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DNeasy® PowerPlant Pro® HTP 96 Kit Handbook

For high-throughput isolation of genomic DNA from plant and seed samples

QIAGEN

Contents

Kit Contents

DNeasy PowerPlant Pro HTP 96 Kit	(384)
Catalog no.	13496-4
Number of preps	4
PowerBead Solution	200 ml
Solution SL	2 x 15 ml
Solution IR	200 ml
Solution PB	255 ml
Solution IW	120 ml
Solution EB	51 ml
RNase A Solution (25 mg/ml)	2 ml
Phenolic Separation Solution	17 ml
QIAamp 96 Plates	4
Collection Plates 2 ml	4
Collection Plates 1 ml	4
S-Block	2
Elution Microtubes	4
AirPore Tape Sheet	25
Caps for Elution Microtubes	50 x 8
Sealing tape	16
Quick-Start Protocol	1

Storage

The DNeasy PowerPlant Pro HTP 96 Kit should be stored at room temperature (15–25°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.

CAUTION 	**Potentially reactive compound** **[C1]** Do not add bleach or acidic solutions directly to the sample preparation waste. The sample preparation waste contains guanidine thiocyanate from PowerBead® Solution and guanidine hydrochloride from Solution PB; these can form highly reactive compounds when combined with bleach. If liquid containing these buffers is spilt, clean with 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 PowerPlant Pro HTP 96 Kit is tested against predetermined specifications to ensure consistent product quality.

Introduction

With the DNeasy PowerPlant Pro HTP 96 Kit, highly reproducible yields of total cellular DNA can be isolated in under three hours. The high-throughput procedure processes 5–50 mg plant samples quickly and easily. Time is saved by eliminating individual pipetting, tedious labeling and additional resuspension steps. Cross-contamination is minimized, and inhibitors are efficiently removed. Purified DNA is ready for all downstream applications, including PCR and next-generation sequencing.

Principle and procedure

The DNeasy PowerPlant Pro HTP 96 Kit employs bead beating and a 96-well format to efficiently isolate DNA from ≤50 mg of wet plant sample or ≤10 mg of dry plant sample. Material is loaded into QIAamp 96 plates and shaken on a specialized plate shaker designed to facilitate the grinding process (TissueLyser II, cat. no. 85300, and adapters, cat. no. 11990, recommended). The lysis solution, which is added to the sample, processes material without the use of phenol and chloroform, facilitating cellular breakdown when combined with the action of the mechanical shaker.

The addition of Phenolic Separation Solution (PSS) efficiently removes polyphenolic compounds from difficult plant sample types, including grape leaf and pine. Polyphenolic compounds can bind to DNA and reduce nucleic acid yields, which in turn reduce successful downstream applications. PSS prevents this loss by breaking and inhibiting this bond before phenolic compounds are removed. However, not all plants require the addition of this solution. Running small samples with and without the PSS step and comparing the results will help determine if the plant samples in question will require this step.

Inhibitor Removal Technology (IRT) removes inhibitors from lysates before DNA is bound to the silica membrane on the spin plate. The spin plate is washed to remove contaminants and DNA eluted in a 10 nM Tris buffer (pH 8.0).

The DNA yield varies depending on age, tissue and phenolic compound level. Below is an estimate of the DNA yields possible from a variety of plant types. All samples were processed using the DNA PowerPlant Pro HTP 96 Kit.

Table 1. Possible DNA yields and PSS improvement

Plant samples	DNA yields (50 mg)	PSS*
Grape leaf	2.5–3.5 µg	+
Strawberry leaf	10–15 µg	+
Tomato stem	10–25 µg	+
Cotton leaf	2.5–3.5 µg	+/–
Cotton seed	20–25 µg	–
Grass leaf	40–50 µg	–
Pine needle	30–35 µg	+
Rice leaf	7–11 µg	–
Mint leaf	2–3 µg	–
Dried pepper leaf	10 µg	+/–
Soybean seed	5 µg	+
Watermelon, single seed	2.5 µg	+
Canola, 6 whole seeds	4 µg	+
Flax, 6 seeds with coat removed	2 µg	–
Wheat, single seed	10 µg	–
Barley, single seed	1.4 µg	–

* Yields were improved with the addition of PSS (+); Yields were reduced with the addition of PSS (-); Yields were the same with or without PSS (+/-).

