May 2019

DNeasy® PowerWater® Sterivex™ Kit Handbook

For the isolation of genomic DNA from water samples collected with Sterivex filter units

Sample to Insight

QIAGEN

Contents

Kit Contents

DNeasy PowerWater Sterivex Kit	**(50)**
Catalog no.	**14600-50-NF**
Number of preps	**50**
MB Spin Columns	50
PowerBead Tubes (5 ml), Glass 0.1 mm	50
Solution ST1A	44 ml
Solution ST1B	5.86 g
Solution MBL	2 x 25 ml
Solution IRS	2 x 15 ml
Solution MR	2 x 100 ml
Ethanol	3 x 30 ml
Solution PW	2 x 30 ml
Solution EB	9 ml
Syringes (3 ml)	50
Tube extenders (20 ml)	2 x 25
Collection tubes (2.2 ml)	6 x 25
Collection tubes with caps (5 ml)	50
Inlet caps	50
Outlet caps	50
Quick-Start Protocol	1

Storage

The DNeasy PowerWater Sterivex Kit reagents and components can be stored at room temperature (15–25°C) until the expiration date printed on the box label. After Solution ST1A is added to the bottle labeled Solution ST1B, store it at 2–8°C.

Intended Use

All DNeasy products are intended for molecular biology applications. These products are not intended for the diagnosis, prevention, or treatment of a disease.

All due care and attention should be exercised in the handling of the products. We recommend all users of QIAGEN products to adhere to the NIH guidelines that have been developed for recombinant DNA experiments, or to other applicable guidelines.

Safety Information

When working with chemicals, always wear a suitable lab coat, disposable gloves, and protective goggles. For more information, please consult the appropriate safety data sheets (SDSs). These are available online in convenient and compact PDF format at **www.qiagen.com/safety** where you can find, view and print the SDS for each QIAGEN kit and kit component.

WARNING	
	Solution PW and ethanol are flammable.

CAUTION	
	DO NOT add bleach or acidic solutions directly to the sample preparation waste.

Solution MBL and Solution MR contain guanidine salts, which can form highly reactive compounds when combined with bleach. If liquid containing these buffers is spilt, clean with a suitable laboratory detergent and water. If the spilt liquid contains potentially infectious agents, clean the affected area first with laboratory detergent and water, and then with 1% (v/v) sodium hypochlorite.

Quality Control

In accordance with QIAGEN's ISO-certified Quality Management System, each lot of DNeasy PowerWater Sterivex Kits is tested against predetermined specifications to ensure consistent product quality.

Introduction

The DNeasy PowerWater Sterivex Kit is designed to isolate genomic DNA from Sterivex filter units (Millipore® cat. no. SVGPL10RC) without the need for enzymes or hazardous organic chemicals. Using a novel filter membrane treatment, microbes are released from Sterivex filter units without extensive incubation times or the need to cut open the plastic casing holding the membrane. Inhibitor Removal Technology® (IRT) is included to provide high-quality DNA from all types of water samples, even those containing heavy amounts of contaminants. In addition, MB Spin Columns and tube extenders allow for one-step addition of the entire sample lysate (4.5 ml) and elution in a 50–100 µl volume.

Principle and procedure

The DNeasy PowerWater Sterivex Kit protocol starts with the addition and incubation of the Sterivex units with a novel filter membrane treatment. Lysis buffer is added to the units, which are then mixed. The lysate is then removed for additional mechanical lysis in a 5 ml bead-beating tube. After the protein and inhibitor removal steps, total genomic DNA is captured on an MB Spin Column under vacuum. The column is washed, and high-quality DNA is eluted from the MB Spin Column filter membrane for use in downstream applications, including PCR and qPCR.

Note: A vacuum manifold is highly recommended for this protocol. If a vacuum manifold is not available, refer to Appendix B: Options in the Absence of a Vacuum Manifold, page 20, for more information.

