



MONDAY  
**BASICS:**

TRAINING & COFFEE

# LAB BASICS: MICROPIPETTES

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Senior Technician

Research group:



Group member:



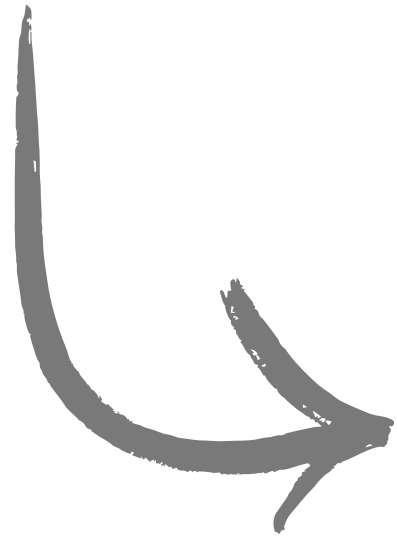


# CRUCIAL LABORATORY TOOL

What is the purpose of  
a micropipette?



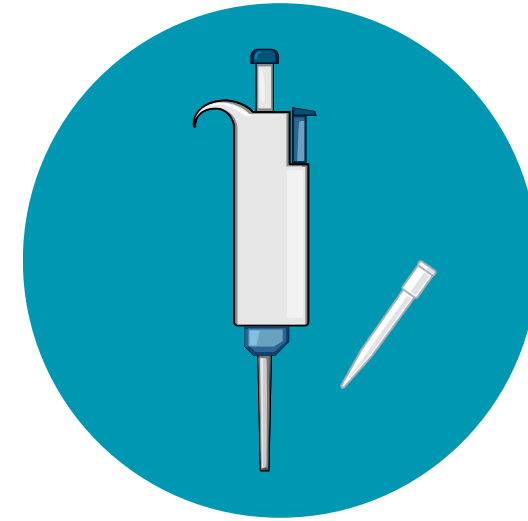
# GOOD USE OF MICROPIPETTES



- **Conditions**
- **Verification**



# CONDITIONS



Pipette and tips



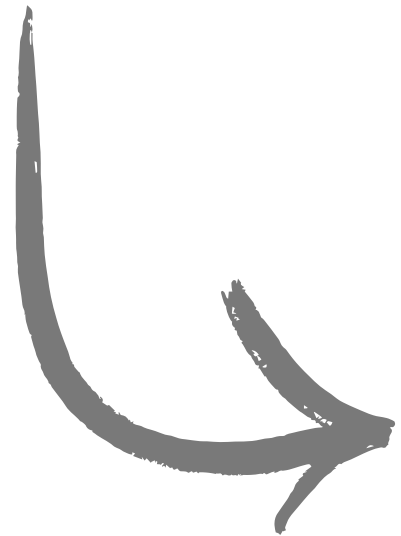
Technique



Avoid contamination



# VERIFICATION

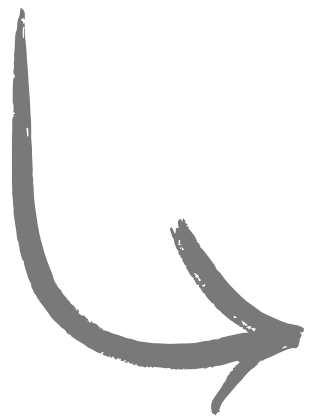