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 (4500 x *g*) capable of spinning two stacked 96-well blocks (13 cm x 8.5 cm x 7.5 cm)

  Note: If the centrifuge used has a maximum speed under 4500 x *g*, see the Troubleshooting Guide, page 20.
- Multi-channel pipettor (50–650 µl)
- Pipette tips for multi-channel pipettor

  Note: The tips must fit in the round wells of the 1 ml blocks.
- Mechanical shaker capable of shaking 96-well blocks and plate adapter set
- Vortex with 3 inch platform
- Reagent reservoirs (optional)
- Metal bead plates (optional)

Protocol: Experienced User

Notes before starting

- If Solution SL contains precipitates, heat at 37–55°C to dissolve precipitates.
- Add 106 ml of 100% ethanol (user provided) to Solution IW before starting to prepare the final wash solution. Check the box and write the date on the label.
- For each prep, add 3 µl of RNase A to 0.45 ml PowerBead Solution before starting. For each 96-well plate, add 300 µl of RNase A to 45 ml of PowerBead Solution.

Procedure

1. Add up to 50 mg of wet plant material (or up to 10 mg of dry material) to your chosen bead homogenization plate. Add 450 µl of RNase A/PowerBead Solution (if your sample is low in phenolics), or 410 µl of RNase A/PowerBead Solution and 40 µl of Phenolic Separation Solution (if your sample is high in phenolics).

   Note: We recommend precutting the tissue into small pieces before loading into the bead homogenization plate. For tough plants or seeds, pregrind the material with a mortar and pestle.

2. Add 50 µl of Solution SL to each sample. With its mat securely fastened, position the bead homogenization plate between 2 Adapter Plates (cat. no. 11990), and then place the entire thing on a TissueLyser II (cat. no. 85300).

3. Shake the plate at 20 Hz for 8 min. Remove the plate and reposition so that the side closest to the machine body is now furthest from it, and then shake again at 20 Hz for another 8 min.

   Note: For samples other than soft leaf tissue, optimization of bead-beating settings specific to your sample type is required.

4. Centrifuge at 4500 x g for 9 min. Remove and discard sealing mat. Transfer supernatant to a clean 1 ml Collection Plate (supernatant may still contain particles and debris).
5. Add 175 µl of Solution IR and apply sealing tape to plate. Vortex for 5 s.

   Note: For problematic samples, add up to 250 µl of Solution IR.
6. Incubate the 1 ml Collection Plate at 4°C for 10 min. Centrifuge at 4500 x g for 9 min. Remove and discard the sealing tape.
7. Avoiding the pellet, transfer the supernatant to a clean 2 ml Collection Plate.
8. Add 600 µl of Solution PB to the first row of the 2 ml Collection Plate containing the supernatant and pipet up and down to mix. Repeat for all remaining rows.
9. Add 600 µl of 100% ethanol (user provided) and pipet up and down to mix.
10. Seal any unused wells of a QIAamp 96 Plate with AirPore Tape Sheet and place the QIAamp 96 Plate onto an S-Block.
11. Carefully transfer half of each sample (from the 2 ml Collection Plate) to the QIAamp 96 Plate. Apply AirPore Tape Sheet and centrifuge at 4500 x g for 5 min.
12. Repeat Step 11 until all the supernatant has been processed (2 loads).
13. Discard the flow-through from the S-Block and replace the same S-Block beneath the QIAamp 96 Plate. Discard the AirPore Tape Sheet.
14. Make sure that 100% ethanol has been added to the bottle containing Solution IW. Add 500 µl of Solution IW to each well of the QIAamp 96 Plate.
15. Apply AirPore Tape Sheet. Centrifuge at 4500 x g for 3 min.
16. Add 500 µl of 100% ethanol (user provided) to each well of the Spin Plate. Apply a new piece of AirPore Tape Sheet and centrifuge at 4500 x g for 3 min.
17. Discard the flow-through and replace same S-Block beneath the QIAamp 96 Plate. Centrifuge at 4500 x g for 7 min.

