Washing Filters for Algal Assay to Remove Trace Contaminants

1. SCOPE AND APPLICATION

1.1. This method is based on Miller, W. E., T. E. Maloney, and J. C. Greene. 1978. The *Selenastrum capricornutum* Printz algal assay bottle test. EPA-600/9-78-018. U. S. EPA, Cincinnati, Ohio. 126 p. It is used to remove water soluble contaminants from filters used in AGP tests.

2. SUMMARY OF METHOD

2.1. A filtering apparatus is set up. A filter is placed on the filter holder. Deionized water is passed through the filter. Washed filters are placed in a container and dried in an oven. Dried filters are stored in a covered container until used.

2.2. Interferences include contaminated water, airborne particulates, and dirty filtering apparatus.

3. EQUIPMENT AND SUPPLIES

3.1. Filter apparatus (see Figure 1)

3.1.1. Whatman® or Millipore® filter glass funnel (2 each)

3.1.2. Filter clamps (2 each)

3.1.3. Whatman or Millipore fritted-glass filter base and stopper (2 each)

3.1.4. Plastic sidearm and bushing

3.1.5. 2 L Erlenmeyer filter flask (2 each)

3.1.6. Stopper with hole for waste flask airline

3.1.7. Airline hose (2 each)

3.2. 500-mL Graduated cylinder

3.3. Unwashed filters (0.45 µm membrane filters and 1.2 µm glass fiber filters)

3.4. 8-inch Carolina dish lined with Kimwipes® (1 for each type of filter)

3.5. Kimwipes®

3.6. Aluminum foil

3.7. Small forceps, flat tipped

3.8. Drying oven

4. REAGENTS AND STANDARDS

4.1. Deionized (DI) water

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5. METHOD

5.1. Insert the stem of each filter base into a blue Millipore plug (if missing) and place into the 2 L filter flask. Note that wetting the stem of the filter funnel and the opening in the plug makes it easier to insert the funnel into the plug.

5.1.1. One filter base and funnel may be used for both filter sizes. The tox lab should always have two filter sets available in case of more than one AGP filtering within the same week or if one filter set breaks.

5.2. Connect the filter flask and the waste flask to each other. Connect the waste flask to the vacuum line using rubber tubing (see Figure 1). A sidearm is available if using a flask with a hole. Turn on the vacuum at the countertop valve. The vacuum can be turned off and on during filtering by manually turning off the valve or using the small stopcocks along the base of the vacuum manifold (if present).

5.3. Using flat-tipped forceps, place the filter to be washed on the filter base. Wash 20% more filters than you think will be needed. Keep track of the number of filters washed. Writing the date and number of filters processed on the aluminum foil cover is useful to determine the next time to filter.

5.4. Clamp the filter funnel onto the top of the filter assembly.

5.5. Use the 500 mL cylinder to pour approximately 100 mL of DI water into the filter funnel.

5.6. Apply vacuum to filter the DI water through the filter. Start the vacuum by turning the vacuum valve lever in-line with the nozzle or airline. The vacuum is off when the valve lever is at a 90° angle to the nozzle or airline.

5.6.1. The air filtering station in the toxicology lab is located to the right of the sink. If this station is unavailable, the taxonomy lab has an air vacuum in front of the sinks. In the event there is no available air, portable vacuums are available in the taxonomy lab.

5.7. After the water has passed through the filter, stop the vacuum by closing the valve.

5.8. Remove the clamp and the filter funnel, then, use the forceps to remove the filter from the filter holder.

5.9. Place the filter in the Carolina dish. The first layer of 0.45 µm filters is placed directly onto the Kimwipes®. These filters may overlap slightly, but a new Kimwipe® layer should be placed on top when first is full. 1.2 µm filters are placed onto the Kimwipes® in a separate dish and then layered (offset) on each other. These filters should barely overlap. The Kimwipes® help keep the filters from sticking to the Carolina dish.

5.9.1. The 0.45 µm filters come with blue separator filters that can be used to separate filters within the same layer. These do not get filtered and can simply be discarded.

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5.10. Keep an eye on the level of liquid in the waste flask. Empty as needed.

5.11. Repeat Steps 5.3–5.10 until all the filters are washed.

5.12. Return the stoppers, clamps, and vacuum tubes to their original locations. Empty any water from the waste flask.

5.13. Dry the washed filters for one hour at 70-100 °C in the drying oven. This speeds the drying process and, most importantly, helps prevent mildew from forming on the stored filters.

