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Introduction

The E.Z.N.A.™ BAC/PAC DNA Isolation Kit is designed for rapid high-throughput purification of BACs, PACs, and P1s from small volume of bacterial cultures. It is based on a modified alkaline lysis procedure that is specially adapted for spin-column and high-throughput procedures. The procedure associated with this kit has been tested using a variety of low copy cosmids, BACs, PACs, P1s, and E.Coli strains. In addition this kit can also be used for high copy plasmid isolation. Two protocols are provided in this handbook for your convenience. The new standard protocol provide fast and reliable method for purify BAC, PAC, P1 and plasmid by using HiBind DNA spin column. The second protocol is for the isolation of low-copy cosmids, BACS, PACs, and P1s.

New in this edition

- HiBind DNA column replaces the E.Z.N.A. Filter Column
- New standard protocol provide fast and reliable performance
- Glycogen is replaced by linear polyacrylamides
- New BAC Binding Buffer and SPM Buffer are introduced

Storage and Stability

All E.Z.N.A.™ BAC/PAC DNA Isolation Kit components are guaranteed for at least 12 months from the date of purchase when stored as follows: Buffer T1/RNase A mixture at 4° C, and all other materials at 22-25 °C.

Kit Contents

Product Number	D2156-00	D2156-01	D2156-02
HiBind® DNA Columns	5	50	200
2 ml Collection Tubes	5	50	200
Buffer T1	5 ml	20 ml	60 ml
Buffer T2	5 ml	20 ml	60 ml
Buffer T3	5 ml	20 ml	60 ml
Equilibration Buffer	1.5 mL	7 mL	25mL
BAC Binding Buffer	1.5 ml	5 ml	15 ml
Elution Buffer	1.0 ml	10 ml	40 ml
SPM Buffer	3 ml	15 ml	60 ml
Linear Polyacrylamides	15 µl	120 µl	450 µl
RNase A, Concentrate	50 µl	100 µl	400 µl
Instruction Booklet	1	1	1

* Elution Buffer = 10mM Tris-HCl, pH 8.5

* Equilibration Buffer contains Sodium Hydroxide. Use gloves and protective eyewear when handling this solution.

Before Starting

IMPORTANT	Add vial of RNase A to bottle of Buffer T1 and Store at 4°C
	Dilute BAC Binding Buffer with isopropanol as follows
	D2156-00 Add 4.5ml isopropanol to each bottle D2156-01 Add 15ml isopropanol to each bottle D2156-02 Add 45ml isopropanol to each bottle
	Dilute SPM Buffer with absolute ethanol as follows
D2156-00 Add 7ml ethanol to each bottle D2156-01 Add 35ml ethanol to each bottle D2156-02 Add 140ml ethanol to each bottle	

- Its strongly recommended to use 2 x YT media for the cultivation of cosmids and BACs PACs, and P1s from Bacterial Cultures.
- Buffer T2 should be kept at room temperature. Check for SDS precipitation before use. If necessary re-dissolve SDS precipitate by warming. Close the Buffer T2 bottle immediately after use to avoid acidification that may result from air CO₂.
- Chill Buffer T3 for BACs, PACs, P1s Isolation Protocol for precipitation enhancement.

BACs, PACs, P1s and Plasmid Isolation Protocol (standard protocol)

Materials Supplied by User

- Microcentrifuge capable of at least 18,000 x g
- Sterile Deionized Water (or TE Buffer)
- Sterile 1.5 ml Centrifuge Tubes
- 10-15 ml Culture Tubes
- 70% Ethanol
- 96%-100% Isopropanol