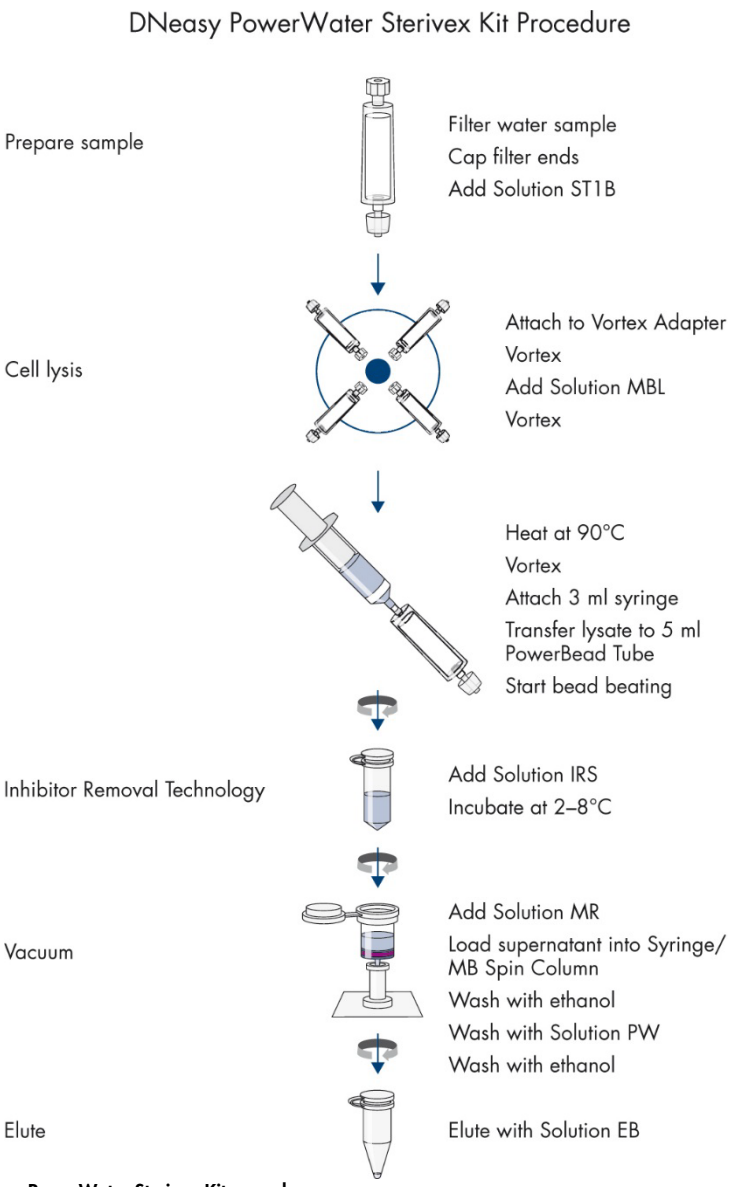

Figure 1. DNeasy PowerWater Sterivex Kit procedure.

Equipment and Reagents to Be Supplied by User

When working with chemicals, always wear a suitable lab coat, disposable gloves, and protective goggles. For more information, consult the appropriate safety data sheets (SDSs) available from the product supplier.

- Centrifuge for 15 ml tubes (≤4000 x *g*)
- Water bath or heat block set at 90°C
- Microcentrifuge (13,000 x *g*)
- Pipettors
- Vortex-Genie®2 vortex
- Vortex adapter for 5 ml and 15 ml tubes (cat. no. 13000-V1-5)
- QIAvac® 24 Plus Manifold (cat. no. 19413)

Protocol: Experienced User

Important points before starting

- We recommend you use Sterivex filter units (Millipore cat. no. SVGPL10RC). If you have non–Luer-style Sterivex filters, please refer to the "Troubleshooting Guide", page 17, or contact technical services for recommendations.
- Add Solution ST1A to the bottle labeled Solution ST1B, and mix well.
- Warm Solutions MBL and MR at 65°C for 5–10 min to dissolve precipitates prior to use. Solutions MBL and MR must be used while still warm.
- Shake Solution PW to mix before use.