18. Carefully place the QIAamp 96 Plate on an Elution Microtube Rack. Remove the AirPore Tape Sheet and discard. Air dry for 10 min at room temperature.

19. Add 100 µl of Solution EB to the center of the white filter membrane in the QIAamp 96 Plate wells. Apply a new piece of AirPore Tape Sheet. Incubate for 2 min at room temperature.

20. Centrifuge at 4500 x g for 3 min. Remove and discard the AirPore Tape Sheet. If all 96 wells were utilized, discard the entire QIAamp 96 plate.

21. Seal the Elution Microtubes with the Elution Microtube Caps (provided). The DNA is now ready for downstream applications.

Protocol: Detailed Vacuum and Centrifugation Protocol

Notes before starting

- If Solution SL contains precipitates, heat at 37–55°C to dissolve precipitates.
- Add 106 ml of 100% ethanol (user provided) to Solution IW before starting to prepare the final wash solution. Check the box and write the date on the label.
- For each prep, add 3 µl of RNase A to 0.45 ml PowerBead Solution before starting. For each 96-well plate, add 300 µl of RNase A to 45 ml of PowerBead Solution.
- If processing fewer than 192 samples (two 96-well preps), divide samples between 2 plates evenly so that plates are always balanced.

Procedure

1. Add up to 50 mg of wet plant material (or up to 10 mg of dry material) to your chosen bead homogenization plate. Add 450 µl of RNase A/PowerBead Solution (if your sample is low in phenolics), or 410 µl of RNase A/PowerBead Solution and 40 µl of Phenolic Separation Solution (if your sample is high in phenolics).

   Note: We recommend precutting the tissue into small pieces before loading into the bead homogenization plate. For tough plants or seeds, pregrind the material with a mortar and pestle.

   Note: Plant material is added to the bead plate to prepare it for a bead-beating homogenization step. The PSS disassociates the phenolics from the nucleic acids so they can be removed during the Inhibitor Removal Technology (IRT) process.

2. Add 50 µl of Solution SL to each sample. With its mat securely fastened, position the bead homogenization plate between 2 Adapter Plates (cat. no. 11990), and then place the entire thing on a TissueLyser II (cat. no. 85300).

   Note: Solution SL contains SDS; it will form a precipitate if it gets cold. Heating and dissolving the solids will restore it to full efficiency. Solution SL may be used while still warm.

3. Shake the plate at 20 Hz for 8 min. Remove the plate and reposition so that the side closest to the machine body is now furthest from it, and then shake again at 20 Hz for another 8 min.

   Note: For samples other than soft leaf tissue, optimization of bead-beating settings specific to your sample type is required.

   Note: The bead-beating step homogenizes plant material without the need for manual grinding. In some cases, the plant material will not be completely disintegrated after the specified times of each method. However, there should be sufficient disruption for a good yield of DNA. The plate is rotated to ensure homogenization across all wells on the plate.

4. Centrifuge at 4500 x g for 9 min. Remove and discard sealing mat. Transfer supernatant to a clean 1 ml Collection Plate (supernatant may still contain particles and debris).

   Note: The supernatant contains DNA and other cell components. Avoid transferring any solid plant tissue at this point.

5. Add 175 µl of Solution IR and apply Sealing Tape to plate. Vortex for 5 s.

   Note: For problematic samples, add up to 250 µl of Solution IR.

6. Incubate the 1 ml Collection Plate at 4°C for 10 min. Centrifuge at 4500 x g for 9 min. Remove and discard the Sealing Tape.

   Note: Solution IR is a novel formulation of Inhibitor Removal Technology (IRT) and completes the process for removing PCR inhibitors in 1 step. This step pellets the proteins and inhibitors.

7. Avoiding the pellet, transfer the supernatant to a clean 2 ml Collection Plate.

8. Add 600 µl of Solution PB to the first row of the 2 ml Collection Plate containing the supernatant and pipet up and down to mix. Repeat for all remaining rows.

