

How to Use Analytical Balances

Analytical balances are a type of balance used to determine the mass of an object (see **Figure 1**). Mass is defined as a measure of the amount of matter within an object. Matter is anything that takes up space or has mass. The unit for measuring mass is usually in grams. In converting measurements from grams to other measurements such as kilograms and so forth, weight conversions are performed.



Figure 1. Ohaus AX124/E Adventurer Analytical Balance. *Source:* [https://www.dscbalances.com/products/ohaus-ax124-e-adventurer-analytical-balance?\[_BwE](https://www.dscbalances.com/products/ohaus-ax124-e-adventurer-analytical-balance?[_BwE)

Materials

To ensure that the procedure is followed precisely, you will need to obtain the correct materials for using the analytical balance. The following materials are required before the balance is used:

- Analytical balance
- Calibration weights
- Lab notebook / worksheet
- Writing utensil (pen/pencil, etc.)
- Goggles (depends upon the object or sample)
- Stainless steel spoon/spatula
- Weighing boats/cups

Leveling & Calibration

Before using the analytical balance, it must first undergo leveling and calibration. Many analytical balances used today have a leveling indicator. The leveling indicator makes sure the balance is properly leveled on the surface it is resting upon (**see Figure 2**). It is important that the balance is properly leveled as this can prevent the balance from weighing objects precisely. Also, the calibration of analytical balances is necessary prior to use, as it provides accuracy of the scale when measuring the weight of objects.



Figure 2. OHAUS Pioneer PA224 Analytical Balance, 220g. *Source:* <https://www.labgearusa.com/ohaus-pioneer-pa224-analytical-balance-220g/>

Procedure: Leveling

To ensure that the analytical balance will give a proper reading, the balance must be at level with the surface it rests upon. The following procedure is necessary for leveling the analytical balance:

1. Look through the level indicator and see if the clear bubble is aligned within the solid circle (**See Figure 3**).

If the bubble is within the circle, you can calibrate the balance. If outside the circle, proceed to the following steps:

- a. Look at the bottom of the balance for the four adjustable feet.
- b. Turn the feet slowly to loosen the balance.

Note: Do not remove the adjustable feet completely.

- c. Monitor the ball through the level indicator.
- d. Loosen and tighten the feet accordingly until the ball is in the center.

Caution:

When loosening and tightening the foots, do so gently. The balance can be damaged if not handled with care.



Figure 3. BAOSHISHAN 200g/0.001g Lab Scale Precision 1mg Analytical Electronic Balance Lab Precision Weighing Balance Scales. *Source:* [https://www.ubuy.com.kz/en/product/PCHQ2NK-baoshishan-200g-1mg-lab-scale-\[...\]-weighing-](https://www.ubuy.com.kz/en/product/PCHQ2NK-baoshishan-200g-1mg-lab-scale-[...]-weighing-)

Procedure: Calibration

To ensure that the analytical balance gives a proper reading, the balance must also be calibrated. To calibrate the balance, the following must be done:

1. Turn on the balance.
2. Wait for it to be configured or until numbers appear.
3. Click and hold the calibration button to calibrate the scale.

Note: It should flash a few times and depending on the balance settings, it will indicate which calibration weight to place on the scale.

4. Open **one** sliding glass door.
5. Place the correct calibration weight(s) and close the sliding door.

Note: Closing the door prevents additional airflow. Keeping it open causes the balance from accurately reading the weight.

6. Wait for the balance to give a reading. The weight should be the same as the calibration weight requested by the balance.

Note: If the weight of the calibration weight is not the weight it should be, you need to recalibrate the scale all over again until you get the correct calibration weight. Take out the calibration weight and **repeat steps 3-6**. Calibration weights are seen in **Figure 4**.



Figure 4. TOODOO 1g 2g 5g 10g 20g Gram Set for Digital Scale Balance and 1 Piece Calibration Weight.