1. **Isolate a single colony from a freshly streaked selective plate, and inoculate a starter culture of 2-5 ml LB or YT medium containing the appropriate selective antibiotic. Incubate for ~20-24 hr at 37° C with vigorous shaking (~300 rpm).** Use a flask with a volume at least 4 times the volume of the culture.
2. **Pellet 1.5-5 ml bacteria by centrifugation at 13,000 x g for 3 min at room temperature. Decant or aspirate medium and discard.**
3. **Resuspend the bacterial pellet by adding 200 µl of Buffer T1/RNase A solution, and vortexing.** Complete resuspension of cell pellet is vital for obtaining good yields.
4. **Add 200 µl of Buffer T2 and gently mix by inverting 5-10 times to obtain a clear lysate. Incubate at room temperature for 5 minutes.** Avoid vigorous mixing as this will shear chromosomal DNA and lower plasmid purity. The lysate should appear viscous. Do not allow the lysis reaction to proceed more than 5 min. (Store Buffer T2 tightly capped when not in use).
5. **Add 200 µl of Chilled Buffer T3 and gently mix by inverting 15-20 times until a flocculent white precipitate forms. Incubate on ice for 5 minutes.** Do not vortex, as this will result in shearing.
6. **Centrifuge at ≥ 20,000 x g for 10 minutes at 4° C.** Promptly proceed to the next

step.

7. **Prepare the column by adding 100 µl of Equilibration Buffer placed in a 2 mL collection tube. Centrifuge at $\geq 13,000 \times g$ for 30-60 seconds. Discard the liquid flow-through.**

Note: this step can be performed during step 6.

8. **Carefully transfer the cleared supernatant to a new 1.5 ml tube (not supplied). Add 200µl of BAC Binding Buffer diluted with isopropanol. Invert 3-5 times to mix thoroughly.**

Note: BAC Binding Buffer has to be diluted with isopropanol (96-100%) before use. See the label on the bottle or page 3 for detail instructions.

9. **Apply the sample to the HiBind® DNA column assembled in a 2 ml collection tube (provided).**
10. **Centrifuge at $> 8000 \times g$ for 30 second at room temperature. Remove the HiBind® DNA column, discard the flow-through and re-use the collection tube for next step.**
11. **Place the HiBind® DNA column back into the collection tube and add 750µl of SPM Buffer (diluted with ethanol). Centrifuge at $> 8000 \times g$ for 30 seconds at room temperature. Discard the flow-through and re-use the collection tube.**
12. **Place the HiBind® DNA column back into the collection tube and centrifuge at maximum speed for 2 minutes to dry the column.**
13. **Place the HiBind® DNA column into a clean 1.5 ml centrifuge tube, apply 40µl of Elution Buffer (10mM Tris-HCl, pH 8.5) or water onto the center of the membrane. Incubate 5 minutes at room temperature.**
14. **Centrifuge at maximum speed for 2 minutes to elute the DNA.**
15. **Store the eluted DNA at -20°C .**

BACs, PACs, P1s and Plasmid Isolation Protocol (For low copy number)

1. **Isolate a single colony from a freshly streaked selective plate, and inoculate a starter culture of 2-5 ml LB or YT medium containing the appropriate selective antibiotic. Incubate for ~20-24 hr at 37°C with vigorous shaking (~300 rpm). Use a flask with a volume at least 4 times the volume of the culture.**