9. Add 600 µl of 100% ethanol (user provided) and pipet up and down to mix.

10. Seal any unused wells of a QIAamp 96 Plate with AirPore Tape Sheet.

11. Remove the top portion of the vacuum manifold and place an appropriate waste receptacle at the bottom of the vacuum manifold.

12. Replace the top of the manifold and place the QIAamp 96 Plate on top of the manifold and turn the vacuum pump on.

13. Ensure a good seal between the manifold and the QIAamp 96 Plate by gently lifting the plate – you should be able to lift the entire unit without the QIAamp 96 Plate separating from the manifold.

14. Carefully transfer 600 µl of each sample (from the 2 ml Collection Plate) to the QIAamp 96 Plate. Allow the liquid to pass through the wells until all samples have been processed. This may take up to 3 loads in total if processing 600 µl at a time. Turn off the vacuum.

    Note: In the presence of Solution PB and ethanol, DNA will bind to the spin filter plate. Passing the combined lysate through the spin filter allows the DNA to bind to the filter membrane while allowing unwanted salt and impurities to pass through the membrane.

15. Remove the QIAamp 96 Plate from the manifold and set it aside. Discard the flow-through from the waste reservoir at the bottom of the manifold, and then place the reservoir back in the manifold.

16. Reassemble the manifold with the QIAamp 96 Plate back on top of the manifold, and turn the vacuum on. Test the seal by lifting gently. Turn vacuum off and do not pick up the QIAamp 96 Plate.

17. Make sure that 100% ethanol has been added to the bottle containing Solution IW. Add 500 µl of Solution IW to each well of the QIAamp 96 Plate. Apply the vacuum.

    Note: Solution IW is an ethanol-containing wash buffer that removes residual salt and other impurities from the spin filter membrane.

18. After Solution IW has passed through the wells, turn off the vacuum. Add 500 µl of 100% ethanol (user provided) to each well of the Spin Plate. Apply vacuum.

    Note: To completely remove all residual salt from the spin filter membrane, use 100% ethanol.

19. Once the ethanol has passed through the wells, turn off the vacuum.

20. Place a 0.5 ml Collection Plate beneath the spin plate. Apply AirPore Tape sheet and centrifuge at 4500 x g for 7 min.

    Note: The ethanol remaining in the spin plate is dried using centrifugation. It is very important to remove all traces of the wash solutions before continuing.

21. Carefully place the QIAamp 96 Plate on an Elution Microtube Rack. Remove the AirPore Tape Sheet and discard. Air dry for 10 min at room temperature.

    Important: This is a critical step. It is very important to allow traces of the previous wash solutions to evaporate.

22. Add 100 µl of Solution EB to the center of the white filter membrane in the QIAamp 96 Plate wells. Apply a new piece of AirPore Tape Sheet. Incubate for 2 min at room temperature.

    Note: Solution EB is 10 mM Tris, pH 8.0. The bound DNA is resolubilized from the membrane into the low-salt buffer that is neutral pH, which protects DNA during storage. See the Troubleshooting Guide (page 20) for more details.

23. Centrifuge at 4500 x g for 3 min. Remove and discard the AirPore Tape Sheet. If all 96 wells were utilized, discard the entire QIAamp 96 plate.

24. Seal the Elution Microtubes with the Elution Microtube Caps (provided). The DNA is now ready for downstream applications.

Protocol: Detailed Centrifuge Protocol

Notes before starting

- If Solution SL contains precipitates, heat at 37–55°C to dissolve precipitates.
- Add 106 ml of 100% ethanol (user provided) to Solution IW before starting to prepare the final wash solution. Check the box and write the date on the label.
- For each prep, add 3 µl of RNase A to 0.45 ml PowerBead Solution before starting. For each 96-well plate, add 300 µl of RNase A to 45 ml of PowerBead Solution.
- If processing fewer than 192 samples (two 96-well preps), divide samples between 2 plates evenly so that plates are always balanced.

Procedure

1. Add up to 50 mg of wet plant material (or up to 10 mg of dry material) to your chosen bead homogenization plate. Add 450 µl of RNase A/PowerBead Solution (if your sample is low in phenolics) or 410 µl of RNase A/PowerBead Solution and 40 µl of Phenolic Separation Solution (if your sample is high in phenolics).

