

Filtration

Filtration is used in the chemistry laboratory to remove impurities from a solution, or to isolate a solid sample from a solution. In the first year chemistry laboratory we will use two types of filtration, gravity filtration and vacuum or suction filtration.

Gravity Filtration

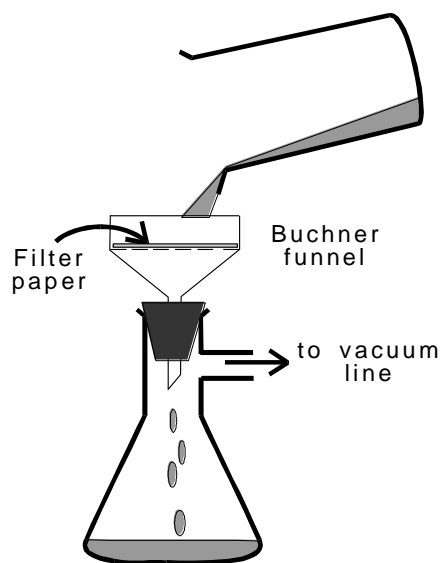
Gravity filtration is most often used to remove impurities from a solution. The “impurity” can be a drying agent, excess reactant or an undesired side product. Gravity filtration is often the filtering method of choice when it is the liquid that is of interest.

First select a size of filter paper with a diameter slightly smaller than the depth of the cone of your funnel. Fold the filter paper in half, then in half again, and open it up to form a cone. Support the funnel in a ring clamp, or place it in the neck of an Erlenmeyer flask. Be sure that there is ample depth to your flask to allow the solution to drain from the funnel. Place the filter paper in the funnel, and wet it with a few millilitres of the solvent in use. Wetting the paper holds it in place against the walls of the funnel. Pour the solution to be filtered through the funnel. You will likely need to pour it slowly, in several portions.

Vacuum Filtration

Vacuum filtration is a technique used to separate a solid product from a solvent or liquid reaction mixture. The mixture is poured through a filter paper in a Buchner funnel. The solid is trapped on the filter paper, and the liquid is drawn through the funnel by vacuum pressure. Vacuum filtration is faster than gravity filtration because the solution or solvent is forced through the filter paper by the application of reduced pressure. The apparatus used for vacuum filtration in this laboratory is illustrated at the right.

Check the filtering flask (vacuum flask, side arm flask) carefully for cracks. A crack in the flask could cause it to collapse violently under vacuum pressure injuring you or your lab mates. Securely fit a Buchner funnel in the neck of the flask using a rubber stopper. Vacuum pressure is created using the vacuum adaptors on the water lines of the bench top sinks. Turn on the water and check for suction by holding your thumb over the end of the vacuum line. Connect the vacuum line to the side arm of your flask. It may be necessary to wet the side arm in order to attach the tubing. Now check the system for good suction by placing your hand over the top of the Buchner funnel. If you do not feel strong suction, check your system for leaks such as cracks in the tubing or stopper.



Place a piece of filter paper in the Buchner funnel that is large enough to cover all the holes on the funnel, but small enough to sit flat on the bottom of the funnel. Wet the filter paper with a small amount of solution to seal the filter paper to the funnel. Filter your solution by slowly pouring the mixture onto the centre of the filter paper. Pouring solution slowly will prevent the filter paper from

floating upwards and allowing solids to be drawn into the flask. If this happens you will need to recover the filtrate (the liquid in the flask) and begin your filtration again.

The vacuum should draw the liquid rapidly through the funnel. Be careful not to over fill your funnel, the solution should never fill more than two-thirds of the Buchner funnel. If you need to rinse your beaker, use a small amount of solvent and carefully add it to the funnel. Once your solution is filtered, you can continue to run the vacuum to dry your solid sample. When you are finished drying, turn off the water taps to release the vacuum, and remove the vacuum tubing from your flask. Carefully remove the filter paper and solid from the Buchner funnel, place on a clean, dry watch glass and allow to air dry.