Procedure

1. Filter water sample through a Sterivex filter unit. Remove as much of the remaining liquid as possible using a syringe containing air. Cap both ends with the inlet and outlet caps.
2. Remove the inlet cap and add 0.9 ml of Solution ST1B using a pipette tip. Insert pipette completely into inlet so that pipette tip is visible inside the unit just above the membrane.
3. Re-cap the inlet and secure the Sterivex filter unit horizontally, with the inlet facing out, to a vortex adapter.
4. Vortex at minimum speed for 5 min.
5. While still attached to the vortex adapter, rotate the Sterivex filter unit 180 degrees from the original position. Vortex at minimum speed for an additional 5 min.
6. Set the Sterivex filter unit with the inlet facing up and remove the inlet cap. Add 0.9 ml of Solution MBL using a pipette tip. Insert pipette completely into the inlet so that the pipette tip is visible inside the unit just above the membrane. Re-cap the inlet.
7. Incubate the Sterivex filter unit at 90°C for 5 min. Ensure heat is evenly distributed. **Note**: Do not heat at higher temperatures or for longer than 5 min.
8. Cool the unit at room temperature for 2 min. Ensure that the caps are on tightly.

9. Secure the Sterivex filter unit horizontally, with the inlet facing out, to a vortex adapter.
10. Vortex at maximum speed for 5 min. Set the Sterivex filter unit with the inlet facing up and remove the inlet cap.
11. Pull back the plunger of a 3 ml syringe to fill the barrel with 1 ml of air, and then attach it to the inlet of Sterivex filter unit. Push air into the unit until there is resistance, and then release the plunger. Continue to pull back on the plunger to remove as much of the lysate as possible. Detach the syringe from the Sterivex filter unit.
12. Add the lysates to 5 ml glass PowerBead Tubes. Secure the PowerBead Tubes horizontally to a vortex adapter.
13. Vortex at maximum speed for 5 min. Centrifuge at 4000 x *g* for 1 min.
14. Transfer all the supernatant to a clean 2.2 ml collection tube.
15. Add 300 µl of Solution IRS and vortex briefly to mix. Incubate at 2–8°C for 5 min.
16. Centrifuge the tube at 13,000 x *g* for 1 min. Avoiding the pellet, transfer the supernatant to a clean 5 ml collection tube.
17. Place a tube extender firmly into an MB Spin Column.
18. Attach the tube extender/MB Spin Column unit to a VacConnector and VacValve on the QIAvac 24 Plus Manifold.
19. Add 3 ml of Solution MR to the Collection Tube containing supernatant. Vortex to mix.
20. Load the entire 4.5 ml of supernatant into the tube extender/MB Spin Column.
21. Turn on the vacuum source and open the VacValve of the port. Allow the lysate to pass through. After the lysate has passed through completely, close the VacValve of that port.
22. While keeping the MB Spin Column attached to the VacValve, remove the tube extender and discard.
23. Add 0.8 ml of ethanol to the MB Spin Column. Open the VacValve. Allow the ethanol to pass through the column completely. Close the VacValve.
24. Add 0.8 ml of Solution PW to the MB Spin Column. Open the VacValve and allow Solution PW to pass through the column completely. Continue to pull a vacuum for another minute to dry the membrane. Close the VacValve.

25. Add 0.8 ml of ethanol to the MB Spin Column. Open the VacValve and apply a vacuum until the ethanol has passed through the MB Spin Column completely. Continue to pull a vacuum for another minute to dry the membrane. Close the VacValve.
26. Turn off the vacuum source and open an unused port to vent the manifold. If all 20 ports are in use, break the vacuum at the source.
27. Remove the MB Spin Column and place in a 2.2 ml collection tube. Centrifuge the tube at 13,000 x *g* for 2 min to completely dry the membrane.
28. Transfer the MB Spin Column to a new 2.2 ml collection tube and add 100 µl of Solution EB or sterile DNA-free PCR-grade water to the center of the white filter membrane.
29. Centrifuge at 13,000 x *g* for 1 min at room temperature. Discard the MB Spin Column. The DNA is now ready for any downstream application.

Protocol: Detailed

Important points before starting

- We recommend you use Sterivex filter units (Millipore cat. no. SVGPL10RC). If you have non–Luer-style Sterivex filters, please refer to the "Troubleshooting Guide", page 17, or contact technical services for recommendations.
- Add Solution ST1A to the bottle labeled Solution ST1B, and mix well.
- Warm Solutions MBL and MR at 65°C for 5–10 min to dissolve precipitates prior to use. Solutions MBL and MR must be used while still warm.
- Shake Solution PW to mix before use.