   Note: We recommend precutting the tissue into small pieces before loading into the bead homogenization plate. For tough plants or seeds, pregrind the material with a mortar and pestle.

   Note: Plant material is added to the bead plate to prepare it for a bead-beating homogenization step. The PSS disassociates the phenolics from the nucleic acids so that they can be removed during the Inhibitor Removal Technology (IRT) process.

2. Add 50 µl of Solution SL to each sample. With its mat securely fastened, position the bead homogenization plate between 2 Adapter Plates (cat. no. 11990), and then place the entire thing on a TissueLyser II (cat. no. 85300). Refer to the adapter plate protocol for proper placement.

3. Shake the plate at 20 Hz for 8 min. Remove the plate and reposition so that the side closest to the machine body is now furthest from it, and then shake again at 20 Hz for 8 min.

   Note: For samples other than soft leaf tissue, optimization of bead-beating settings specific to your sample type is required.

   Note: The bead-beating step homogenizes plant material without the need for manual grinding. In some cases, the plant material will not be completely disintegrated after the specified times of each method. However, there should be sufficient disruption for a good yield of DNA. The plate is rotated to ensure equal homogenization across all of the wells on the plate.

4. Centrifuge at 4500x g for 9 min. Remove and discard sealing mat. Transfer supernatant to a clean 1 ml Collection Plate (supernatant may still contain particles and debris).

   Note: This step will pellet unwanted cell and tissue debris. The supernatant contains this DNA and other cell components. Avoid transferring any of the pellet.

5. Add 175 µl of Solution IR and apply Sealing Tape to plate. Vortex for 5 s.

   Note: For problematic samples, add up to 250 µl of Solution IR.

6. Incubate the 1 ml Collection Plate at 4°C for 10 min. Centrifuge at 4500 x g for 9 min. Remove and discard the Sealing Tape.

   Note: Solution IR is a novel formulation of Inhibitor Removal Technology (IRT) and completes the process for removing PCR inhibitors in 1 step. This step pellets proteins and inhibitors.

7. Avoiding the pellet, transfer the supernatant to a clean 2 ml Collection Plate.

8. Add 600 µl of Solution PB to the first row of the 2 ml Collection Plate containing the supernatant and pipet up and down to mix. Repeat for all remaining rows.

9. Add 600 µl of 100% ethanol (user provided) and pipet up and down to mix.

10. Seal any unused wells of a QIAamp 96 Plate with AirPore Tape Sheet and place the QIAamp 96 Plate onto an S-Block.

11. Carefully transfer 600 µl of each sample (from the 2 ml Collection Plate) to the QIAamp 96 Plate. Apply AirPore Tape Sheet and centrifuge at 4500 x g for 5 min.

12. Repeat Step 11 until all the supernatant has been processed (2 loads).

    Note: In the presence of Solution PB and ethanol, DNA will bind to the spin filter plate. Centrifugation of the combined lysate through the spin filter allows the DNA to bind to the filter membrane while allowing unwanted salt and impurities to pass through the membrane.

13. Discard the flow-through from the S-Block and replace the same S-Block beneath the QIAamp 96 Plate. Discard the AirPore Tape Sheet.

14. Make sure that 100% ethanol has been added to the bottle containing Solution IW. Add 500 µl of Solution IW to each well of the QIAamp 96 Plate.

15. Apply AirPore Tape Sheet. Centrifuge at 4500 x g for 3 min.

    Note: Solution IW is an ethanol-containing wash buffer that removes residual salt and other impurities from the spin filter membrane.

16. Add 500 µl of 100% ethanol (user provided) to each well of the Spin Plate. Apply a new piece of AirPore Tape Sheet and centrifuge at 4500 x g for 3 min.

    Note: The addition of 100% ethanol is used to completely remove all residual salt from the spin filter membrane.

17. Discard the flow-through and replace same S-Block beneath the QIAamp 96 Plate. Centrifuge at 4500 x g for 7 min.

    Note: The ethanol remaining in the spin plate is dried using centrifugation. It is very important to remove all traces of the wash solutions before continuing.

