

Best Practices in Sample Weighing

User Level 1



Selecting the Right Balance

	4 place balance	5 place balance	6 place balance
mass uncertainty	+/- 0.0001g +/- 0.1mg	+/- 0.00001g +/- 0.01mg	+/- 0.000001g +/- 0.001mg
Sample size (mg)	% weighing error	% weighing error	% weighing error

2	5.00%	0.500%	0.0500%
5	2.00%	0.200%	0.0200%
10	1.00%	0.100%	0.0100%
15	0.67%	0.067%	0.0067%
30	0.33%	0.033%	0.0033%
50	0.20%	0.020%	0.0020%
100	0.10%	0.010%	0.0010%
300	0.03%	0.003%	0.0003%
1000	0.01%	0.001%	0.0001%

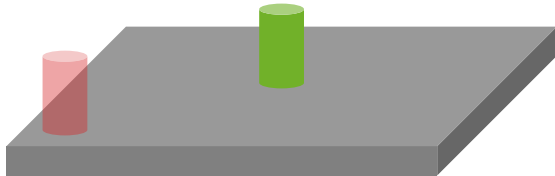
- Weighing errors directly impact errors in reported elemental composition.
- As a rough guideline:

Readability	Min. Mass
0.1 mg	50 mg
0.01 mg	10 mg
0.001 mg	0.5 mg

Proper Conditions for Recording Sample Weight

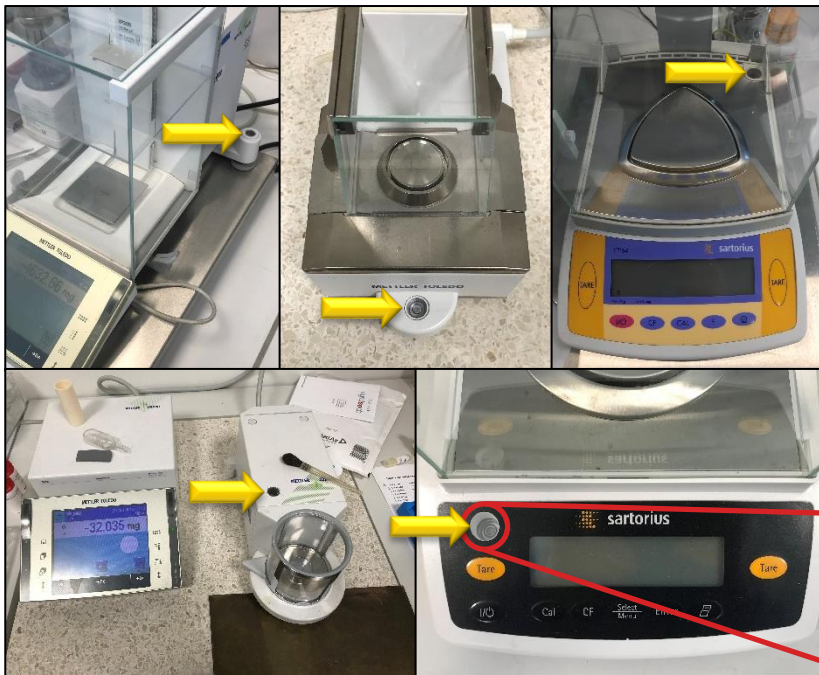
- Before recording the sample weight, ensure the following:
 - The sample is centered on the balance pan.
 - The balance is level.
 - The balance pan is clean.
 - The sample is at room temperature.
 - The balance doors are all closed.
 - The sample is free from magnetic or electrostatic influences.
 - The sample is properly wrapped or sealed, if necessary.

Sample Positioning Effects



- The positioning of the sample on the balance pan affects the angle of the forces measured.
- Consistent sample positioning and keeping the balance level will help ensure repeatable results consistent with the balance calibration.
 - » Always place samples in the center of the weighing pan.
 - » Always check that the balance is level before weighing a sample.