Procedure

1. Filter water sample through a Sterivex filter unit. Remove as much of the remaining liquid as possible using a syringe containing air. Cap both ends with the inlet and outlet caps.
   Note: For long-term storage, Sterivex filter units should be stored capped without excess liquid at –30 to –15°C.
   Note: We do not recommend adding SET (sucrose/EDTA/Tris) buffer to Sterivex filter units for storage. SET buffer is not required for this protocol and may interfere with DNA extraction and inhibitor removal. Refer to the "Storage with SET Buffer" section in the "Troubleshooting Guide" (page 17) for more information.
2. Remove the inlet cap and add 0.9 ml of Solution ST1B using a pipette tip. Insert pipette completely into inlet so that pipette tip is visible inside the unit, just above the membrane.
   Note: Solution ST1B is a cell-release solution that helps pull microbes from the membrane into the solution so that they can be lysed. After Solution ST1A is added to the bottle labeled Solution ST1B, it should be stored at 2–8°C.
3. Re-cap the inlet and secure the Sterivex filter unit horizontally, with the inlet facing out, to a vortex adapter.
4. Vortex at minimum speed for 5 min.

5. While still attached to the vortex adapter, rotate the Sterivex filter unit 180 degrees from the original position. Vortex at minimum speed for an additional 5 min.
6. Set the Sterivex filter unit with the inlet facing up and remove the inlet cap. Add 0.9 ml of Solution MBL using a pipette tip. Insert pipette completely into the inlet so that the pipette tip is visible inside the unit, just above the membrane. Re-cap the inlet.
   Note: Solution MBL is a strong lysing reagent that includes a detergent to help break cell walls and will remove non-DNA organic and inorganic materials. It is also part of the Inhibitor Removal Technology (IRT). When cold, this solution will form a white precipitate in the bottle. Heating to 65°C will dissolve the components without damaging them. Solution MBL should be used while it is still warm.
7. Incubate the Sterivex filter unit at 90°C for 5 min. Ensure heat is evenly distributed.
   Note: Do not heat at higher temperatures or for longer than 5 min.
   Note: For samples containing easy-to-lyse organisms or where less DNA shearing is desired, this step can be omitted. Refer to the "Alternative Lysis Methods" section, page 18, in the "Troubleshooting Guide".
8. Cool the unit at room temperature for 2 min. Ensure that the caps are on tightly.
9. Secure the Sterivex filter unit horizontally, with the inlet facing out, to a vortex adapter.
10. Vortex at maximum speed for 5 min. Set the Sterivex filter unit with the inlet facing up and remove the inlet cap.
    Note: Vortexing at maximum speed helps to further free microbes and lyse cells within the Sterivex filter membrane.
11. Pull back the plunger of a 3 ml syringe to fill the barrel with 1 ml of air, and then attach it to the inlet of Sterivex filter unit. Push air into the unit until there is resistance, and then release the plunger. Continue to pull back on the plunger to remove as much of the lysate as possible. Detach the syringe from the Sterivex filter unit.
    Note: Lysate containing both intact and lysed microbes is removed from the Sterivex filter unit for further processing.
12. Add the lysates to 5 ml glass PowerBead Tubes. Secure the PowerBead Tubes horizontally to a vortex adapter.

Note: For samples containing easy-to-lyse organisms or where less DNA shearing is desired, steps 12 and 13 can be omitted. Refer to the "Alternative Lysis Methods" section, page 18, in the "Troubleshooting Guide".