Source: Amazon.com. [https://www.amazon.com/Hestya-Calibration-Digital-\[...\]=df0](https://www.amazon.com/Hestya-Calibration-Digital-[...]=df0)

7. Click the **“Tare” or “T” button**. Taring the balance sets the scale to zero.
8. Open one sliding door and remove the calibration weight.
9. Close the sliding door.
10. Click the **“Tare” or “T” button**.
11. You can now begin using the balance.

Warning: Slowly open and close the sliding glass doors; the doors can misalign and cause injury.

Weighing Objects & Samples

There are times when the object or sample you need to weigh cannot easily be weighed. For example, the container is too large to fit inside the balance and or your sample is in liquid form. To solve these issues, a weighing boat or other weighing vessels are used. To prevent contamination and removing excessive amounts of sample, utensils such as lab spoons and spatulas are necessary (**see Figure 5**).



Figure 5. SP Bel-Art Teflon FEP Lab Spoon and Spatula, 9", Stainless Steel. Source:

[https://www.globalindustrial.com/p/sp-teflon-fep-lab-spoon-and-spatula-9-stainless-steel\[...\]](https://www.globalindustrial.com/p/sp-teflon-fep-lab-spoon-and-spatula-9-stainless-steel[...])_BwE

Procedure

To ensure that objects and samples are weighed properly, the procedure below must be followed:

1. Open the sliding doors.
2. Place the object/ sample on the scale.

Note: Determine whether a weighing boat or weighing vessel is needed before placing the object/sample inside the balance. If so, place the weighing boat/vessel first. Wait for it to be weighed and then click the tare button. Use a lab spoon or spatula to extract your sample and weigh.

3. Close the sliding doors.
4. Wait a couple of seconds for the reading.
5. Write down the weight on your lab notebook or worksheet.
6. **Gently** open the sliding doors and remove the object/sample.
7. Close the sliding doors.
8. Click the **“Tare” or “T” button**.
9. Repeat steps 1-8 if weighing more than one object/sample.

When weighing any object that can weigh between .001 and over 500+ grams, it is important that equipment have the capability to measure at those scales. Analytical balances do a great in measuring objects at those ranges and with accuracy. Analytical balances are essential to not only science, but the world.

References

- [1] *BAOSHISHAN 200g/0.001g Lab Scale Precision 1mg Analytical Electronic Balance Lab Precision Weighing Balance Scales Jewelry Scales Calibrated (200g/1mg)* [Picture]. (n.d.). Ubuy. <https://www.ubuy.com.kz/en/product/PCHQ2NK-baoshishan-200g-1mg-lab-scale-precision-0-001g-analytical-electronic-balance-lab-precision-weighing->
- [2] *Ohaus AX124/E Adventurer Analytical Balance* [Picture]. (n.d.). Data Support Company. <https://www.dscbalances.com/products/ohaus-ax124-e-adventurer-analytical-balance?variant=36822733750422&cy=USD>
- [3] *OHAUS Pioneer PA224 Analytical Balance, 220g* [Picture]. (n.d.). LabGear USA. <https://www.labgearusa.com/ohaus-pioneer-pa224-analytical-balance-220g/>
- [4] *TOODOO 1g 2g 5g 10g 20g Gram Set for Digital Scale Balance and 1 Piece Calibration Weight Tweezer, Silver* [Picture]. (n.d.). Amazon.com. https://www.amazon.com/Hestya-Calibration-Digital-Balance-Tweezer/dp/B078Q3JZY7/ref=asc_df_B078Q3JZY7/?tag=hyprod-20&linkCode=df0
- [5] *SP Bel-Art Teflon FEP Lab Spoon and Spatula, 9", Stainless Steel* [Picture]. (n.d.). Global Industrial. https://www.globalindustrial.com/p/sp-teflon-fep-lab-spoon-and-spatula-9-stainless-steel?infoParam.campaignId=T9F&gclid=EAlaIqobChMI4vaw83o9AIVRz6tBh0uNQo7EAQYBCABEgLj4PD_BwE