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Simple Apparatus for Vacuum Filtration

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Supporting Information

ABSTRACT: A large syringe can be used as a vacuum source in vacuum filtration.

KEYWORDS: First-Year Undergraduate/General, High School/Introductory Chemistry, Second-Year Undergraduate, Organic Chemistry, Inorganic Chemistry, Hands-On Learning/Manipulatives, Laboratory Equipment/Apparatus

Vacuum filtration is an important and widely used technique in chemistry teaching laboratories. Laboratory manuals^{1–6} universally incorporate water aspirators as the vacuum source. Aspirators, however, have some substantial shortcomings: (a) they waste huge amounts of water, (b) laboratories often have an insufficient number of them, (c) they often have inconvenient locations, and (d) depending on the quality of the aspirator and the water, they may require frequent replacement.

An efficient aspirator can reduce the pressure in a closed container down to the vapor pressure of water at that temperature, but this is far lower than what is needed to successfully carry out a vacuum filtration in most undergraduate chemistry experiments. We have found that a 150 mL syringe can provide a suitable vacuum for carrying out a filtration even when the size of the filtration flask is 150 mL. Smaller syringes can be used with smaller filtration setups. The syringes can be used many times.

Our version of such an apparatus is shown in Figure 1, but there is a wide range of other possibilities such as a Hirsch

funnel used with a side-arm filtration flask. Because the aspirator has been eliminated, the need for a water trap is also eliminated. If the filtration is slow, a wooden block can be wedged between the barrel and the end of the plunger so that the vacuum can be maintained without having to continuously pull the plunger. For added convenience, a hose that is considerably longer than the one shown in Figure 1 can be used.

This system has been used effectively for the vacuum filtration of a variety of compounds including potassium nitrate, nickel and cobalt oxalates, and potassium dichromate. Goggles should be worn any time that the pressure in a vessel is different than that of the surrounding atmosphere.

■ ASSOCIATED CONTENT

Supporting Information

Movie showing a filtration. This material is available via the Internet at <http://pubs.acs.org>.

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Notes

The authors declare no competing financial interest.

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Figure 1. Apparatus for vacuum filtration with syringe.

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