Nanotrap® Microbiome A; 10 mL Manual Protocol with MagMAX™ Wastewater Ultra Nucleic Acid Isolation Kit

Objective: This protocol uses Nanotrap Microbiome A and Nanotrap Enhancement Reagent 1 to capture and concentrate microbes in environmental water samples. It is optimized for microbe capture from 10 mL samples and is compatible with MagMAX Wastewater Ultra Nucleic Acid Isolation Kit.

Materials and equipment:

Sample Type	
Environmental Water Samples	
Concentration Reagent	**Vendor**
Nanotrap Microbiome A	Ceres Nanosciences; SKU# 44202
Nanotrap Enhancement Reagent 1 (ER1) [1]	Ceres Nanosciences; SKU# 10111
Nanotrap Buffer 2	Ceres Nanosciences; SKU# 10102
Extraction Kit	**Vendor**
MagMAX Wastewater Ultra Nucleic Acid Isolation Kit	Thermo Fisher Scientific™; Cat# A52606
Materials/Equipment	**Vendor**
Heat Block	Southern Labware; SKUBSH200
Mini Centrifuge	Scientific Industries; SKU WZ-MF6000
DynaMag™-15 Magnet	Thermo Fisher Scientific™; Cat# 12301D
DynaMag™-2 Magnet	Thermo Fisher Scientific; Cat# 12321D
15 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 ER1 if stored below room temperature. Allow ER1 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 Microbiome A MagMAX Manual 10 mL 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 samples to reach room temperature before processing)
    2. Add 10 mL of environmental water sample into a clean 15 mL conical tube.
    3. Add 100 µL of Nanotrap Enhancement Reagent 1 (ER1) to the sample, cap the sample and then invert 2 times to mix it.
    4. Add 150 µL of Nanotrap Microbiome A Particles (Nanotrap particles) to the sample, cap the sample and then invert 2 times to mix the particles.
    5. Incubate samples with Nanotrap particles at room temperature for 10 minutes.

        Note: Invert every 5 minutes or use a rotator.
    6. Place the tube on a DynaMag-15 magnetic rack to separate the Nanotrap particles from the sample for 5 minutes.
    7. 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).
    8. Add 1 mL of Nanotrap Buffer 2 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.
    9. Transfer the Nanotrap particle suspension to a new 2 mL microcentrifuge tube.
    10. Place the 2 mL microcentrifuge tube on a DynaMag-2 magnetic rack to separate the Nanotrap particles from the sample for 2 minutes.
    11. 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.
    12. Add 500 µL of MagMAX™ Microbiome Lysis Solution to Nanotrap particle pellet, pipette up and down until Nanotrap particles are resuspended completely.
    13. Close the tube lid, incubate the samples on a heating block at 56°C for 10 minutes.
    14. 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.

15. Transfer 400 µL of supernatant/lysate to a new 2 mL collection tube and discard the Nanotrap particles pellet.
16. Sample is now ready for Part 2.

2. **Nanotrap Microbiome A MagMAX Manual Procedure-Part 2**

1. Add 530 µL of MagMAX Binding Buffer to the sample/lysate.
2. Add 10 µL of MagMAX Proteinase K to the sample/lysate.
3. Add 20 µL of MagMAX Magnetic Beads to the sample/lysate.
4. Vortex to mix, then incubate at 65^0 C on a heat block for 10 minutes.
5. Place the tube on a DynaMag-2 magnetic rack to separate the magnetic beads from the sample for 2 minutes, then discard the supernatant using a pipette.

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.

6. Add 1000 µL of MagMAX wash buffer to sample and re-suspend the magnetic beads using a pipette.
7. Place the tube on a DynaMag-2 magnetic rack to separate the magnetic beads from the sample for 2 minutes, then discard the supernatant.
8. Add 1000 µL of 80% EtOH to sample and re-suspend the magnetic beads using a pipette.
9. Place the tube on a DynaMag-2 magnetic rack to separate the magnetic beads from the sample for 2 minutes, then discard the supernatant.
10. Add 500 µL of 80% EtOH to sample and re-suspend the magnetic beads using a pipette.
11. Place the tube on a DynaMag-2 magnetic rack to separate the magnetic beads from the sample for 2 minutes, then discard the supernatant by using a pipette.
12. Centrifuge the tube (Mini Centrifuge at 2000 g for 30 seconds).
13. Place the tube on a DynaMag-2 magnetic rack, then remove excess 80% EtOH using a smaller pipette.
14. Add 100 µL of MagMAX Elution Solution to re-suspend the magnetic beads and then incubate at 65^0 C for 10 minutes on a heat block (close caps).
15. Place the tube in the DynaMag-2 magnetic rack to separate the magnetic beads 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/condensation from inside the lid before magnetic separation.

16. Transfer the supernatant to a new tube, the sample is ready for downstream analysis or can be stored at -80^{0} C.

    Note: Multiple freeze-thaw cycles may cause degradation.