue was found on the competitor transfer pipettes. Fourier Transform Infrared (FTIR) spectroscopy was performed on the competitor's 3mL and 4mL pipettes and Samco 225 and 233 3mL and 4mL pipettes. A small portion was cut from the bulb of two pipettes from each catalog number that had not been previously handled or used. One piece was washed with Ethyl alcohol, dried with a wipe and labeled as "clean". The other piece was left as found and labeled as "original". The scan from the "clean" was subtracted from the "original" samples for each type to show any differences or extra peaks.

Results and discussion

While transfer pipettes are not intended to be as accurate as their piston driven cousins, a certain level of accuracy and reproducibility is required and can be useful in comparing between brands. Accuracy is commonly defined as the variance between what was intended to be dispensed and what was actually dispensed. Table 1 below compares various transfer pipette brands in terms of % accuracy and reproducibility (%CV) n=30.

In both the 3 mL and 4 mL sizes, Samco 225 and Samco 233 transfer pipettes were significantly more accurate and reproducible than the competitor's pipettes.

The difference in accuracy and reproducibility in the 3 mL and 4 mL competitor's transfer pipettes may be explained by the more rigid, stiffer, construction which made it harder to fill or empty the full graduated volume. The competitor's 3mL pipette was the most difficult to fill.

Visual appearance and other common quality issues can also be used to compare between brands. All brands tested had some degree of embedded particulate matter in the material itself. This material is most likely burnt remnants of the base resin that is a common artifact of molding. Transfer pipettes had comparable levels of visual inclusions. None of the pipettes had holes in the bulb, cracks, or blocked tips.

A slippery film was found on some of the competitive pipettes examined. This film was extracted and analyzed via FTIR and found to be Oleamide/Erucamide which is a commonly used slip agent in injection molding. No residual Oleamide was found via FTIR on Samco brand transfer pipettes. Oleamides and Erucamides are of potential concern as a source of interference in some biological assays (i.e. G protein-coupled fatty acid receptor assays)^{1, 2}.

	Samco 225 (3mL)	Competitor Brand (3mL)	Samco 233 (4mL)	Competitor Brand (4mL)
% Accuracy (larger number is better)	99.0	92.7	95.4	67.4
Reproducibility (%CV) (smaller number is better)	1.1	3.1	2.2	6.7

Table 1. Accuracy and Reproducibility of Various Transfer Pipette Brands

Conclusions

- Samco brand transfer pipettes do not use injection mold release or slip agents. Many competitor transfer pipettes do use injection mold slip agents that can interfere with some assays.
- Transfer pipettes, although considered a commodity item, vary considerably in accuracy and reproducibility between brands. Choosing the right transfer pipette is more important than choosing a cheap transfer pipette, as an inferior transfer pipette can affect assay results.
- The “usability” of some brands can be affected by the rigidity of the design and the materials of construction.
- A more comprehensive view of the properties of transfer pipettes is needed when making procurement decisions.

References

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2. McDonald, G. Reid, et al. “Bioactive Contaminants Leach from Disposable Laboratory Plasticware.” *Science*, vol 322, 7 November 2008, p917.

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