18. Carefully place the QIAamp 96 Plate on an Elution Microtube Rack. Remove the AirPore Tape Sheet and discard. Air dry for 10 min at room temperature.

    Important: This is a critical step. This allows all traces of the previous wash solutions to evaporate.

19. Add 100 µl of Solution EB to the center of the white filter membrane in the QIAamp 96 Plate wells. Apply a new piece of AirPore Tape Sheet. Incubate for 2 min at room temperature.

    Note: Solution EB is 10 nM Tris, pH 8.0. The bound DNA is resolubilized from the membrane into the neutral pH, low-salt buffer which protects DNA during storage. See Troubleshooting Guide (page 20) for more details.

20. Centrifuge at 4500 x *g* for 3 min. Remove and discard the AirPore Tape Sheet. If all 96 wells were utilized, discard the entire QIAamp 96 plate.

21. Seal the Elution Microtubes with the Elution Microtube Caps (provided). The DNA is now ready for downstream applications.

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 the information and protocols in this handbook or about sample and assay technologies in general. For contact information, visit **www.qiagen.com**.

		Comments and suggestions
Processing fewer than 192 samples		
a)	Distribute samples between two plates	Balance the number of samples so that centrifugation steps do not damage the centrifuge. Match the total number of samples per plate, as well as the orientation (e.g., if wells A1–A12 are used on one plate, use those same wells on the second plate).
Sample distribution		
a)	Multi-channel pipettors	Use of a multi-channel pipettor is advised for maximum efficiency; one with a broad range of volumes is ideal (50 µl–650 µl).
b)	Reagent reservoirs	Use reagent reservoirs for the most efficient pipetting.
c)	Mark used wells	Mark all used wells to prevent reusing wells and cross-contamination.
Sample amount		
a)	Amount of sample to process	This depends on plant type. Usually 5–50 mg works well (~1 to 6 hole punches of leaf tissue or equivalent).

		Comments and suggestions
DNA		
a)	Concentrating eluted DNA	The final volume will be 100 µl. If this is too dilute, DNA can be concentrated by ethanol precipitation. This will be most efficient in smaller microcentrifuge tubes. Add 4 µl of 5 M NaCl or 10 µl of 3 M sodium acetate (pH 5.2), and then mix. Then add 200 µl of 100% cold ethanol. Incubate at –20°C for 10 minutes to overnight. Centrifuge at 13,000 x *g* for 15 minutes. Decant all liquid. Wash the DNA with 70% ethanol. Centrifuge for 10 minutes at 13,000 x *g*. Decant the ethanol and allow to dry in a speed vac or desiccator or ambient air. Resuspend precipitated DNA in desired volume.
b)	DNA floats out of a well when loading a gel	This usually occurs because residual ethanol remains in the final sample. Ethanol precipitation (described in "Concentrating eluted DNA", previous paragraph) is the best way to remove residual ethanol.
c)	Storing DNA	DNA is eluted in Solution EB (10 mM Tris) and must be stored at –20°C to –80°C to prevent degradation. DNA can be eluted in TE without loss, but the EDTA may inhibit downstream reactions such as PCR and automated sequencing.

Ordering Information

Product	Contents	Cat. no.
DNeasy PowerPlant Pro HTP 96 Kit (384)	For 4 preps: For high-throughput isolation of genomic DNA from plant and seed samples	13496-4
DNeasy PowerPlant Pro Kit (50)	For 50 preps: For the isolation of genomic DNA from plant and seed samples	13400-50
RNeasy® PowerPlant Kit (50)	For 50 preps: For isolating total RNA from difficult plant and seed samples.	13500-50
TissueLyser II	1 unit	85300
Plate Adapter Set	Set of four adapters required to assemble two 96-well plates onto the 96 Well Plate Shaker	11990

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.

Handbook Revision History

Document	Date	Changes
HB-2263-002	November 2018	In statements that say, “Add 300 µl of RNase A to 45 µl PowerBead Solution”, replaced “45 µl” with “45 ml”. Deleted warning for Solution CB.