

Weighing and the Electronic Balance

Mass determination by weighing is a fundamental and crucial task that requires a balance. While there are many kinds of balances, there are only two common weighing procedures. Mass is determined either directly or indirectly by difference. Both procedures ought to be self-evident, and they will be utilized in the first experiment. Of the two, indirect weighing is most often used. Can you think of any reasons why this is the case?

You will use an electronic pan balance for all weighings. These balances are precision instruments that possess several desirable features. They are easy to use, rugged, reliable, and most importantly, it takes only a few seconds to weigh an object and determine its mass using them. There are three different brands of electronic balances in lab, but they possess similar operational characteristics. All display an object's mass directly on an LED display, and all are sensitive to the thousandths place, 0.001 g. Whichever balance is used, it is first zeroed prior to weighing an object. This is accomplished by pressing the tare/zero (T) touch key – Sartorius balance, zero/function (red key) – Fisher balance, or O/T bar – Mettler balance; the LED blinks momentarily and then displays all zeros. (The last zero may drift a little; that's ok.) Next, the object to be weighed is placed on the balance pan; the LED blinks and presto its mass is displayed.



Sartorius Balance



Mettler Balance



Fisher Balance

Balance Protocol

There are four balances in each lab, and your instructor may assign you to a particular balance. Even if your instructor doesn't assign you to a balance, always use the same balance for all weighings.

Most often you will be weighing by difference, and in most cases you will be weighing a powdered solid. To weigh a solid by difference, first gather all needed items – container, scoopula, data sheet, etc. – and take them with you to the balance. Stock bottles containing needed solids will generally be adjacent to the balance. Weigh and record the mass of the container that the solid will be transferred to. Remove the container from the pan and transfer the needed material – check the bottle label – to it in small portions with a

scoopula or spatula. Reweigh and record the mass of the container and solid. The mass of solid is obtained by difference. If not enough material is transferred, add one or more additional portions and reweigh. Record the new mass. If too much material is taken, remove some material from the container and dispose of it properly; do not return it to the stock bottle. Reweigh and record the new mass.

Liquids can be weighed by difference following the procedure described above, but either pour the liquid directly into a pre-weighed container or transfer it to the container using a buret or pipet. As above, remove the container from the balance pan before adding (removing) liquid to (from) it. Dispose of excess liquid properly; do not return it to the stock bottle.

Balance Etiquette

Proper care and use of the balances is essential to keeping them in good working order. As a balance user, you have a vital role to play in maintaining 'your' balance. The most important thing that you can do is to make every effort to keep the balance and surrounding area free from debris and to clean up spills on or near the balance as soon as they occur. Take all items with you – containers, scoopula, data sheet – when you finish weighing. Dispose of used weighing paper in the trash can and clean up solid spills with the brush that is adjacent to the balance. If a liquid spills on the balance, notify your instructor right away. Lastly, if you notice that the balance is not working properly, inform your instructor.