

Nanotrap® Microbiome Combined; 35 mL Manual Protocol with QIAamp Viral RNA Mini Kit

Objective: This protocol uses Nanotrap Microbiome A Particles and Nanotrap Microbiome B Particles and Nanotrap Enhancement Reagent 3 to capture and concentrate microbes in environmental water samples. It is optimized for microbe capture from 35 mL samples and is compatible with QIAGEN QIAamp Viral RNA Mini Kit.

Materials and equipment:

Sample Type	
Environmental Water Samples	
Concentration Reagent	Vendor
Nanotrap® Microbiome A Particles	Ceres Nanosciences; SKU# 44202
Nanotrap® Microbiome B Particles	Ceres Nanosciences; SKU# 65202
Nanotrap® Enhancement Reagent 3 (ER3) ¹	Ceres Nanosciences; SKU# 10113
Extraction Kit	Vendor
QIAamp Viral RNA Mini Kit	QIAGEN; Cat # 52906
Materials/Equipment	Vendor
Heat Block	Southern Labware; SKUBSH200
Mini Centrifuge	Scientific Industries; SKU WZ-MF6000
DynaMag™-50 Magnet	Thermo Fisher Scientific; Cat# 12302D
DynaMag™-2 Magnet	Thermo Fisher Scientific; Cat# 12321D
50 mL Conical Centrifuge Tubes	Stellar Scientific; SKU T15-100
Tube Rotator	Stellar Scientific; SKU BS-RTMNI-2
Serological Pipettes and Controller	Fisherbrand; Cat# 13-678-11E
2mL Micro Centrifuge tubes	Stellar Scientific; SKU T20-100
Mini Vortex Mixer	Scientific Industries; SKU SI-236
General Reagents	Vendor
80% Ethanol	Decon™ Laboratories Decon Labs; # 3916EA
Molecular Biological Grade Water	Corning; Cat# 46-000-CM

¹ Precipitate can form in ER3 if stored below room temperature. Allow ER3 to return to room temperature to dissolve the precipitate (can invert 2-3 times to help resuspend, do not heat).

Capture and Extract Microbes using Nanotrap Microbiome Particles

Procedure:

1. Nanotrap Combined QIAamp Manual Procedure-Part 1

1. Invert the environmental water sample 5 times to mix. Then, let it sit for 45 seconds at room temperature. (No need to wait for sample to reach room temperature before processing)
2. Add 35 mL of environmental water sample into a clean 50 mL conical tube.
3. Add 100 μ L of Nanotrap Enhancement Reagent 3 (ER3) to the sample and then invert 2 times to mix it.
4. Add 525 μ L of Nanotrap Microbiome A Particles to the sample and then invert 2 times to mix the particles.
5. Add 525 μ L of Nanotrap Microbiome B Particles to the sample and then invert 2 times to mix the particles
6. Incubate samples with Nanotrap particles at room temperature for 10 minutes.

Note: Invert every 5 minutes or use a rotator.

7. Place the tube on a DynaMag-50 magnetic rack to separate the Nanotrap particles from the sample for 10 minutes.
8. Using a serological pipette, discard the supernatant carefully without disturbing the Nanotrap particle pellet.

Note: Can use a P-1000 or P-200 pipette to remove any remaining supernatant from the sample (be careful to not lose any Nanotrap particles when removing supernatant).

9. Add 1 mL of molecular grade water to the tube and re-suspend the Nanotrap particle pellet by pipetting on the walls of the conical tube, gently re-suspend until all Nanotrap particles have been completely collected.
10. Transfer the Nanotrap particle suspension to a new 2 mL microcentrifuge tube.
11. Place the 2 mL microcentrifuge tube on a DynaMag-2 magnetic rack to separate the Nanotrap particles from the sample for 2 minutes.
12. Using a P-1000 pipette, discard the supernatant carefully without disturbing the Nanotrap particle pellet.

Note: If any small amount of liquid is still present, use a smaller pipette to remove all the supernatant from the bottom of the tube.

13. Add 700 μ L of Buffer AVL to Nanotrap particle pellet, pipette up and down until Nanotrap particles are resuspended completely.
14. Close the tube lid, incubate the samples on a heating block at 95°C for 10 minutes.
15. Place the 2 mL microcentrifuge tube on a DynaMag-2 magnetic rack to separate the Nanotrap particles from the sample for 2 minutes.

Note: May need to briefly centrifuge the tube (Mini Centrifuge at 2000 g for 2-5 seconds) to remove drops from inside the lid before magnetic separation.

16. Transfer supernatant/lysate to a new 2 mL collection tube and discard the Nanotrap particles pellet.
17. Sample is now ready for Part 2.

2. Nanotrap Microbiome Combined QIAamp Manual Procedure-Part 2

1. Add 560 μ L 100% ethanol to lysate samples, vortex to ensure the sample is properly mixed. Briefly centrifuge the tube to remove drops from inside the lid.
2. Carefully apply 630 μ L of the solution to a QIAamp Mini column (in a 2 mL collection tube) without wetting the rim. Close the cap and centrifuge at 6000x g for 1 min.
3. Place the column into a clean 2 mL collection tube. Repeat step 2 with the remainder of the solution.
4. Place the column into a clean 2 mL collection tube. Open the column and add 500 μ L of Buffer AW1. Close the cap and centrifuge at 6000x g for 1 min.
5. Place the column into a clean collection tube. Open the column and add 500 μ L of Buffer AW2. Close the cap and centrifuge at full speed (20,000x g) for 3 min.
6. Place the column into a new 2 mL collection tube. Centrifuge at full speed for 1 min.
7. Place the column into a clean 2 mL collection tube.
8. Carefully open the column and add 100 μ L Buffer AVE. Close the cap and incubate at room temperature for 3 min.
9. Centrifuge at 6000x g for 1 min.
10. The sample is ready for downstream analysis or can be stored at -80°C.

Note: Multiple freeze-thaw cycles may cause degradation.