- **Accuracy**
- **precision**

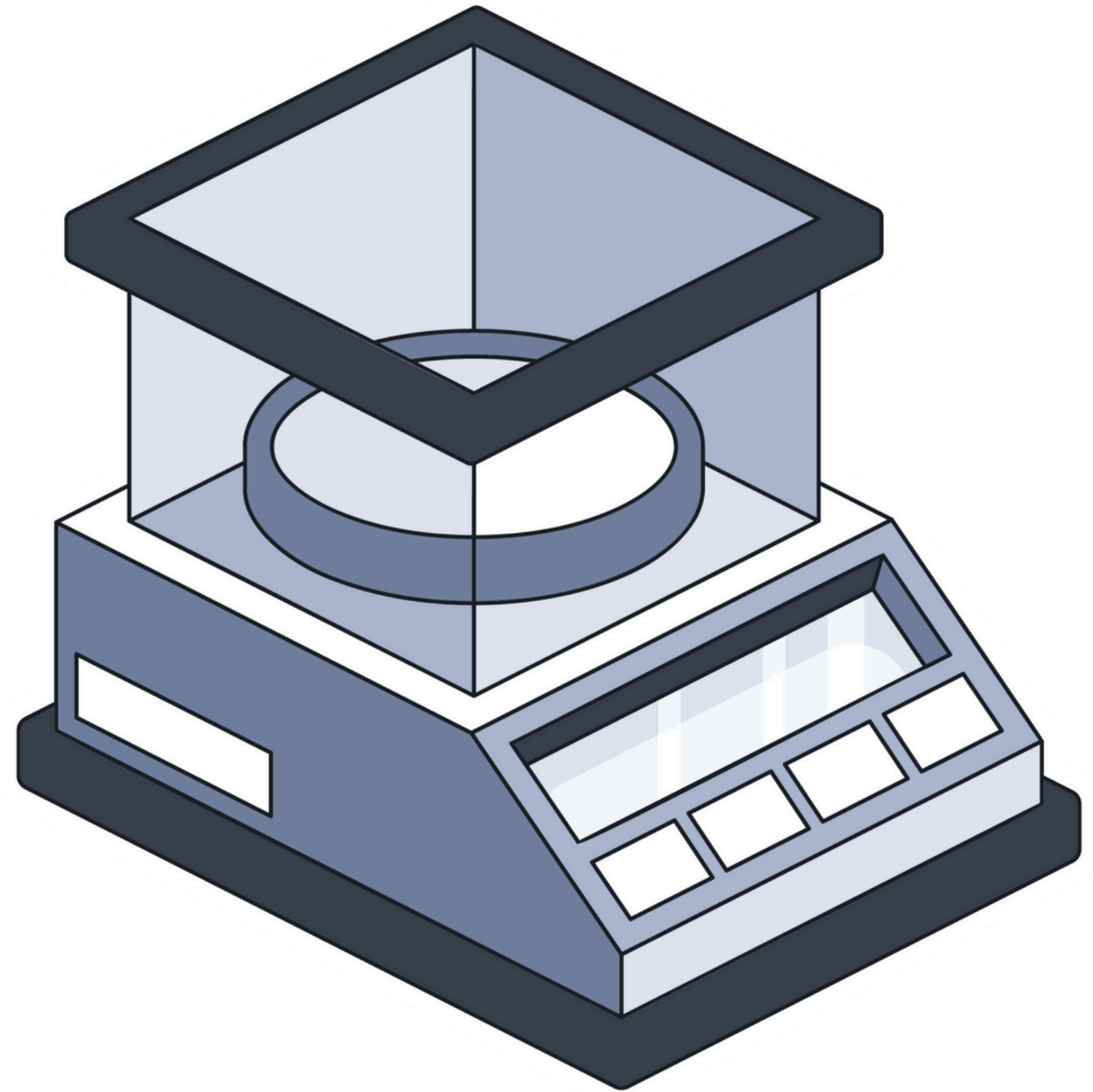




# How to verify micropipette?

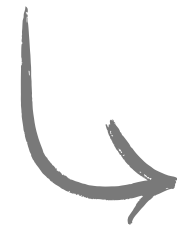


**Analytical balance**



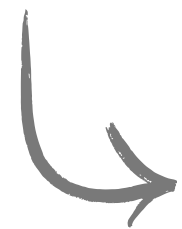


# ACCURACY

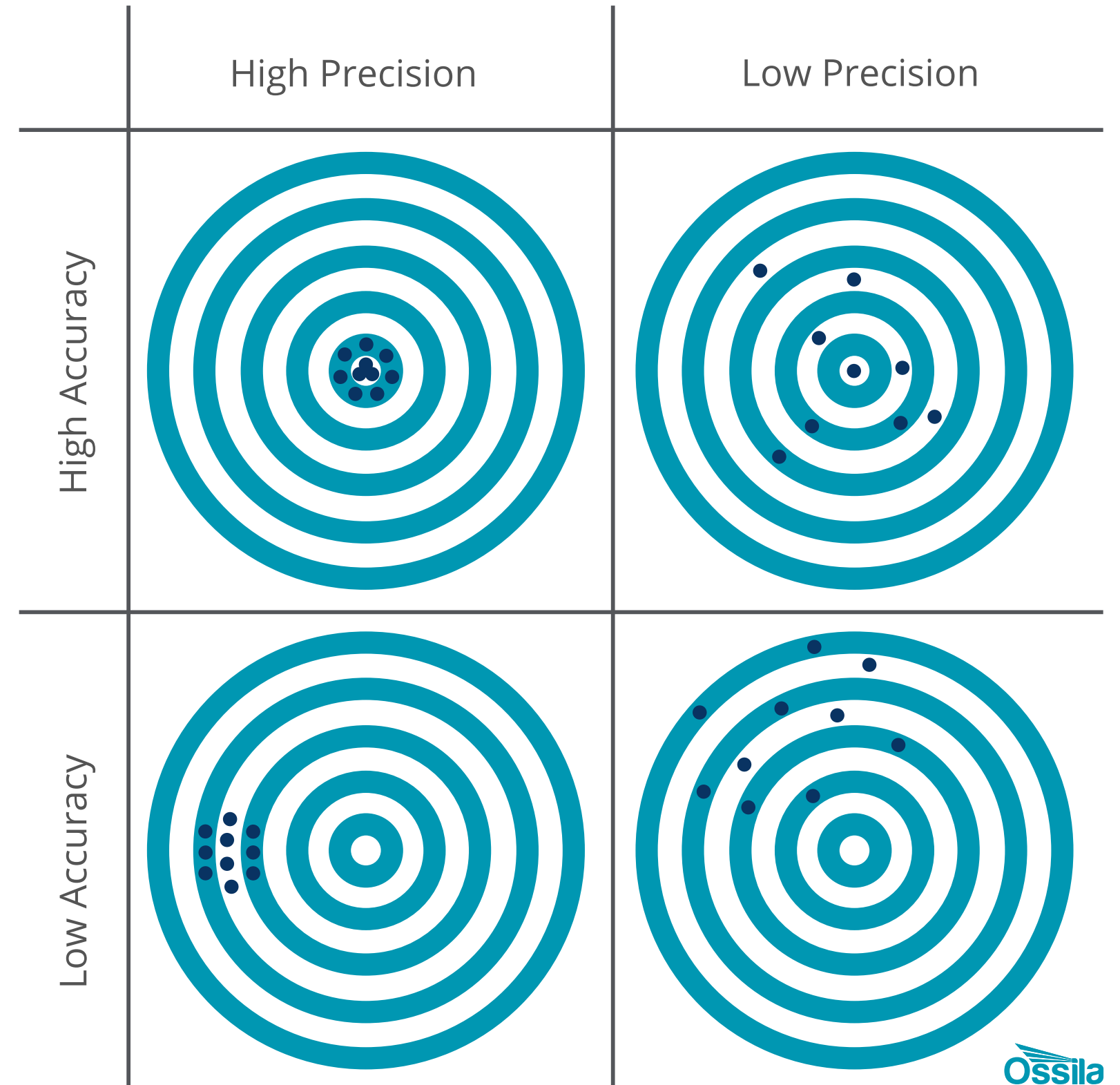


- **Correctness**

# PRECISION



- **Repeatability**





# VERIFICATION



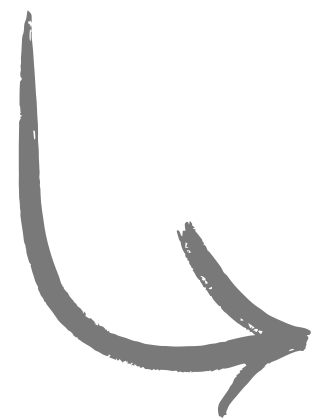
# CALIBRATION



- **Frequency of micropipette use**
- **Handling and care of micropipette**
- **Type of liquid dispensed**
- **Micropipette applications**

