RAININ
Pipetting 360°

Quick Check Worksheet

Performed by: _____

Date: _____ Temperature C°: _____ Z-Factor*: _____

* See other side

Pipette 1

Brand: Model: Serial #: Pipette Volume: µL

Step 1 Take four weighings at 100% and 50%, then determine calculated volume and mean volume.

	Weighings at 100% Volume	Calculated Volumes	Weighings at 50% Volume	Calculated Volumes
1				
2				
3				
4				
	Mean Volume:		Mean Volume:	

Step 2 Calculate and compare the accuracy and precision of your pipette vs. its specifications.

	Accuracy @ 100% (Mean Error @ 100%)	Precision @ 100% (Standard Dev. @ 100%)	Accuracy @ 50% (Mean Error @ 50%)	Precision @ 50% (Standard Dev. @ 50%)
Pipette 1				
Manufacture Specifications				
Difference	△	△	△	△
Pass/Fail				

Pipette 2

Brand: Model: Serial #: Pipette Volume: µL

Step 1 Take four weighings at 100% and 50%, then determine calculated volume and mean volume.

	Weighings at 100% Volume	Calculated Volumes	Weighings at 50% Volume	Calculated Volumes
1				
2				
3				
4				
	Mean Volume:		Mean Volume:	

Step 2 Calculate and compare the accuracy and precision of your pipette vs. its specifications.

	Accuracy @ 100% (Mean Error @ 100%)	Precision @ 100% (Standard Dev. @ 100%)	Accuracy @ 50% (Mean Error @ 50%)	Precision @ 50% (Standard Dev. @ 50%)
Pipette 2				
Manufacture Specifications				
Difference	△	△	△	△
Pass/Fail				

Volume

Expressed in mL.

$$v_i = (w_i)Z$$

v_i = individual volume
w_i = individual weighing
Z = Z-factor

Mean Volume

The mean weight result with corrections for Z-factor. Expressed in µL.

$$\bar{v} = \frac{\sum_{i=1}^{n} v_i}{n}$$

$\bar{v}$ = mean volume
n = number of weighings
v_i = individual volumes

Accuracy

Mean error is the difference between the mean volume of actual measurements and the value specified by the volume setting of the pipette. Expressed in µL.

$$E = \bar{v} - v_s$$

E = mean error
$\bar{v}$ = mean volume
v_s = volume setting

Precision

Standard deviation quantifies the magnitude of scatter due to random error in pipetting.

$$s = \sqrt{\frac{\sum_{i=1}^{n} (v_i - \bar{v})^2}{n-1}}$$

s = standard deviation
n = number of weighings
v_i = individual volume
$\bar{v}$ = mean volume

Quick Check Worksheet

Pipette 3

Brand: Model: Serial #: Pipette Volume: µL

Step 1 Take four weighings at 100% and 50%, then calculate each volume and the mean volume.

	Weighings at 100% Volume	Calculated Volumes	Weighings at 50% Volume	Calculated Volumes
1				
2				
3				
4				
	Mean Volume:		Mean Volume:	

Step 2 Calculate and compare the accuracy and precision of your pipette vs. its specifications.

	Accuracy @ 100% (Mean Error @ 100%)	Precision @ 100% (Standard Dev. @ 100%)	Accuracy @ 50% (Mean Error @ 50%)	Precision @ 50% (Standard Dev. @ 50%)
Pipette 3				
Manufacture Specifications				
Difference	△	△	△	△
Pass/Fail				

Pipette 4

Brand: Model: Serial #: Pipette Volume: µL

Step 1 Take four weighings at 100% and 50%, then calculate each volume and the mean volume.

	Weighings at 100% Volume	Calculated Volumes	Weighings at 50% Volume	Calculated Volumes
1				
2				
3				
4				
	Mean Volume:		Mean Volume:	

Step 2 Calculate and compare the accuracy and precision of your pipette vs. its specifications.

	Accuracy @ 100% (Mean Error @ 100%)	Precision @ 100% (Standard Dev. @ 100%)	Accuracy @ 50% (Mean Error @ 50%)	Precision @ 50% (Standard Dev. @ 50%)
Pipette 4				
Manufacture Specifications				
Difference	△	△	△	△
Pass/Fail				

Value for Z (µL/mg)

As a function of temperature and pressure, for distilled water at 1 atm.

Temp °C	Z-Factor
15.0	1.0020
15.5	1.0020
16.0	1.0021
16.5	1.0022
17.0	1.0023
17.5	1.0024
18.0	1.0025
18.5	1.0026
19.0	1.0027
19.5	1.0028
20.0	1.0029
20.5	1.0030
21.0	1.0031
21.5	1.0032
22.0	1.0033
22.5	1.0034
23.0	1.0035
23.5	1.0036
24.0	1.0038
24.5	1.0039
25.0	1.0040
25.5	1.0041
26.0	1.0043
26.5	1.0044
27.0	1.0045
27.5	1.0047
28.0	1.0048
28.5	1.0050
29.0	1.0051
29.5	1.0052
30.0	1.0054

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