Checking that the balance is level



- The balance level indicator location varies depending on the make and model. Check the operating manual if you cannot locate it.
- Adjust the leveling feet until the bubble is exactly in the center of the level indicator.

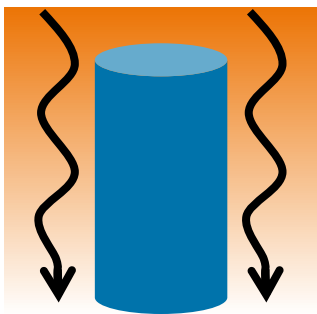
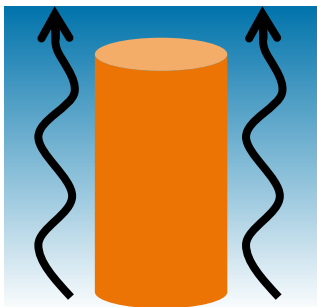


Keeping the balance pan clean



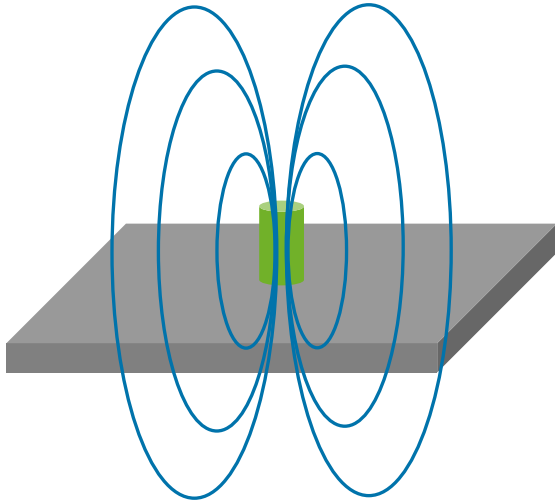
- Stray particles can affect the accuracy of the balance operation.
- Spills on the sample pan might also throw off the tare of the sample container.
- Follow the manufacturer's instructions on keeping your balance clean and in good working order.
 - » Make sure the balance pan is clean before taring or recording the sample weight.

Sample Temperature and Air Current Effects



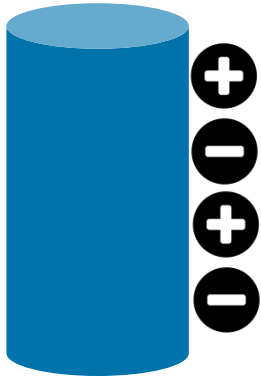
- Temperature gradients between the weighing sample and the surroundings cause air currents along the weighing vessel.
- This can increase (cold sample) or decrease (hot sample) the apparent weight of the sample.
- Condensation of ambient humidity on the surface of the sample might also occur if the sample is below room temperature.
 - » Only weigh room temperature samples.
- Air currents in the room can produce similar effects.
 - » Close all balance doors when recording the mass.

Magnetism Effects



- Magnetic and magnetized objects are attracted to the magnetically permeable parts within the balance.
- The additional forces that arise are wrongly interpreted as a load by the balance.
 - » Magnetic protection options provided by the balance manufacturers are a possible remedy.

Electrostatic Charge Effects



- Materials with low electrical conductivity such as glass, plastics, powder or granulates can only very slowly (over hours) drain away electrostatic charges.
- The charging occurs primarily through stirring or rubbing during the handling or transport of containers or materials.
- Dry air with less than 40 % relative humidity increases the risk of this effect.
 - » Antistatic kits provided by the balance manufacturers are a possible remedy.

Other Influencing Factors



- Volatile or hygroscopic substances can cause drift of the balance (through evaporation of the sample or uptake of ambient humidity).
 - » Seal liquids in capsules and wrap dry samples in foil or paper.
- Small amounts of sample might be lost during the wrapping/sealing process.
 - » Record the sample mass *after* enclosing the sample in the sample container.