# GOOD TO KNOW

- Range of verification
- Balance
- Procedure



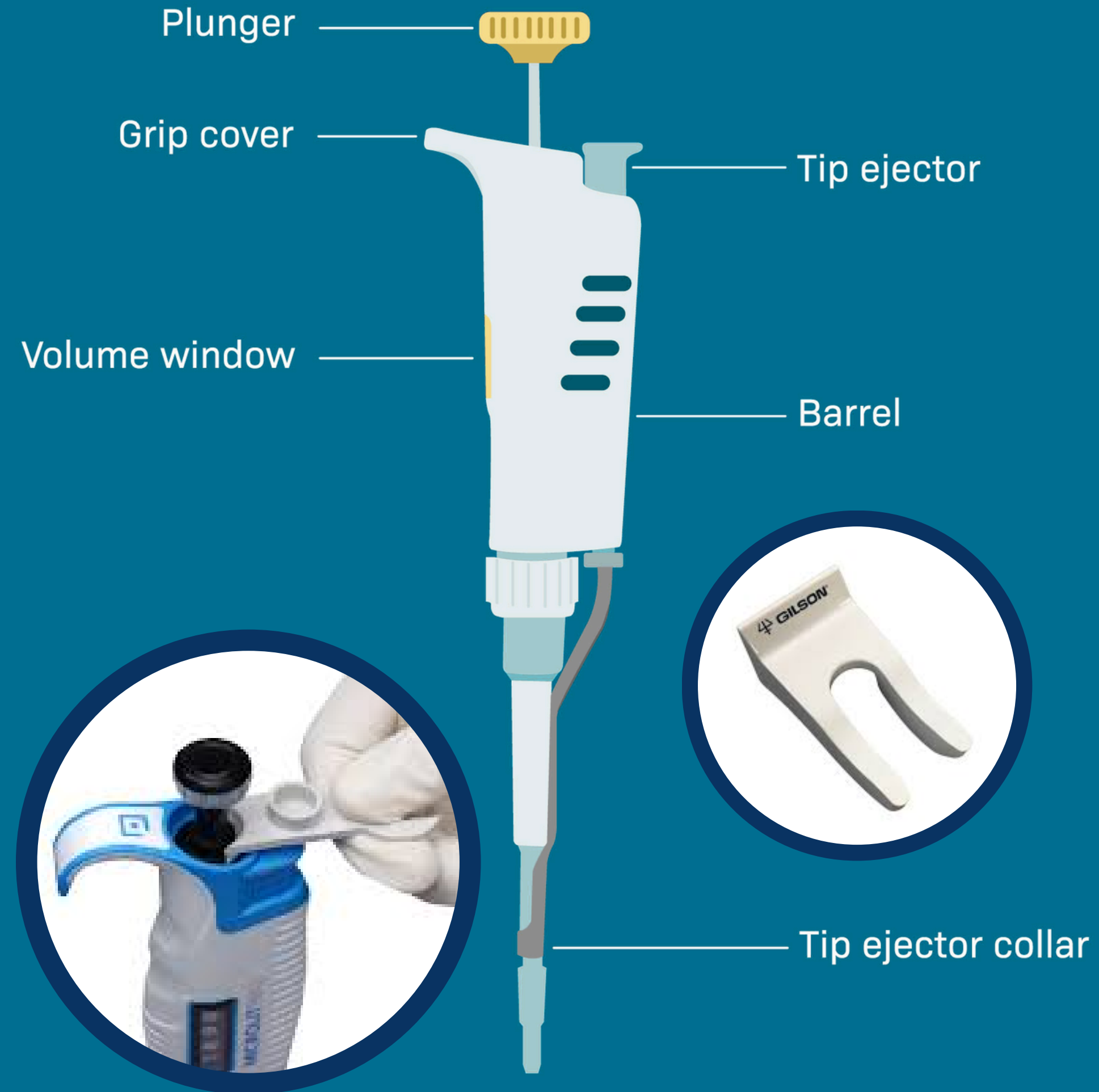
**Experimental work**





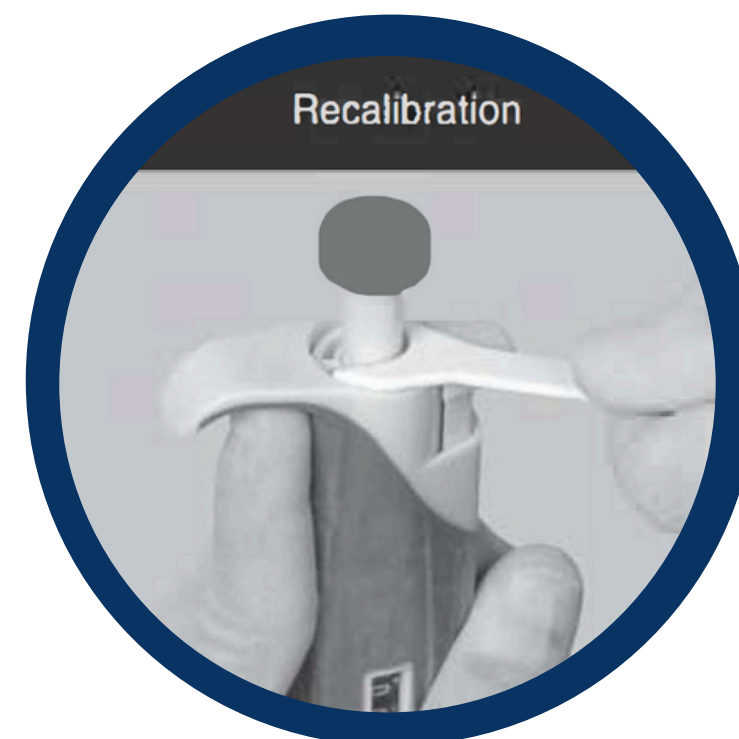
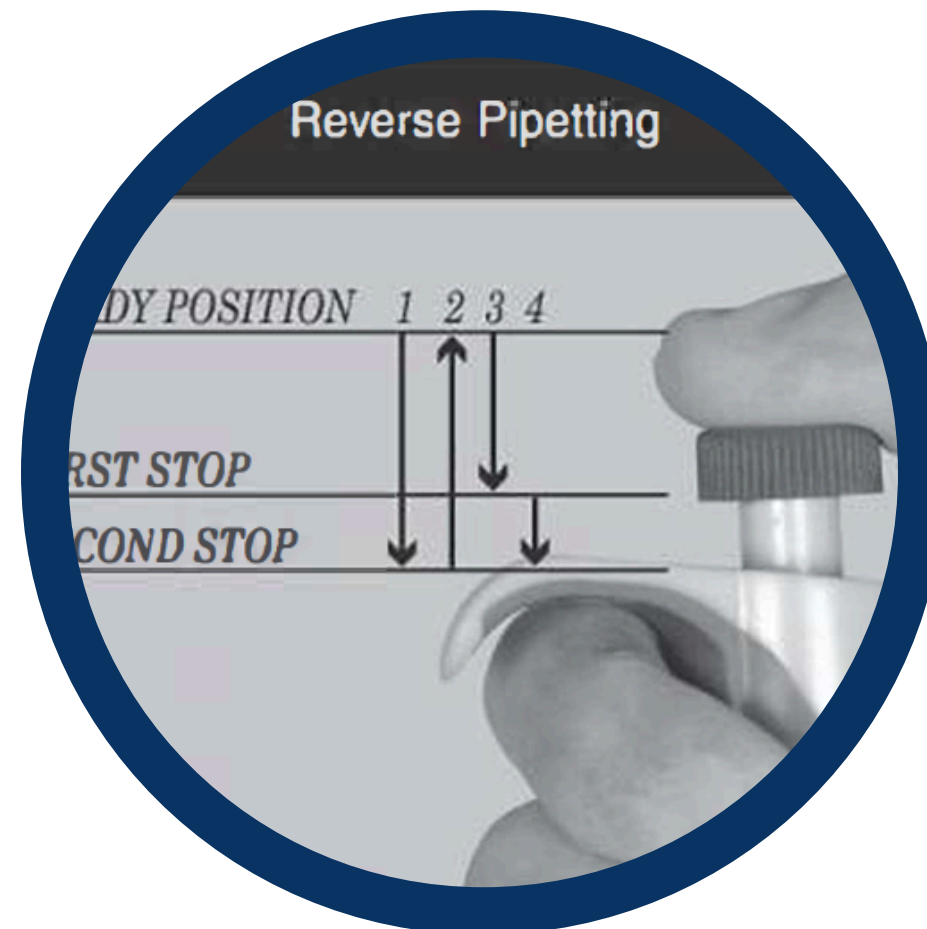
# MICROPIPETTES

Micropipettes are provided with a calibration tool and a micropipette stand as an accessory



# MICROPIPETTES

Manual include accuracy and precision for each volume, calibration and in-house maintenance procedures



DIGITAL MICROPIPETTE  
DIGITAL VOLUME  
HANDLING  
Make it simple,  
change the measurement  
method & volume.

Tip Range	Volume	Tip Size	Volume (µL)	Volume (nL)
10-100 µL	10 µL	1000 µm	10.00	10000
10-100 µL	20 µL	1000 µm	20.00	20000
10-100 µL	30 µL	1000 µm	30.00	30000
10-100 µL	40 µL	1000 µm	40.00	40000
10-100 µL	50 µL	1000 µm	50.00	50000
10-100 µL	60 µL	1000 µm	60.00	60000
10-100 µL	70 µL	1000 µm	70.00	70000
10-100 µL	80 µL	1000 µm	80.00	80000
10-100 µL	90 µL	1000 µm	90.00	90000
10-100 µL	100 µL	1000 µm	100.00	100000

Tip Range	Volume	Tip Size	Volume (µL)	Volume (nL)
10-100 µL	10 µL	1000 µm	10.00	10000
10-100 µL	20 µL	1000 µm	20.00	20000
10-100 µL	30 µL	1000 µm	30.00	30000
10-100 µL	40 µL	1000 µm	40.00	40000
10-100 µL	50 µL	1000 µm	50.00	50000
10-100 µL	60 µL	1000 µm	60.00	60000
10-100 µL	70 µL	1000 µm	70.00	70000
10-100 µL	80 µL	1000 µm	80.00	80000
10-100 µL	90 µL	1000 µm	90.00	90000
10-100 µL	100 µL	1000 µm	100.00	100000