2. **Pellet 1.5-5 ml bacteria by centrifugation at $\geq 13,000 \times g$ for 3 min at room temperature. Decant or aspirate medium and discard.**
3. **Resuspend the bacterial pellet by adding 260 µl of Buffer T1/RNase A solution, and vortexing.** Complete resuspension of cell pellet is vital for obtaining good yields.
4. **Add 260 µl of Buffer T2 and gently mix by inverting 5-10 times to obtain a clear lysate. Incubate at room temperature for 5 minutes.** Avoid vigorous mixing as this will shear chromosomal DNA and lower plasmid purity. The lysate should appear viscous. Do not allow the lysis reaction to proceed more than 5 min. (Store Buffer T2 tightly capped when not in use)
5. **Add 260 µl of Chilled Buffer T3 and gently mix by inverting 15-20 times until a flocculent white precipitate forms. Incubate on ice for 5 minutes.** Do not vortex, as this will result in shearing.
6. **Centrifuge at $\geq 18,000 \times g$ for 10 minutes at 4°C .** Promptly proceed to the next step.
7. **Carefully aspirate and add the clear supernatant to a HiBind® DNA Column assembled in a provided 2 ml collection tube.** Ensure that the pellet is not disturbed and that no cellular debris has carried over into the column. **Centrifuge for 1 min at $\geq 13,000 \times g$ at room temperature to completely pass lysate through the HiBind® DNA Column.**
8. **Discard the HiBind® DNA Column and add 2 µl of the supplied linear polyacrylamides to the 2 ml collection tube containing the cleared cell lysate. Add a 0.7 volume of room temperature isopropanol to the samples. (546 µl of isopropanol for 780 µl of cell lysate). Mix the sample by vortexing for 15 seconds.**
9. **Centrifuge at $\geq 18,000 \times g$ for 10 minutes at room temperature to pellet the DNA. Carefully aspirate or decant the supernatant and discard, making sure not to dislodge the DNA pellet.**
10. **Wash the DNA pellet with 500 µl of 70% ethanol. Centrifuge the 2 ml collection tube containing pellet (in the same orientation as before) for 10 minutes. Carefully aspirate or decant the supernatant, being careful not to dislodge the DNA pellet. Invert the tube containing the DNA pellet on a paper towel for 10-15 min to air dry the DNA pellet.**

Note: Ensure that no alcohol droplets are visible after air drying, with out overdrying the DNA pellet. Overdrying of the DNA pellet will make redissolving the pellet difficult.

11. **Redissolve the DNA pellet by adding 30-50 µl of Elution Buffer (10 mM Tris-HCl, pH 8.5), and incubating overnight at room temperature**
12. **Yield and quality of DNA: Determine the absorbance of an appropriate dilution of**

the sample at 260 nm and then at 280 nm.

The DNA concentration is calculated as follows:

$$\text{DNA concentration} = A_{260} \times 50 \times (\text{Dilution Factor}) \mu\text{g/ml}$$

A ratio of $(A_{260}) / (A_{280})$ is an indication of nucleic acid purity. Alternatively, yield (as well as quality) can sometimes be best determined by agarose gel/ethidium bromide electrophoresis.

Troubleshooting Guide

Problem	Cause	Possible Solution
Low DNA yields	Poor Cell Lysis	Only use LB or YT medium containing ampicillin. Do not use more than 5 ml (with high copy plasmids or 10 ml with low copy plasmids) culture with the basic protocol.
		Cells may not have been dispersed adequately prior to the addition of Buffer T2. Make sure to vortex cell suspension to completely disperse.
		Increase incubation time with Buffer T2 to obtain a clear lysate.
	Buffer T2 if not tightly closed, may need to be replaced. Prepare as follows: 0.2 N NaOH, 1% SDS.	
	Bacterial Clone is not fresh.	Use fresh glycerol cultures and avoid repeated freezing/thawing cycles of clones. Always make enough replica plates and use precultures for inoculation. Any remaining precultures can be used to set up fresh glycerol stocks.
No DNA Eluted	Lysate prepared incorrectly.	Check the stock of buffers and age of the buffers. Make sure that the correct volume of buffer has been added to the samples.
	Buffer T2 precipitated	Warm up the Buffer T2 to dissolve the precipitate.
	Cells are not completely resuspended	Pelleted cells should be completely resuspended with Buffer T1. Do not add Buffer T2 until an even cell suspension is obtained.
High molecular weight DNA contamination of product.	Over mixing of cell lysate upon addition of T2	Do not vortex or mix aggressively after adding Buffer T2.
	Culture overgrown	Overgrown culture contains lysed cells and degraded DNA. Do not grow cell for longer than 16 hours.
DNA degraded after the storage	High levels of endonuclease activity.	Perform the heat inactivation step.
RNA visible on agarose gel	RNase A not added to Buffer T2.	Add 1 vial of RNase to each bottle of Buffer T2.
	DNA floats out of well while loading agarose gel.	Air dry the DNA pellet before redissolving the DNA.