5.14. Cover the Carolina dish containing the dried filters with aluminum foil.

5.15. Store the washed and dried filters in the cabinet above the filter apparatus set-up area to the right of the sink.

5.16. Record the number of filters washed and the date on the aluminum foil cover. The frequency of washing filters depends on the number of AGP samples scheduled.

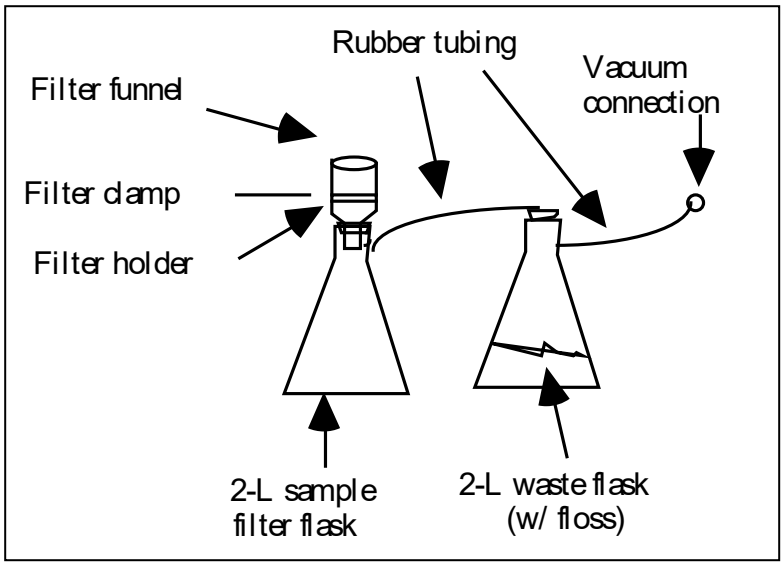


Figure 1

6. DATA ARCHIVAL

6.1. Use a black, waterproof pen for all bench sheets and logbooks.

6.2. To correct raw data entries, place a single line through the incorrect or illegible entry, write the corrected entry near the error, date and initial the correction. Do not overwrite entries.

6.2.1. The corrected entry is written as near as possible to the error or in the comment box on the appropriate bench sheet.

6.2.2. If the correction requires an explanation, write a comment and reference the error with a letter. Initial and date the explanation. Do not attempt to put all information (correction and comments) into a small space.

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6.2.3. Use sequential alphabetical annotation to identify errors and corresponding comments (use A for first error and use A for corresponding explanatory comment; use B for second error, etc.).

7. QUALITY CONTROL

7.1. Refer to Laboratory Quality Manual for corrective action and handling out-of-control data.

8. SAFETY/HAZARDOUS WASTE MANAGEMENT

8.1. Proper laboratory protection—including lab hood or ventilation system, lab coat, gloves, and safety glasses—is required when working with chemicals and unprocessed samples.

8.2. Refer to Laboratory Quality Manual for sample disposal.

8.3. Refer to the Laboratory Health and Safety Manual and Hazardous Waste Management.

8.4. Read MSDS information for reagent handling and disposal.

9. REFERENCES

9.1. EPA-600/9-78-018

9.2. Laboratory Quality Manual

9.3. Laboratory Health and Safety Manual

9.4. MSDS Information Sheets

APPENDIX OF CHANGES

01/04/2008 Added Scope and Application, Summary of Method and Appendix of Changes

12/30/2008 Added Interference and Reference Sections

09/05/2013 Reformatted SOP

02/09/2015 Formatted for 508 compliance.

08/14/2015 Updated links.

09/14/2016 Updated links. Made separate reagent section.

09/14/2017 Corrected steps referenced in Step 5.11.

08/28/2018 Updated links and changed font to Calibri.

07/10/2019 Updated links.

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08/26/2020 Updated data archival section with new universal language. Changed titles to "Equipment and Supplies" and "Reagents and Standards." Updated equipment section language.

08/02/2021 Updated links.

08/12/2022 Reworded materials and clarified filter apparatus. Removed mention of AGP Record of Preparation logbook since no longer used. Updated method to better match current procedures. Updated links. Data archival section left alone in the event filters are referenced in outside AGP logbooks.

08/11/2023 Minor method updates regarding available equipment, recording number of filters and use of portable vacuums.

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