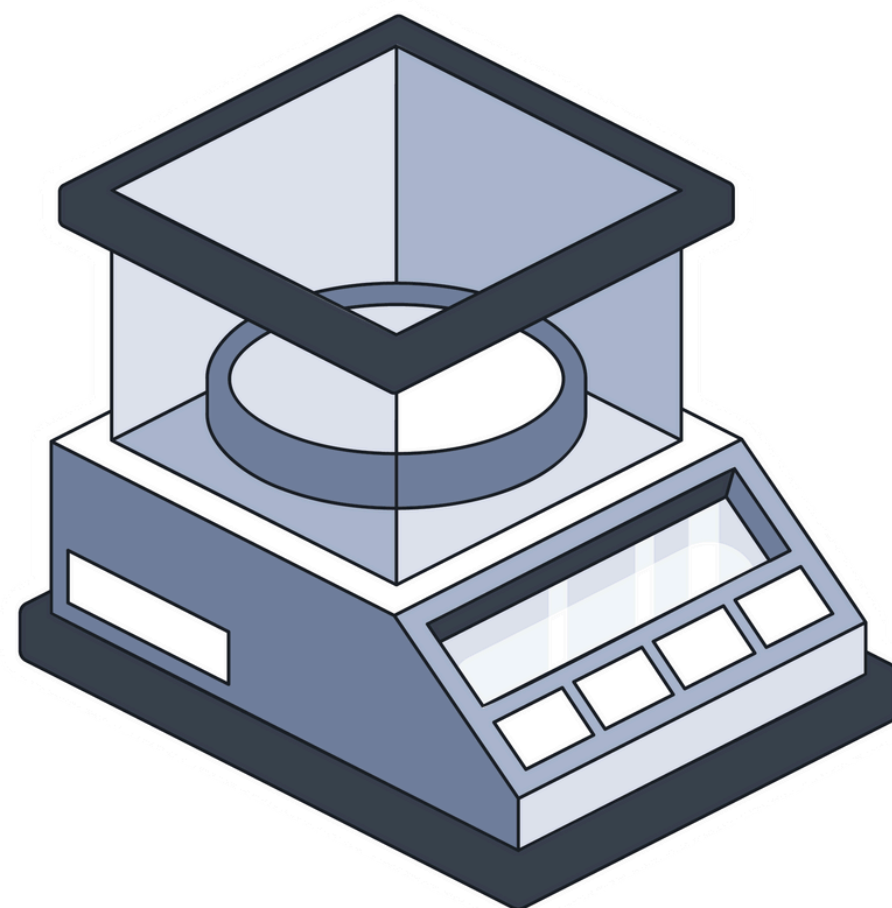
# MICROPIPETTES

- 0.1 - 2.5  $\mu\text{l}$
- 0.5-10  $\mu\text{l}$
- 2-10  $\mu\text{l}$
- 10-100  $\mu\text{l}$
- 20-200  $\mu\text{l}$
- 100-1000  $\mu\text{l}$
- 1000-5000  $\mu\text{l}$
- 2-10 ml

	CRITERIA	
volume ( $\mu\text{l}$ )	Accuracy (%)	Precision (%)
0,5	4,0	2,0
1,0	4,0	2,0
2,0	3,5	1,6
5,0	3,0	1,4
10,0	3,0	1,4
50,0	2,5	1,2
100,0	2,0	0,8
200,0	2,0	0,8
500,0	2,0	0,8
1000,0	1,8	0,6
1500,0	1,8	0,6
2000,0	1,6	0,6
3500,0	1,6	0,6
5000,0	1,6	0,6
10000,0	1,2	0,6

*According our experimental work*

# BALANCE



- Mettler AE163

	Acceptance Criteria	
Weight mass (g)	Acceptance Criteria Accuracy- Linearity(g)	Acceptance criteri St. deviation (g)
0.1	0.00010	0.00050
1.0	0.00020	0.00050
50.0	0.00200	0.00100

*According our experimental work*

- Kern EW

	Acceptance Criteria	
Weight mass (g)	Acceptance Criteria Accuracy- Linearity(g)	Acceptance criteri St. deviation (g)
1.0	0.05	0.02
50.0	0.05	0.02

*According our experimental work*



# EXAMPLES

## Which balance to choose?

- Micropipette P10 0.5-10  $\mu\text{L}$

Measure of 5  $\mu\text{L}$

Accuracy 3 % (4.85  $\mu\text{L}$  - 5.15  $\mu\text{L}$ )

Weight (0.00485 g - 0.00515 g)

5 digits in the balance

**Verification with balance Merck**

**Linearity 0.00010 g**

- Micropipette 10 mL

Measure of 5000  $\mu\text{L}$

Accuracy 1.6 % (4920  $\mu\text{L}$  - 5080  $\mu\text{L}$ )

Weight (4.920 g - 5.080 g)

2 digits in the balance

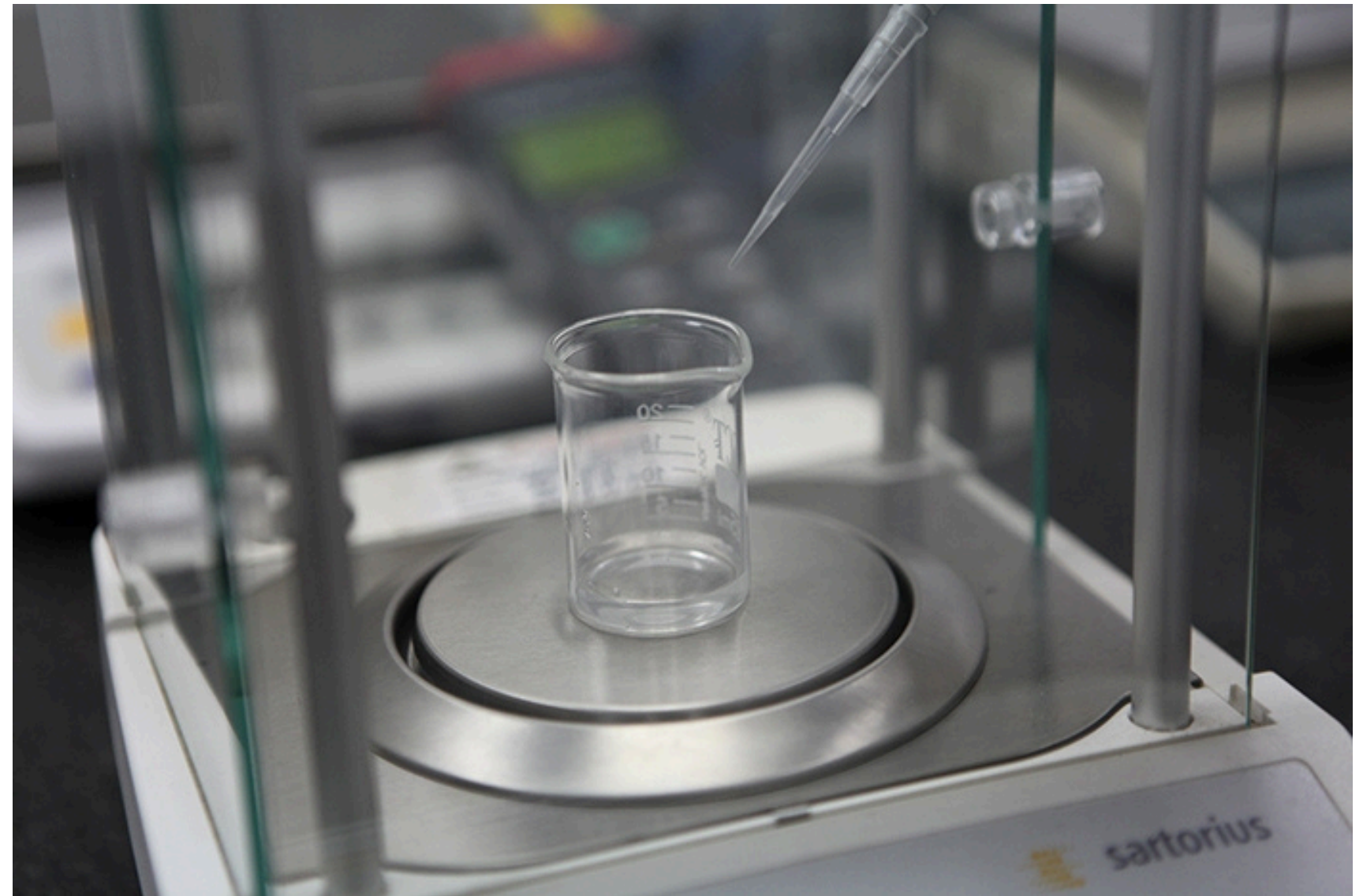
**Verification with balance Kern**

**Linearity 0.05 g**

# VERIFICATION PROCEDURE



- Verify the balance
- Measure temperature of the water
- Weight several times a defined volume of water
- **Use a container micro-weighing for small volumes ( $\leq 10 \mu\text{L}$ )**