13. Vortex at maximum speed for 5 min. Centrifuge at 4000 x *g* for 1 min.
14. Transfer all the supernatant to a clean 2.2 ml collection tube.
    Note: Placing the pipette tip down into the beads and against the bottom of the tube is required. Pipet more than once to ensure removal of all the supernatant. Any carryover of beads will not affect subsequent steps. Expect to recover ~1.5 ml of supernatant. The supernatant is separated and removed from sample debris and beads at this step.
15. Add 300 µl of Solution IRS and vortex briefly to mix. Incubate at 2–8°C for 5 min.
    Note: Solution IRS is another part of the Inhibitor Removal Technology® (IRT) and is a second reagent to remove additional non-DNA organic and inorganic materials, including humic acid, cell debris, and proteins. It is important to remove contaminating organic and inorganic matter that may reduce DNA purity and inhibit downstream DNA applications.
16. Centrifuge the tube at 13,000 x *g* for 1 min. Avoiding the pellet, transfer the supernatant to a clean 5 ml collection tube.
    Note: The pellet at this point contains additional non-DNA organic and inorganic materials. For highest DNA yield and purity, avoid transferring any of the pellet.
17. Place a tube extender firmly into an MB Spin Column.
    Note: The tube extender serves as an MB Spin Column extender that allows the one-step addition of all sample lysate (4.5 ml) without the use of a midi or maxi column and centrifugation.
18. Attach the tube extender/MB Spin Column unit to a VacConnector and VacValve on the QIAvac 24 Plus Manifold.
19. Add 3 ml of Solution MR to the collection tube that contains supernatant. Vortex to mix.
    Note: Solution MR is a high-concentration salt solution. DNA binds tightly to silica at high salt concentrations. Solution MR adjusts the salt concentration to selectively allow for the binding of DNA to the MB Spin Column filter membrane, but non-DNA organic

and inorganic materials that may still be present at low levels are prevented from binding.

20. Load the entire 4.5 ml of supernatant into the tube extender/MB Spin Column.
21. Turn on the vacuum source and open the VacValve of the port. Allow the lysate to pass through. After the lysate has passed through completely, close the VacValve of that port.
    Note: The DNA is selectively bound to the MB Spin Column filter membrane while contaminants pass through.
22. While keeping the MB Spin Column attached to the VacValve , remove the tube extender from the MB Spin Column and discard.
    Note: The tube extender is discarded so that the MB Spin Column can be washed
23. Add 0.8 ml of ethanol into the MB Spin Column. Open the VacValve. Allow the ethanol to pass through the column completely. Close the VacValve.
    Note: The ethanol prewash helps remove residual contaminants, to result in higher DNA purity and yield.
24. Add 0.8 ml of Solution PW to the MB Spin Column. Open the VacValve and allow Solution PW to pass through the column completely. Continue to pull a vacuum for another minute to dry the membrane. Close the VacValve.
    Note: Solution PW is an alcohol-based wash solution used to further clean the DNA that is bound to the MB Spin Column filter membrane. This wash solution removes residual salt and other contaminants while allowing the DNA to stay bound to the MB Spin Column filter membrane.
25. Add 0.8 ml of ethanol to the MB Spin Column. Open the VacValve and apply a vacuum until the ethanol has passed through the MB Spin Column completely. Continue to pull a vacuum for another minute to dry the membrane. Close the VacValve.
    Note: Ethanol ensures complete removal of Solution PW, to result in higher DNA purity and yield.
26. Turn off the vacuum source and open an unused port to vent the manifold. If all 20 ports are in use, break the vacuum at the source.

27. Remove the MB Spin Column and place in a 2.2 ml collection tube. Centrifuge the tube at 13,000 x *g* for 2 min to completely dry the membrane.
    Note: The second spin removes residual ethanol. It is critical to remove all traces of ethanol because it can interfere with downstream DNA applications such as PCR, restriction digests, and gel electrophoresis.
28. Transfer the MB Spin Column to a new 2.2 ml collection tube and add 100 µl of Solution EB or sterile, DNA-free, PCR-grade water to the center of the white filter membrane.
    Note: Placing EB (sterile elution buffer) in the center of the small white membrane will ensure the entire membrane is wet. This will result in a more efficient and complete release of the DNA from the filter membrane. As Solution EB passes through the MB Spin Column filter membrane, the DNA that was bound in the presence of high salt is selectively released by Solution EB (10 mM Tris), which lacks salt. Solution EB contains no EDTA. If DNA degradation is a concern, sterile TE may also be used instead of Solution EB for elution of DNA from the MB Spin Column.
    Note: Alternatively, sterile, DNA-free, PCR-grade water may be used for DNA elution from the MB Spin Column at this step.
29. Centrifuge at 13,000 x *g* for 1 min at room temperature. Discard the MB Spin Column. The DNA is now ready for any downstream application.
    Note: We recommend storing DNA frozen (–30 to –15°C* or –90 to –65°C†). To concentrate DNA, refer to the "Troubleshooting Guide" on page 17.

