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ONEMag™ Rapid Soil DNA Extraction Kit

(ONE-SLDNA-50)

Principle:

The **ONEMag™ Rapid Soil DNA Extraction Kit** is based on magnetic bead–based purification technology for rapid and efficient isolation of high-quality genomic DNA from soil samples.

Soil samples containing microbial cells, plant material, humic substances, and other environmental inhibitors are subjected to mechanical and chemical lysis using a proprietary lysis buffer to release nucleic acids. Insoluble debris and particulate matter are removed during sample clarification. Under optimized chaotropic salt conditions, genomic DNA selectively binds to silica-coated magnetic beads, while proteins, humic acids, polysaccharides, and other soil-derived contaminants remain in solution.

The magnetic beads are separated using a magnetic field and washed sequentially to remove residual inhibitors and salts. A brief air-drying step ensures complete removal of wash buffer residues. Purified DNA is then eluted under low-salt conditions.

The isolated DNA is suitable for downstream molecular applications including PCR, qPCR, microbial community analysis, metagenomics, and next-generation sequencing (NGS).

Kit Contents:

Components	Quantity (50 Reactions)
LM Tubes	50 Tubes
SL Buffer	25 mL
PC Buffer	25 mL
BB Buffer	30 mL
Magnetic Bead	3 mL
BW Buffer (Concentrate)	15 mL
BE Buffer	3 mL

Material's/Equipment's Required but not Supplied:

- Ethanol (96–100%), Molecular Grade
- Micropipettes and sterile tips
- 1.5 mL Microcentrifuge Tubes
- Heating block or Water bath
- Vortex Mixer
- Magnetic Stand for 1.5/2.0 mL tubes

Storage Conditions:

All components of the **ONEMag™ Rapid Soil DNA Extraction Kit** should be stored at room temperature (~25°C). The kit is stable until the expiration date printed on the product label when stored under recommended conditions.

Preparation of Buffers

Preparation of BW Buffer

BW Buffer is supplied as a concentrate and must be diluted with ethanol before use.

Component	Volume for 50 Reactions
BW Buffer (Concentrate)	15 mL
Ethanol (96-100%)	45 mL
Final Volume	60 mL

Mix thoroughly and store at room temperature.

Protocol:

1. Weigh up to 250 mg of soil sample into an LM tube containing ceramic beads.
2. Add 400 µL of SL Buffer and 400 µL of PC Buffer, then vortex vigorously for 5 minutes to ensure efficient mechanical lysis.
3. Incubate at 65 °C for 15 minutes.
4. Invert the tube several times during incubation to mix the sample.
5. Centrifuge at 8,000 rpm for 8 minutes and transfer 500 µL of lysate to a new 1.5 mL tube.
6. Add 500 µL of BB buffer and vortex well.
7. Add 20 µL of magnetic beads and vortex thoroughly.
8. Incubate at room temperature for 5 minutes.
9. Place the tube on a magnetic stand and allow the beads to separate for 30 seconds.
10. Carefully discard the supernatant without disturbing the beads.
11. Add 500 µL of BW buffer and vortex well.
12. Place the tube on the magnetic stand for 30 seconds.
13. Carefully discard the supernatant.
14. Repeat the wash step once more (Steps 11–13).
15. Remove any residual buffer and air-dry the beads for 1 minute. Do not over-dry.
16. Add 50 µL of BE buffer, vortex briefly, and incubate at room temperature for 5 minutes.
17. Place the tube on the magnetic stand for 1 minute, then transfer the eluted DNA to a new tube and store at –20 °C.

Troubleshooting Guide:

Problem	Possible Cause	Recommended Solution
Low DNA yield	Incomplete mechanical or chemical lysis	Ensure soil is added to LM tube with ceramic beads; vortex vigorously for the full 5 minutes and incubate at 65 °C for 15 minutes.
	Insufficient sample homogenization	Mix thoroughly by vortexing and invert tubes during incubation to improve lysis efficiency.
	Loss of beads during supernatant removal	Place tube fully on magnetic stand; remove supernatant carefully, leaving a small residual volume if needed.
Poor DNA purity (PCR inhibition)	Carryover of humic substances or soil inhibitors	Perform all wash steps completely; repeat the BW Buffer wash once more if inhibition persists.
	Incorrect BW Buffer preparation	Confirm BW Buffer concentrate is diluted with the correct volume of ethanol before use.
	Residual wash buffer or ethanol	Air-dry beads for ~1 minute only; do not over-dry or leave visible liquid.
Beads do not separate properly	Magnetic stand not suitable	Use a magnetic stand compatible with 1.5/2.0 mL tubes and ensure firm tube contact.
	Insufficient separation time	Allow beads to settle for at least 30 seconds before removing supernatant.
Cloudy or viscous lysate	High organic content or clay-rich soil	Increase centrifugation time slightly and transfer only clear lysate for binding.
	Excess soil input	Do not exceed 250 mg soil per extraction.
Low PCR / qPCR performance	Residual inhibitors	Ensure complete washing and ethanol removal; dilute DNA 1:5 or 1:10 before PCR if needed.
	Elution volume too low	Increase BE Buffer volume slightly (e.g., 60–80 µL) if higher yield is required.
No DNA detected	Magnetic beads discarded accidentally	Always confirm bead capture on the magnetic stand before aspirating supernatant.
	Elution step missed or incorrect	Add BE Buffer directly onto beads, mix well, and incubate for full 5 minutes before separation.
DNA degradation	Improper storage of eluted DNA	Store purified DNA at −20 °C for long-term storage; avoid repeated freeze–thaw cycles.