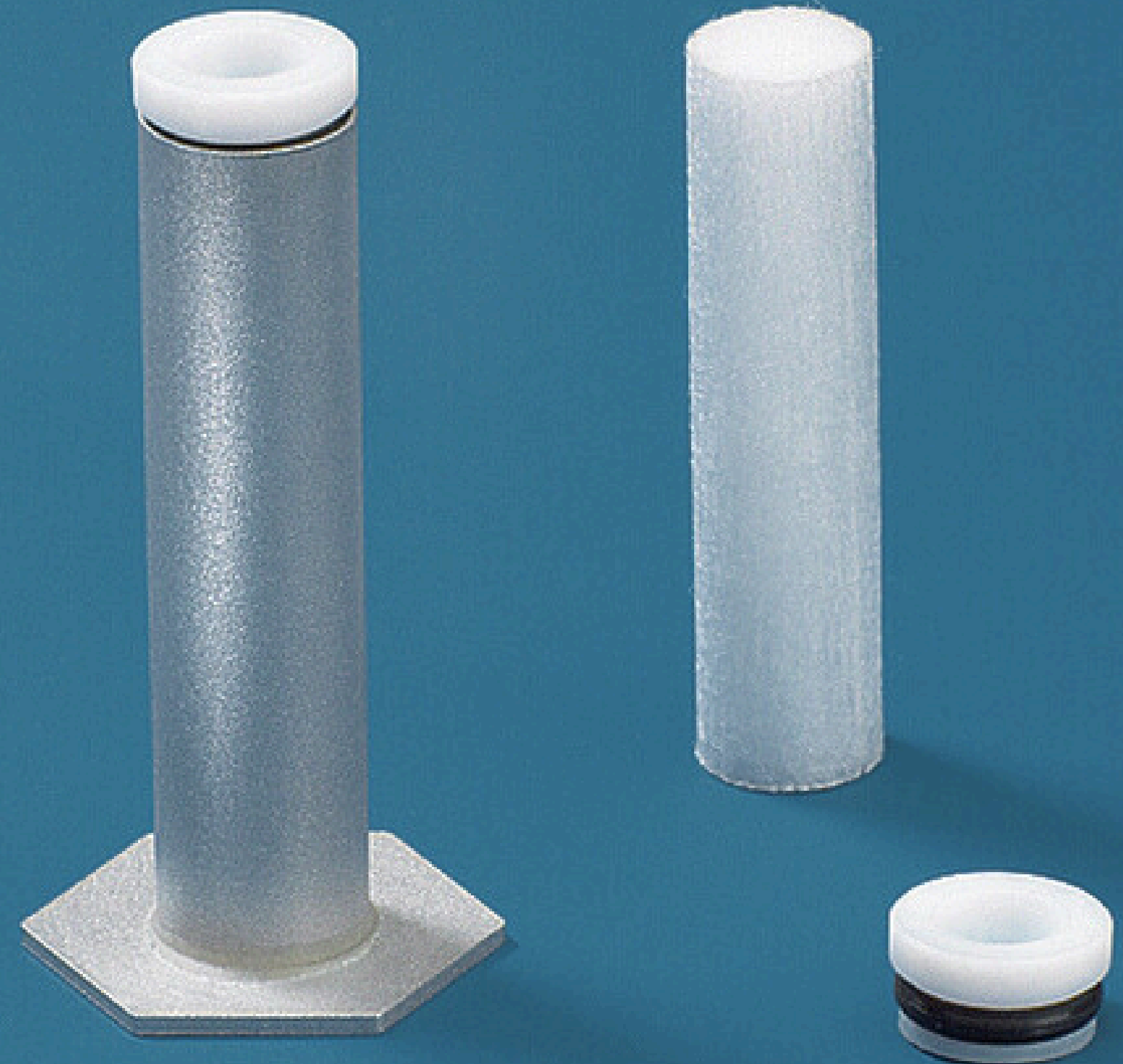
# SMALL VOLUMES

↪ **water loss**

## Price

- VWR International Eurolab, S.L.  
ref. BRND708470 42.50 €
- Fisher Scientific, S.L.  
ref. 70323033 45.84 €

Container micro-weighing  
BRAND ref. 708470







# TEMPERATURE

- ISO 8655, for volumetric equipment, “Z-Factor” is a temperature-dependent correction factor used to convert measured mass to volume.

CORRECTION FACTOR Z	
T °C	FACTOR Z
10	1,0015
10,5	1,00155
11	1,0016
11,5	1,00165
12	1,0017
12,5	1,00175
13	1,0018
13,5	1,00185
14	1,0019
14,5	1,00195
15	1,002
15,5	1,00205
16	1,0021
16,5	1,0022
17	1,0023
17,5	1,0024
18	1,0025
18,5	1,0026
19	1,0027
19,5	1,0028
20	1,0029

CORRECTION FACTOR Z	
T °C	FACTOR Z
20,5	1,003
21	1,0031
21,5	1,0032
22	1,0033
22,5	1,0034
23	1,0035
23,5	1,00365
24	1,0038
24,5	1,0039
25	1,0040
25,5	1,0041
26	1,0043
26,5	1,00435
27	1,0045
27,5	1,0047
28	1,0048
28,5	1,00485
29	1,0051
29,5	1,00515
30	1,0054

