

Minimizing TOC with the Right Flush Volume for Membrane Filter Discs

This protocol outlines a step-by-step procedure for determining the appropriate rinsing volume for membrane filter discs, with the goal of minimizing the leaching of organic compounds into the final product during the subsequent filtration of target product. The method relies on measuring the concentration of total organic carbon (TOC) in rinsing fractions, which provides a reliable indicator of the amount of organic material present. TOC is a measure of the total carbon content of organic compounds in pure water and aqueous systems. By following this protocol, users can calculate the volume of purified water needed to rinse the membrane disc effectively, ensuring that the filtration process is cost-effective, low-waste, and produces a pure final product.

Required Materials

- Stainless steel filter holder, order no. 16275 (hose barb) or 16276 (sanitary connection)
- Pressure source (e.g. peristaltic pump)
- Membrane filter discs with a diameter of 142 mm or 150 mm
- Vials for low level TOC analysis (e.g. vials for sample volumes of 40 mL)
- 0.1 M Sodium Hydroxide (NaOH)
- Purified water (e.g. Type 1 ultrapure Arium water)
- Stopwatch
- Glass ware incl. flasks and beakers
- Pressure tubes and connectors



Procedure

1. Prepare the experimental set by rinsing the filter holder with 1 liter of 0.1 M NaOH solution.
2. Rinse the filter holder with 5 liters of purified water (Arium water) to remove any remaining NaOH residue from the filter housing.
3. Install the membrane into the filter housing, fill the filter with purified water and vent the system to ensure the entire filtration area can be used during the test.
4. When filter holder is filled with purified water start the test and adjust the pump flow rate to collect filtrate every 25 mL in separate vials.
5. Stop the filtration after generating approximately 500 mL or more of filtrate.
6. To ensure accurate determination of TOC, weigh the collected filtrate fractions to specify the precise volume in each vial.
7. Send the collected samples to the laboratory for TOC analysis, specifying the volume of each fraction.

Example

In an exemplary study, a total of 300 mL of purified water (Arium water) were filtered through two 142 mm PES filter discs with a pore size of 0.2 μm . The filtrate was fractionated every 25 mL, and the TOC content was determined in ppb for each fraction (Figure 2). The study found highest TOC levels in the first three fractions, reaching up to 550 ppb, but subsequent fractions showed lower levels. At a rinse volume of 175 mL, the TOC reached a stable level of 140-160 ppb. To ensure proper control of the rinsing process, it is recommended to define a minimum flush volume that includes a safety margin. The suggested minimum flush volume is at least 1.5 to 2.0 times the 175 mL flush volume used in the study. Therefore, it is recommended to use a minimum flush volume of 300 mL of purified water for mounted PES membrane.

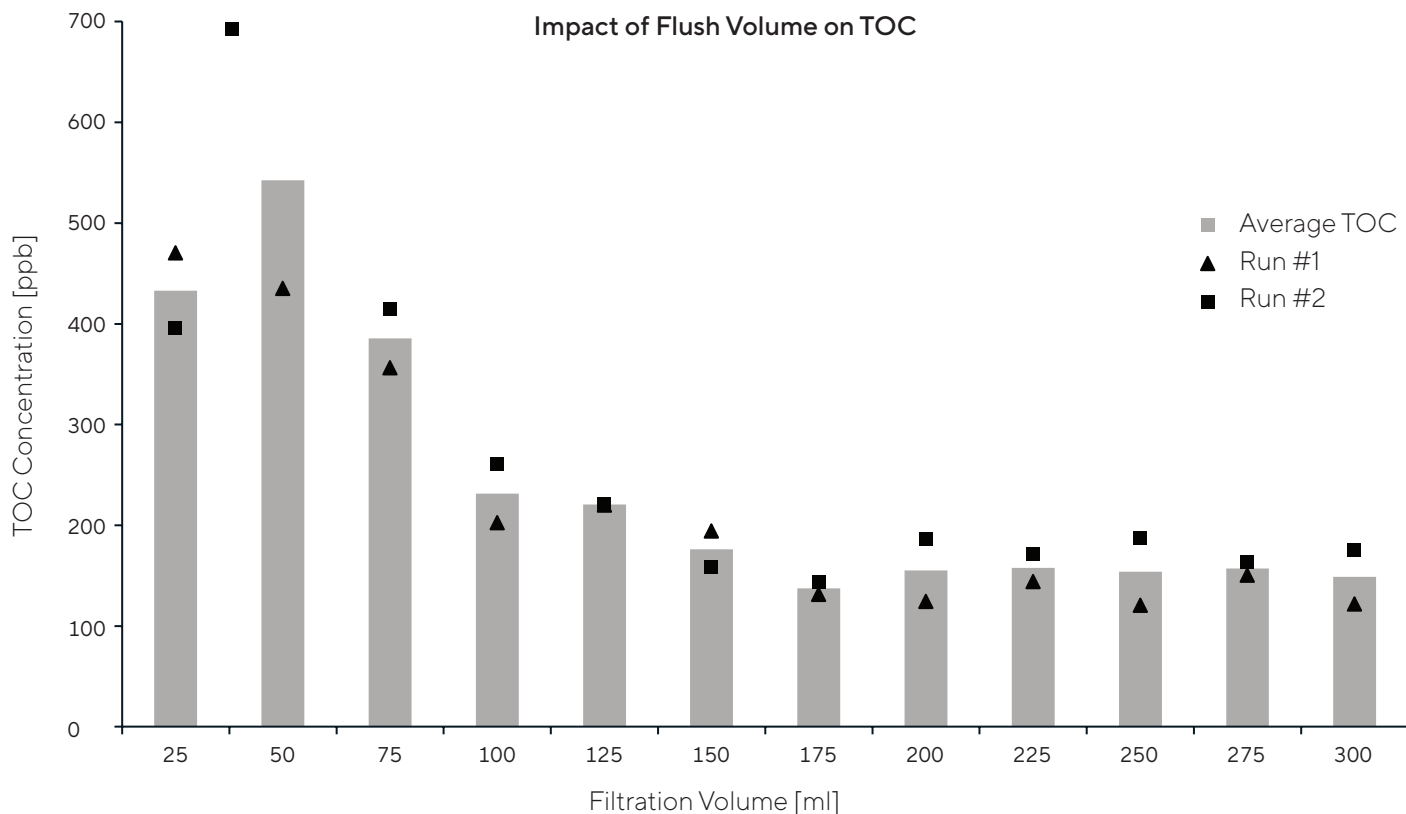


Figure 1: Amount of purified water (Arium® water) needed to rinse the membrane filter holder and membrane filter disc. The total organic compound (TOC) of successive rinse fractions was measured in duplicate and used to determine the rinse volume.

Germany

Sartorius Lab Instruments GmbH &
Co. KG
Otto-Brenner-Strasse 20
37079 Goettingen
Phone +49 551 308 0

Americas

Sartorius Corporation
565 Johnson Avenue
Bohemia, NY 11716
Phone +1 631 254 4249
Toll-free +1 800 635 2906

U.K.

Sartorius UK Ltd.
Longmead Business Centre
Blenheim Road, Epsom
Surrey KT19 9QQ
Phone +44 1372 737159

 **For further information, visit**
www.sartorius.com