FILTRATION

Filtration is a technique used for two main purposes

1. to remove solid impurities from a liquid
2. to collect a desired solid from the solution

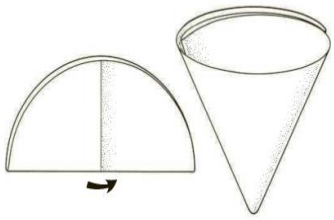
Two general methods include

- ❖ gravity filtration.
- ❖ vacuum (or suction) filtration.

1. GRAVITY FILTRATION

The most familiar filtration technique. Because even a small piece of filter paper will absorb a significant volume of liquid in most microscale procedures requiring filtration, this technique is useful only when the volume of mixture to be filtered is greater than 10mL. Gravity filtration can be divided into

I. FILTER CONES

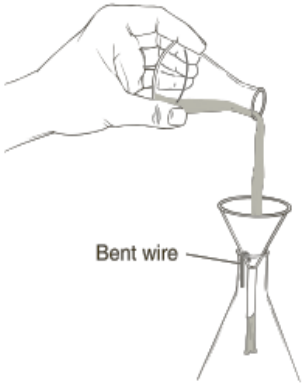


Most useful when the solid material being filtered from a mixture is to ***be collected and used later***. The filter cone can easily be scraped free of collected solids. The filter cone is likely to be used only when relatively large volume (greater than 10mL) is being filtered**.**

SEALING is problem associated with filtration by filter cones because *Solvent may form seals between the filter and the funnel and between the funnel and the lip of the receiving flask*. ***This sealing can lead to stopping of filtration because the displaced air has no possibility of escaping.*** This problem can be solved by:

a. *insertion a small piece of paper, a paper clip, or some other bent wire between the funnel and the lip of the flask to let the displaced air escape* **or**

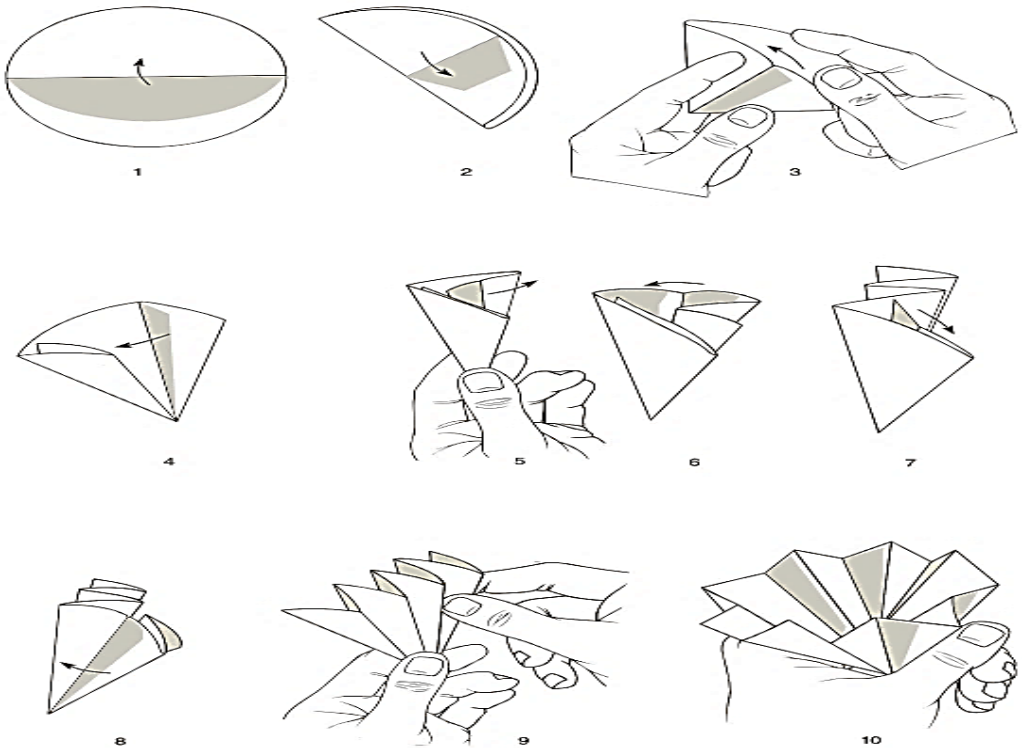
b. *supporting the funnel by a clamp fixed above the flask rather than placed on the neck of the flask.*



II. FLUTED FILTER

Fluted filter is used when the desired material is expected to remain in solution, so is

- *used to remove undesired solid materials dirt particles, decolorizing charcoal, and undissolved impure crystals]*
- *often used to filter a hot solution saturated with a solute during a crystallization procedure***.**



ADVANTAGES

It increases the speed of filtration in two ways:

First: *it increases the surface area of the filter paper.*

Second: *it allows air to enter the flask along its sides to permit rapid pressure equalization.*

CLOGGING is problem associated with fluted filter ***when it is necessary to filter a hot solution saturated with a dissolved solute*** **so** *a number of steps must be taken to ensure that the filter does not become clogged by solid material accumulated in the stem of the funnel or in the filter paper*:

a. Use a short-stemmed or a stemless funnel.

b. Keep the liquid to be filtered at or near its boiling point at all times.

c. Preheat the funnel by pouring hot solvent through it before the actual filtration.

d. Keep the filtrate in the receiver hot enough to continue boiling slightly (by setting it on a hot plate, for example).

III. DECANTATION

*It is not always necessary to use filter paper to separate insoluble particles. If you have large, heavy, insoluble particles, with careful pouring you can decant the solution. If there are a large number of particles and they retain a significant amount of the liquid, they can be rinsed with solvent and a second decantation performed***.**

2. VACUUM FILTRATION

Vacuum, or suction, filtration is more rapid than gravity filtration and ***is most often used to collect solid products resulting from precipitation or crystallization***.

This technique is used primarily when the volume of liquid being filtered is more than **1–2mL**.

Before beginning the filtration, ***it is advisable to moisten the paper with a small amount of solvent***. *The moistened filter paper adheres more strongly to the fritted disk and prevents unfiltered mixture from passing around the edges of the filter paper*.

Vacuum filtration is generally not used to separate fine particles such as decolorizing charcoal, because the small particles would likely be pulled through the filter paper.

Two types of funnels are useful for vacuum filtration

- **Hirsch funnel**
- **Büchner funnel**