# VERIFICATON REPORT

 UNIVERSITAT ROVIRA I VIRGILI Sistema de Gestió de la Qualitat <b>R+D+i</b>	<b>VERIFICATION INTERNAL REPORT MICROPIPETTES</b>	2- RG0705-INTERFIBIO Versió: Data:	 Interfibio
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Equipment:		PNT Equipement:	
Identification n.:		Standard used:	
Brand / Model:		Person for verification:	
Temperature (°c)		Z	

			WEIGHT (mg)					ACCURACY				PRECISION				VERIFICATION RESULTS	
	Vol	Teorical volume (µL)	pes 1 (mg)	pes 2 (mg)	pes 3 (mg)	pes 4 (mg)	pes 5 (mg)	Average	Accuracy (%)	Acceptable accuracy criteria (%)	Pass Accuracy (S/N)	Standard Deviation	Precision cv (%)	Acceptable precision criteria (%)	Pass Precision		
Verification date	Superior volume	2						= (PROMEDIO(D12:H12))*D8	= ((I12-C12)*100)/C12	3,5	= SI (ABS(J12)<=K12;"PASSA";"NO PASSA")	= DESVEST(D12:H12)	= (M12*100)/I12	1,6	= SI (ABS(N12)<=O12;"PASSA";"NO PASSA")	= SI (ABS(N12)<=O12;"PASSA";"NO PASSA")	= SI (R12="MAL";"MAL";SI(R13="MAL";"MAL";"OK"))
	Inferior volume	0,5						= (PROMEDIO(D13:H13))*D8	= ((I13-C13)*100)/C13	4,0	= SI (ABS(J13)<=K13;"PASSA";"NO PASSA")	= DESVEST(D13:H13)	= (M13*100)/I13	2,0	= SI (ABS(N13)<=O13;"PASSA";"NO PASSA")	= SI (ABS(N13)<=O13;"PASSA";"NO PASSA")	

↓  
Weights

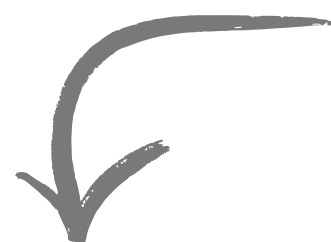
↓  
Accuracy

↓  
Precision

↓  
Pass or not pass

# EXAMPLE REPORT

- Kartell, 846710004, 0.5 - 2 µl



volume (µl)	CRITERIA	
	Accuracy (%)	Precision (%)
2,0	3,5	1,6
5,0	3,0	1,4

CORRECTION FACTOR Z	
T °C	FACTOR Z
23	1,0035



Equip:	Micropipeta			PNT Equip:	PNT 25		
Nº Identificació:	846710004			Patrons utilitzats:	Aigua desionitzada i balança analítica calibrada		
Marca i model:	Kartell			Nom persona que realitza la verificació:	Responsable laboratori		
Temperatura (°c)	23	Z	1,0035				

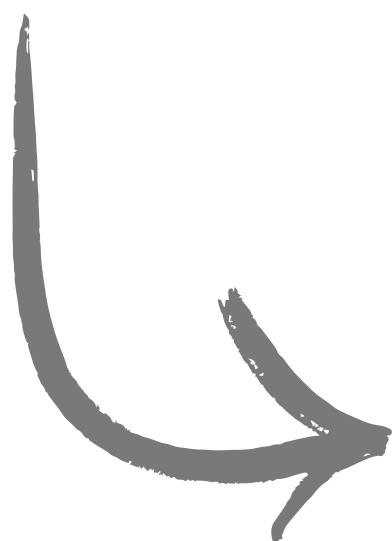
Data verificació	Vol	Vol. Teoric (µl)	PESADES (mg)					EXACTITUD				PRECISIÓ				RESULTAT VERIFICACIÓ	
			pes 1 (mg)	pes 2 (mg)	pes 3 (mg)	pes 4 (mg)	pes 5 (mg)	promig	Exactitud (%)	Criteri acceptació Exactitud (%)	Passa exactitud (S/N)	desviació estàndar	Precisió cv (%)	Criteri acceptació Precisió (%)	Passa precisió		
25/4/2025	Vol. Superior	2	2,00	2,01	2,05	2,03	2,02	2,029	1,454	3,5	PASSA	0,0	0,9	1,6	PASSA	OK	OK
	Vol. Inferior	0,5	0,50	0,49	0,49	0,49	0,51	0,498	-0,5	4,0	PASSA	0,0	1,8	2,0	PASSA	OK	



# EXAMPLE REPORT

- Kartell, 846710004, 0.5- 2  $\mu$ l

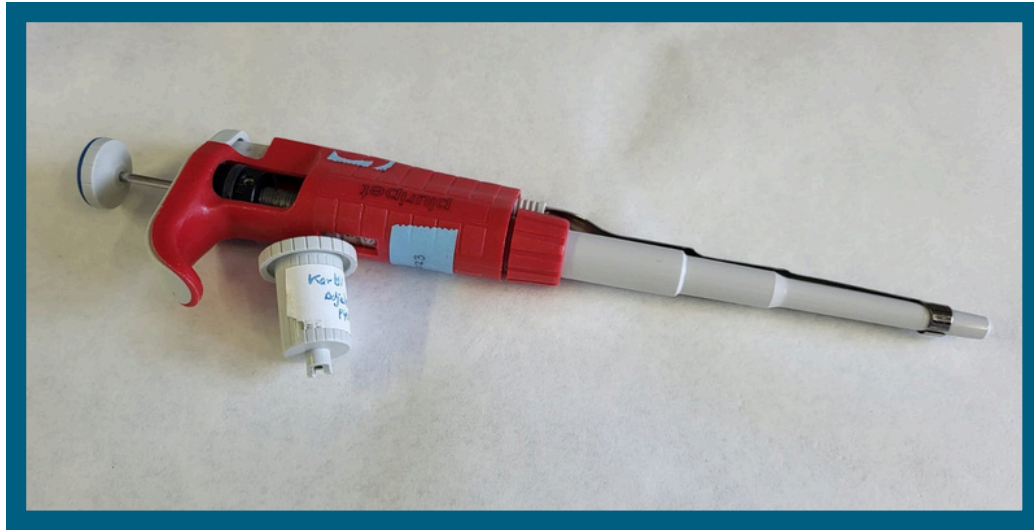
Data verificació	Vol	Vol. Teoric ( $\mu$ l)	PESADES (mg)					EXACTITUD				PRECISIÓ				RESULTAT VERIFICACIÓ	
			pes 1 (mg)	pes 2 (mg)	pes 3 (mg)	pes 4 (mg)	pes 5 (mg)	prom ig	Exactitud (%)	Criteri acceptació Exactitud (%)	Passa exactitud (S/N)	desviació estàndar	Precisió cv (%)	Criteri acceptació Precisió (%)	Passa precisió		
25/4/2025	Vol. Superior	2	2,08	2,07	2,07	2,08	2,06	2,079	3,963	3,5	NO PA SSA	0,0	0,4	1,6	PA SSA	MAL	MAL
	Vol. Inferior	0,5	0,52	0,49	0,49	0,49	0,51	0,502	0,4	4,0	PA SSA	0,0	2,8	2,0	NO PA SSA	MAL	



