

Vacuum filtration:

There are two convenient ways to separate a precipitated solid from its mother liquor. The first and easiest method is to allow the solid to settle and then pour off (decant) the upper liquid layer (supernatant liquid). This can only be done if the solid is heavy and well-coagulated. The remaining solid can then be washed, separated (perhaps using a centrifuge) and dried.

The second, more common method is to filter the solid from the mother liquor. In many cases, gravity provides sufficient force to drive the liquid through a funnel lined with filter paper. Sometimes, a vacuum applied to the lower end of the funnel will speed up that process. This technique is known as a vacuum or Buchner filtration.

The source of vacuum that is preferred is a small portable electrical pump. The older method of using a water aspirator is discouraged to avoid the waste of water. Attach the hose from the pump to a Buchner flask (this is an Erlenmeyer flask made of thick glass, with a side-arm) and clamp the flask to prevent tipping - a common problem. Note that in many teaching labs, we also have another flask between the pump and the Buchner flask, to prevent any excess solvent from going into the pump. Put a rubber filtervac between the top of the Buchner flask and the porcelain funnel. Moistening the filtervac will help create the pressure seal, but this can only be done if the water will not affect the filtrate. Filter paper is placed in the funnel, and moistened to make the paper sit securely over the holes in the funnel. Again, the moistening can only be done if the residue or filtrate are not water sensitive. If they are, a second choice would be to use a little of the solution to soak the filter paper. The apparatus is now ready for use.

When washing a precipitate in a filter funnel, remove the filtrate first. Sometimes the washing liquid may react with the filtrate already collected. This is particularly relevant when nitric acid is in the reaction mixture and the filtered residue is subsequently washed with ethanol. Ethanol (or indeed many organics) and concentrated nitric acid form an explosive mixture!