* For freezers that are set at –20°C.
† For freezers that are set at –80°C.

Troubleshooting Guide

This troubleshooting guide may be helpful in solving any problems that may arise. For more information, see also the Frequently Asked Questions page at our Technical Support Center: **www.qiagen.com/FAQ/FAQList.aspx**. The scientists in QIAGEN Technical Services are always happy to answer any questions you may have about either the information and/or protocols in this handbook or sample and assay technologies. For contact information, visit **www.qiagen.com**.

		Comments and suggestions
Sample processing		
a)	Filter membrane selection	We recommend Sterivex filter units (Millipore cat. no. SVGPL10RC). These units have a male Luer-Lok tip (outlet) that can be easily capped, minimizing the risk of sample loss or leakage. Other commonly used units have a male tip only. If units containing a male tip are used instead of the male Luer-Lok tip, an alternate cap will need to be used. Capping methods include a male Luer plug, clay, or wax. Parafilm can also be used to help seal the unit and prevent leakage.
b)	Storage with SET buffer	SET (sucrose/EDTA/Tris) buffer should not be added to the Sterivex filter units for storage. Sterivex filter units can be stored frozen at –15 to –30°C without any solutions. If Sterivex filter units contain SET buffer, then the buffer should be pushed through the unit with a syringe and the units washed with a balanced salt solution, such as sterile phosphate buffered saline (PBS) or 0.85% saline. Removal of the SET buffer and washing of the unit may cause a reduction in DNA yield due to premature lysis of labile organisms.
c)	MB Spin Columns get clogged	Check to make sure there are no cracks or breaks in the Luer-Lok fittings, which would result in loss of vacuum pressure at that port. Solution MR must be heated and used while still warm to ensure a steady flow through the column under vacuum. If the MB Spin Columns become clogged, the syringe plunger can be reinserted and used to manually push the lysate through the column. Alternatively, the MB Spin Columns can be placed in 2.2 ml collection tubes (provided) and centrifuged at 13,000 x *g* until all the lysate has flowed through and the DNA is bound to the column. The MB Spin Columns can then be placed back onto the vacuum manifold for washing or kept in the 2.2 ml collection tubes and washed using centrifugation.

		Comments and suggestions
DNA		
a)	You obtain low $A_{260/230}$ ratios	$A_{260/230}$ readings are one measure of DNA purity. For samples with low biomass, which would lead to low DNA yields (<20 ng/µl), this ratio may fall below 1.5. However, this ratio is not an indicator of amplification ability or DNA integrity. Ethanol precipitation followed by resuspension in a smaller volume to concentrate the DNA may help to improve the $A_{260/230}$ ratio.
b)	DNA does not amplify	Check DNA yields by gel electrophoresis or spectrophotometer reading. Template DNA concentrations and other reaction conditions, such as enzyme activity and copy number of the target sequence, can influence PCR outcomes. If DNA does not amplify after altering the concentration of template DNA, please contact QIAGEN Technical Services.
c)	Concentrating eluted DNA	The final volume of eluted DNA will be 100 µl. The DNA may be concentrated by adding 5 µl of 3 M NaCl and inverting 3–5 times to mix. Next, add 200 µl of 100% cold ethanol and invert 3–5 times to mix. Centrifuge at 10,000 x *g* for 5 min at room temperature. Decant all liquid. Briefly dry residual ethanol in a speed vac or ambient air. Avoid overdrying the pellet, or resuspension may be difficult. Resuspend precipitated DNA in desired volume of 10 mM Tris (Solution EB).
d)	DNA floats out of a well when loading a gel	This usually occurs because residual ethanol remains in the final sample. To ensure complete drying of the membrane after adding ethanol, centrifuge the MB Spin Column in a clean 2 ml collection tube for an additional minute. Ethanol precipitation (described in "Concentrating eluted DNA", previous row) is the best way to remove residual ethanol. If you live in a humid climate, you may experience increased difficulty drying the membrane in the centrifuge. Increase the centrifugation time at step 27 by another minute or until no visible moisture remains on the membrane.
e)	Storing DNA	DNA is eluted in Solution EB (10 mM Tris) and must be stored at –15 to –30°C or –65 to –90°C (for freezers set at –20°C or –80°C, respectively) to prevent degradation. DNA can be eluted in TE without loss, but the EDTA may inhibit downstream reactions such as PCR and automated sequencing.
Alternative lysis methods		
a)	Sample contains organisms that are easy or difficult to lyse (e.g., fungi, algae)	For samples containing easy-to-lyse organisms or where less DNA shearing is desired, the heating step (step 7) and the bead-beating step (steps 12 and 13) can be omitted. The heating and bead-beating steps are critical for samples that contain difficult-to-lyse organisms, such as spores, fungi, archaea, and cyanobacteria.