## CALIBRATION



# EXAMPLES MICROPIPETTES



• Kartell



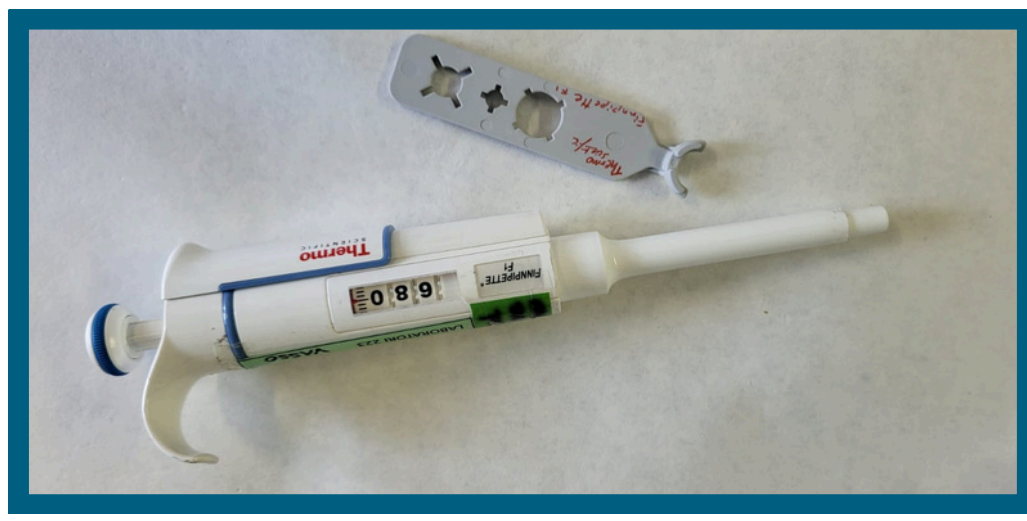
• LLG



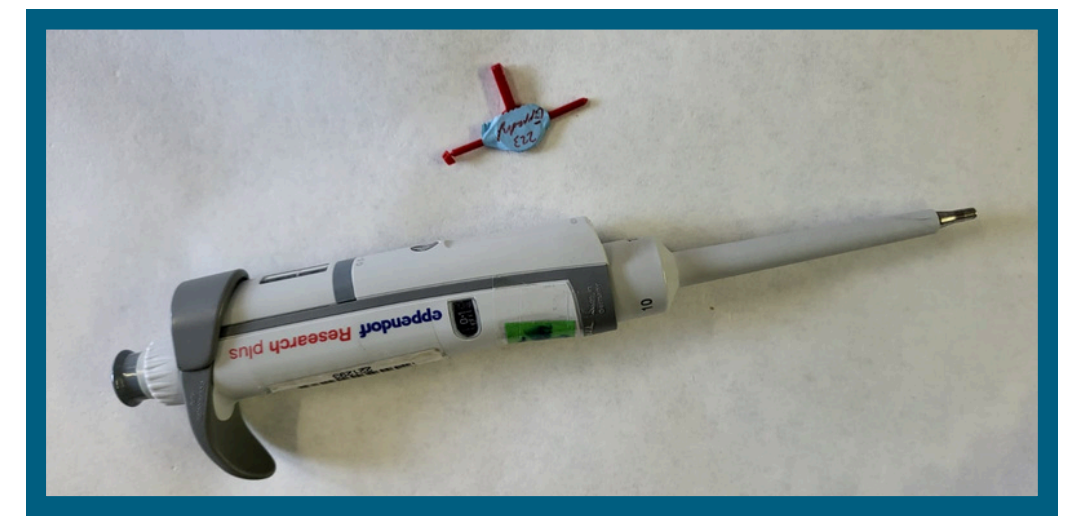
• Brand



• Labnet



• ThermoScientific



• Eppendorf

Thank  
you







Monday Basics: Training & Coffee - A Space to Share Knowledge and Grow Together

**Monday Basics: Training & Coffee** is a transversal training initiative designed to create an **open and collaborative learning community**. Inspired by informal conversations among the **Research Support Staff (PSR) of the Department of Chemical Engineering**, this project aims to leverage collective knowledge to generate synergies and foster an academic and professional support network.

On the **last Monday of each month**, **Monday Basics** sessions provide an informal space where **PDI, PTGAS, and students** can share experiences and acquire new skills in a relaxed environment. Unlike traditional training programs, this initiative embraces a **dynamic and participatory model**, where everyone has the opportunity to both learn and teach, regardless of their role within the university.

In addition to facilitating **continuous learning**, **Monday Basics** breaks down barriers between different university groups and promotes a culture of **collaboration and teamwork**.

More than just a training session, it is an opportunity to connect, exchange ideas, and grow together. Come share knowledge... and a coffee! ☕

► **When:** The last Monday of each month

► **Time:** 9:30 to 10:30

► **Duration:** 1 hour

► **Language:** The presenter decides the language of the session.



What we do



Who we are



Calendar



Videotutorial



Downloads



26/05/25

# Style Guide Basics for Writing Institutional Texts in English

<https://www.deq.urv.cat/en/mondays>