Ordering Information

Product	Applications	Cat. No.
E.Z.N.A.™ Plasmid Miniprep Kit I	Isolation of up to 30 µg Plasmid DNA	D6942-01/02 D6943-01/02
E.Z.N.A.™ Plasmid Miniprep Kit II	Isolation of up to 70 µg Plasmid DNA	D6945-01/02
E.Z.N.A.™ Endo-Free Plasmid Miniprep Kit I	Isolation of up to 30 µg Endotoxin free Plasmid DNA	D6948-01/02
E.Z.N.A.™ Endo-Free Plasmid Miniprep Kit II	Isolation of up to 70 µg Endotoxin free Plasmid DNA	D6950-01/02
E.Z.N.A.™ Plasmid Midiprep Kit	Isolation of up to 250 µg Plasmid DNA	D6904-03/04
E.Z.N.A.™ Plasmid Maxiprep Kit	Isolation of up to 1.5 mg Plasmid DNA	D6922-01/02
E.Z.N.A.™ Fastfilter® Plasmid Midiprep Kit	Isolation of up to 250 µg Plasmid DNA, featuring filter syringes for lysate clearance	D6905-03/04
E.Z.N.A.™ Fastfilter® Plasmid Maxiprep Kit	Isolation of up to 1.5 mg Plasmid DNA, featuring filter syringes for lysate clearance	D6924-01/03/04
E.Z.N.A.™ Endo-Free® Plasmid Midiprep Kit	Isolation of up to 250 µg Endotoxin free Plasmid DNA, featuring filter syringes for lysate clearance	D6915-01/03/04
E.Z.N.A.™ Endo-Free® Plasmid Maxiprep Kit	Isolation of up to 1.5 mg Endotoxin free Plasmid DNA, featuring filter syringes for lysate clearance	D6926-01/03/04
E.Z.N.A.™ HP Plasmid Miniprep Kit I	Isolation of up to 30 µg of High Purity Plasmid DNA	D7042-01/02 D7043-01-02
E.Z.N.A.™ HP Plasmid Miniprep Kit II	Isolation of up to 70 µg of High Purity Plasmid DNA	D7045-01-02
E.Z.N.A.™ HP Plasmid Midiprep Kit	Isolation of up to 200 µg of High Purity Plasmid DNA	D7004-01/02
E.Z.N.A.™ HP Plasmid Maxiprep Kit	Isolation of up to 1.5 mg of High Purity Plasmid DNA	D7022-01/02
E-Z 96® Fastfilter® Plasmid Isolation Kit	Isolation of Plasmid DNA using a 96-well format	D1097-01/02
E.Z.N.A.™ M13 Isolation Kit	Isolation of up to 15µg of single stranded phage DNA	D6900-01/02

E-Z 96® M13 Isolation Kit	Isolation of up to 15µg of single stranded phage DNA using a 96-well format	D1900-01
E.Z.N.A.™ Yeast Plasmid Isolation Kit	Isolation fo Yeast Plasmid DNA	D3476-01/02 D3376-01/02
E-Z 96® Mag-Bind® Plasmid Isolation Kit	Isolation of Plasmid DNA using a 96-well format and paramagnetic beads	M1256-01/02
E-Z 96® Mag-Bind® Endo-Free® Plasmid Isolation Kit	Isolation of Endotoxin free Plasmid DNA using a 96-well format and paramagnetic beads	M1258-01/02
Mag-Bind® Plasmid Maxiprep Kit	Isolation of up to 1.5 mg Plasmid DNA using magnetic beads technology	M1257-01/02
Mag-Bind® Plasmid Megaprep Kit	Isolation of up to 5 mg Plasmid DNA using magnetic beads technology	M1259-01/02
E.Z.N.A.™ BAC/PAC DNA Isolation Kit	Effective purification of BAC or PAC DNA	D2156-01/02
E-Z 96® BAC/PAC DNA Isolation Kit	Parallel purification of BAC or PAC DNA using a 96-well format	D1056-01/02
Mag-Bind® Endo-Free® Plasmid Mega Kit	Isolation of up to 5 mg of Endotoxin free plasmid DNA using magnetic beads	M6262-02

Please Call, Fax , or e-mail us to place an order

We will be happy to answer any questions for you.

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