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A Better Magnetic Stir Bar Retriever

Peter Marrs*

Department of Chemistry, University of Victoria, Victoria, British Columbia V8W 3V6, Canada

Supporting Information

ABSTRACT: An inexpensive alternative to the typical stir bar retriever is described.

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The magnetic stirrer was patented in 1944 by Arthur Rosinger[1] and has become a standard piece of equipment in the chemistry laboratory. Rosinger describes the construction of the stirrer in detail, and also describes a stirring element (herein called a stir bar) as "consisting of a permanent magnet, and a neutral shell or covering therearound".[1] The neutral shell of the modern stir bar is typically Teflon, and glass is also available.[2] The stir bars range in size from 2 × 2 mm to 165 × 12 mm, and come in a variety of shapes designed to achieve optimum mixing in many different vessels.

A search of the *Journal of Chemical Education* archives for "stir bar" retrieved 654 articles,[3] almost all of which simply noted the use of a stir bar in a reaction mixture. Three articles[4] describe alternative ways to use a magnetic stirrer or improvements to the stir bar. None described a better way to get the stir bar *out* of the reaction medium.

The typical stir bar retriever is a plastic stick, made from polyethylene or Teflon, with a magnet encased at one end. These retrievers are placed into a solution to recover the magnetic stir bar, leaving the solution open to contamination. Long-term use of the retriever makes the plastic subject to degradation, and the magnets used lose their strength over time and actually fail to retrieve the stir bar.

An alternative retriever is available from Lee Valley Tools (item #50K02.02).[5] Although marketed as a "super fridge magnet", this tool contains a rare-earth magnet and is easily repurposed as a stir bar retriever. The high magnetic strength of the rare-earth magnet is the key to the use of the retriever.

The retriever is held on the *outside* of the flask (or beaker) containing the solution. The stir bar is attracted to the retriever while the solution is transferred to another vessel. The stir bar does not come out of the flask, and can be washed and cleaned while in the original flask. The stir bar can be recovered by simply removing the retriever from the outside of the flask. The retriever does not need to come in contact with the solution or the stir bar, thus greatly reducing the possibility of contamination.

The retriever works well with the common octagonal stir bars from 1/2 × 1/8 in. to 1 × 5/16 in., and can be used on stir bars up to 3 in. The attractive force between the retriever and the stir bar is strong enough to keep the two attached to the flask; however, holding the retriever is recommended for safety, and caution is still needed with the larger stir bars.

Should the chemist wish to remove the stir bar without transferring the solution, the retriever can be moved up the side of the flask, and the stir bar will move with it. The stir bar can then be recovered from the top of the flask. While the retriever will likely need to be cleaned, the possibility of contaminating the solution is still very low.

The photograph (Figure 1) shows both the commercially available retriever and a homemade version suspended on the side of a beaker containing two stir bars. The small size of the silver retriever is one possible disadvantage, making it easier to lose. Both retrievers can be held comfortably in one hand while manipulating the glassware.

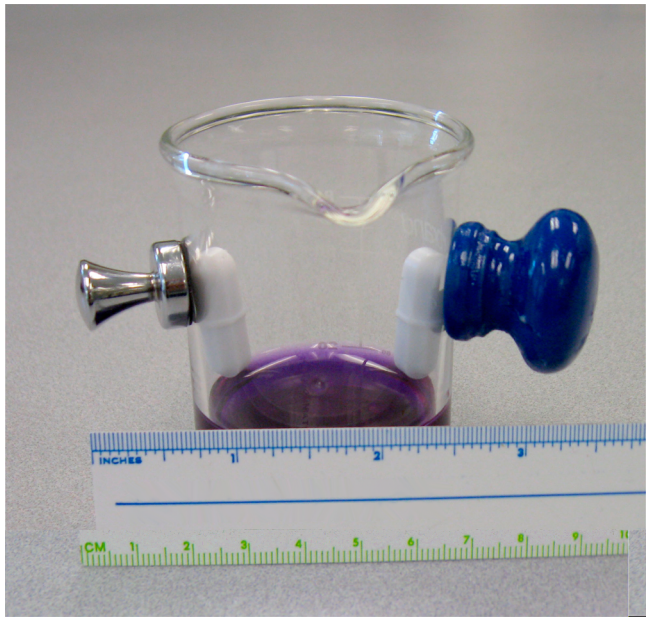

Figure 1. Magnetic stir bars and retrievers (silver, purchased; blue, homemade) supported on the side of a 100 mL beaker.

The final advantage of these retrievers is cost. The cost of the silver retriever is about 25% of the cost of the typical plastic stick, and purchasing the parts for the homemade retriever is even cheaper. There is one commercially available retriever that

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is used outside the flask; however, it is large, more cumbersome, and just as expensive as the plastic sticks.

The retrievers were introduced to the students in our organic laboratories in the summer of 2014. The students and their instructors were very pleased at how the retrievers worked in practice.

■ ASSOCIATED CONTENT

Supporting Information

Parts lists and instructions for making the homemade retriever. This material is available via the Internet at http://pubs.acs.org.

■ AUTHOR INFORMATION

Corresponding Author

*E-mail: pmarrs@uvic.ca.

Notes

The authors declare no competing financial interest.

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