

Calibration of a 10-mL Volumetric Pipet Using the Relationship of Mass, Density and Volume

Be sure to include **results** in the abstract.

Abstract

A 10-mL volumetric pipet was calibrated by using the known density and measured mass of the water delivered. The volume delivered was determined to be 10.01 ± 0.3 mL using the pan balance and 9.99 ± 0.2 mL using the analytical balance with correction for evaporation. The average class analytical balance result was 10.00 ± 0.01 mL.

Results

| Method | Volume delivered (mL) |
|--------------------|-----------------------|
| Pan Balance | 10.01 ± 0.03 |
| Analytical Balance | 9.99 ± 0.02 |
| Class Data | 10.00 ± 0.01 |

Note that you **DO NOT** need to type up your data. Please include only the **final results**.

Discussion

The actual volume delivered by the volumetric pipet was determined to be 10.01 ± 0.3 mL (pan balance), 9.99 ± 0.2 mL (analytical balance). Both values fall within the manufacturer's listed range of 10.00 ± 0.2 mL. The class value, 10.00 ± 0.01 mL, also fell in this range.

Possible sources of random error include: the beaker not being consistently dried between trials, misreading the pipet, spilling liquid while waiting to transfer water from pipet to beaker, errors in measuring evaporation time and the occurrence of any temperature fluctuations while filling the pipet. The main source of systematic error was the evaporation of water during transfer and weighing. Any errors associated with the scales or thermometer would also contribute systematic errors.

This procedure could be improved by using a dark background to help see the pipet line and water meniscus clearly, by practicing and gaining skill with the volumetric pipet, and by minimizing the random errors listed above.

Discussion topics are often listed in the lab manual. In addition, please always include a brief analysis of experimental error and a comparison of your results to the expected results (theoretical/literature).

Please note that the example at left is not intended to be a perfect discussion section. It could have been improved by considering how the various errors affected the final results, i.e. spilling liquid from the pipet would result in a lower mass delivered and thus a lower calculated volume.

Review Questions

- 1)
 - 2)
- Etc.

Please note that review questions can sometimes be answered within the discussion section. If you've done that, then write "See discussion" for that question.

Sample Calculations

Calculations may be handwritten (recommended) and must be **neat and clear**. You have two options:

- (1) Include a sample calculation page (as shown in the lab manual).

or

- (2) Plan ahead. If you keep your data analysis notes (i.e. the calculations you do at the end of lab) neat and clear, then you can just hand that in as your calculations section. Make sure to write down all equations, define all variables and numbers, include units with numbers, etc. The idea here is communication, your calculations should be easy to follow.