

## Weighing Replicate Samples of a Solid

Usually three samples of a substance are titrated in a given titration procedure. Thus, if one sample is lost, by “over-shooting” the endpoint, an average of two samples is still possible.

### 1. Initial weighing

Weigh a **clean dry** 50 mL **beaker** on the top-loading balance. (This is the “weighing beaker”.) With the weighing beaker still on the balance, pour in from the stock bottle about three times the desired aliquot weight of the solid.

### 2. Analytical weighing by difference

Take this weighing beaker, three clean Erlenmeyer flasks (usually 250 mL), and your data record sheet to the balance room. In this procedure, **the flasks need not be dry**. They may still be wet on the interior from rinsing with deionized water. In all future use of this weighing beaker, use a strip of strong paper as a kind of handle strap for manipulating the beaker. In this way you do not touch the beaker, and hence you avoid changing its weight (or apparent weight) due to a sweat residue or a heating effect.

Weigh the weighing beaker to four decimal digits. Record this weight as “Weight of weighing beaker plus sample” on your data sheet. (Since you are weighing samples by difference, it is not necessary to zero the balance. However, do not change the zero setting during the course of the weighings). Remove the weighing beaker from the balance (remember to use the paper strap). Carefully pour, with tapping, about one-third (i.e., approximately the desired aliquot weight) of the solid into the Erlenmeyer flask numbered #1. Be sure not to spill any solid. Reweigh the weighing beaker and contents. If too little solid has been transferred, transfer some more. When approximately the desired weight of solid has been transferred to flask #1, weigh the weighing beaker and record it as “Weight of weighing beaker minus sample” on your data sheet. The difference between the two recorded weights is the weight of sample #1. Cover flask #1 and set it aside.

Repeat this same procedure for samples #2 and #3. Note that the second weight just recorded for sample #1 is also the first weight (i.e., “Weight of weighing beaker plus sample”) for sample #2. Clearly, only four weighings are required to measure out three samples.

### 3. Advantages

The advantages of weighing the weighing beaker rather than the receiving flasks are:

- a) Only  $n+1$  weighings are required to prepare  $n$  samples: ie. 4 weighings for 3 samples.
- b) The titrating flasks need not be dry, only the weighing beaker.

**It does not matter if exactly the same amount is weighed into each flask.** In fact it could be beneficial. The more sample you put into the flask the larger the volume of titrant needed for the titration. If all your samples have different masses then your titration volumes will be different and if you mix up your samples you will be able to match the larger titration volume with the larger mass and the smaller titration volume with smaller mass and so on. However, the mass added to each flask should not vary too much, otherwise after the first titration you will not know the approximate volume needed for the next titration.