Appendix A: Types of Water Samples

This appendix describes types of water sample and how to effectively process them.

Clear water samples

Water samples may vary from clear to highly turbid. Larger volumes of clear water can be processed, because there is less chance of filters clogging. Potable drinking water and ocean samples will generally allow for very high volumes, depending on their quality and particulate count. In most cases, 100 ml – 10 liters can be processed. Some users report processing even higher volumes.

Turbid water samples

Turbid samples with high levels of suspended solids or sediments tend to clog the Sterivex filter units (0.22 micron), so less water can be filtered per unit. Prior to filtering, samples can be stored in a container to allow suspended solids to settle. For samples where settling does not occur or is not desired, using a prefilter with larger pore size is recommended.

Appendix B: Options in the Absence of a Vacuum Manifold

A vacuum manifold is highly recommended for this protocol. If a vacuum manifold is not available, a couple of alternative methods (listed below) can be used for processing a few samples at a time.

Using a syringe plunger

After step 16, use the syringe plunger to manually push the lysate through an MB Spin Column. Once all the lysate has been pushed through, the column can be added to a 2.2 ml collection tube (provided). Wash with 0.7 ml of Solution PW and centrifuge for 1 min at 13,000 x *g*. Discard flow-through and wash with 0.7 ml of ethanol and centrifuge for 1 min at 13,000 x *g*. Resume protocol from step 27.

Using a centrifuge

After step 16, add 3 ml of Solution MR to the collection tube containing supernatant. Vortex to mix. Place an MB Spin Column in a 2.2 ml collection tube (provided) and load 700 µl of supernatant. Centrifuge for 1 min at 13,000 x *g*. Discard the flow-through and repeat until all the supernatant has been loaded into the MB Spin Column. Up to 7 loads may be required for each sample that is processed. Wash with 0.7 ml of Solution PW, and then centrifuge for 1 min at 13,000 x *g*. Discard the flow-through, and then wash with 0.7 ml of ethanol. Centrifuge for 1 min at 13,000 x *g*. Resume protocol from step 27.

Ordering Information

Product	Contents	Cat. no.
DNeasy PowerWater Sterivex Kit (50)	For 50 preps: Isolation of genomic DNA from water samples collected with Sterivex filter units	14600-50-NF
Related Products		
DNeasy PowerWater Kit (50)	For 50 preps: Isolation of genomic DNA from filtered water samples, including turbid water	14900-50-NF
DNeasy PowerWater Kit (100)	For 100 preps: Isolation of genomic DNA from filtered water samples, including turbid water	14900-100-NF
RNeasy® PowerWater Kit (50)	For 50 preps: Isolation of total RNA from filtered water samples, including turbid water	14700-50-NF
Vortex Adapter, Genie, holds 6 (5 ml) tubes	For vortexing 5 ml and 15 ml tubes using the Vortex-Genie 2 Vortex	13000-V1-5
QIAvac 24 Plus	Vacuum manifold for processing 1–24 spin columns; includes QIAvac 24 Plus Vacuum Manifold, Luer Plugs, and Quick Couplings	19413

For up-to-date licensing information and product-specific disclaimers, see the respective QIAGEN kit handbook or user manual. QIAGEN kit handbooks and user manuals are available at **www.qiagen.com** or can be requested from QIAGEN Technical Services or your local distributor.

Document Revision History

Document	Changes	Date
HB-2266-002	Inserted “Add 3 ml of Solution MR…” and “Vortex to mix” at the start of “Using a centrifuge” section, page 20. Removed cat. no. 13000-V1-15 (discontinued product) from vortex adapter recommendations.	May 2019

Notes

HB-2266-002 05/2019