



Protocol for Genomic DNA Purification from Cultured Yeast Cells Using Pall Nucleic Acid Binding Nanosep® Centrifugal Device

1. Consumables and Reagents

Table 1

Consumables for gDNA Purification (nuclease-free consumables are recommended)

Supplier	Product Description	Part Number
Pall Laboratory	Nucleic Acid Binding (NAB) Nanosep Centrifugal Device	ODNABC33, ODNABC34
VWR	Ethanol (not denatured)	153385EDP
VWR	Spectrophotometer Cuvettes ~100 µL (260/280 nm)	612-5688
VWR	Tubes 15 mL (RNase-DNase free)	525-0153
VWR	Tubes 50 mL (RNase-DNase free)	525-0402
VWR	Microcentrifuge tubes 1.5 mL (RNase-DNase free)	211-0015

Table 2

Reagents for gDNA Purification (nuclease-free reagents are recommended)

Supplier	Product Description	Part Number
Qiagen	Buffer AL (264 mL)	19075
Qiagen	Buffer ATL (200 mL)	19076
Qiagen	Buffer AW1 (242 mL)	19081
Qiagen	Buffer AW2 (324 mL)	19072
Qiagen	RNase A (100 mg/mL)	19101
Qiagen	Nuclease-free water	129115
Qiagen	Proteinase K	19131
VWR	Zymolase	USBIZ1000-1
VWR	Tris Buffer pH 7.0 (1 M)	N469-1L
VWR	DTT (25 g)	1.11474.0025
VWR	D-(+)-Sorbitol	0691-100G
VWR	EDTA, pH 8 (0.5 M)	E177-500ML

2. Instruments

- Microcentrifuge
- Spectrophotometer
- Vortex
- Water bath or heating block

3. Important Points Before Starting

- For the Lysis Buffer, combine 1 M Sorbitol, 0.1 M EDTA, pH 7.4 – 8 and before use, add 20 mM DTT + Zymolase (refer to supplier information for quantity to use).
- Buffer AW1 and Buffer AW2 are supplied as concentrates. Before using for the first time, add the appropriate amount of ethanol (96-100 %) as indicated on the bottle to obtain a working solution. Before each use, mix Buffer AW1 by inverting several times.
- All centrifugation steps are performed at room temperature at 10,000 – 14,000 x g.
- Use only the collection tubes provided in the NAB Nanosep device box. There is enough to complete this process in full.
- All Buffers should be allowed to equilibrate to room temperature before use.
- Briefly centrifugate the tubes after vortexing to remove drops from inside the lid.
- Increase volumes of lysis Buffers and reagents proportionally for samples >200 μ L.
- Ensure that any precipitate formed during any of the below steps is not lost.
- Centrifugation at full speed will not affect yield or purity of the DNA. If, after centrifugation the sample has not completely passed through the membrane, centrifuge again until all the solution has passed through.

4. Protocol

1. Centrifuge the appropriate number of cells for 5 - 10 minutes at 1,000 x g. Cell concentrations up to 10^7 may be used. Remove the supernatant and discard.
2. Resuspend the pellet in 500 μ L of the prepared Lysis buffer with the appropriate quantity of Zymolase (refer to supplier guidelines) and incubate at 30 °C for 2 hours.
3. Centrifuge for 5 minutes at 5,000 x g, discard the supernatant and resuspend the pellet in 180 μ L of Buffer ATL.
4. To each 180 μ L sample of resuspended cells in Buffer ATL, add 20 μ L of proteinase K and vortex to mix.
5. Incubate at 56 °C until the tissue is completely lysed, vortexing occasionally during incubation.
6. *Optional RNase digestion steps: (If you do not wish to perform RNase digestion, move on to step 8)*
 - a. Add 4 μ L RNase A (100 mg/mL) to each sample of cells in Buffer ATL and Proteinase K. Pulse vortex to mix for 15 seconds.
 - b. Incubate for 2 minutes at room temperature.
- c. Centrifuge for 5 seconds to remove drops from the inside of the lid.
7. Add 200 μ L of Buffer AL and pulse vortex thoroughly for 15 seconds.
8. Incubate at 70 °C for 10 minutes to complete lysis.
9. Add 200 μ L of 100% non-denatured ethanol to the sample and pulse vortex for 15 seconds to mix.

10. Centrifuge again for 5 seconds to remove drops from the lid.
(Thoroughly mix at each stage to obtain a homogenous solution).
11. Apply the mixture, including any precipitate, to the NAB Nanosep device insert inside a receiver tube. If the sample volume is greater than 500 μL , apply half the sample to the NAB Nanosep device insert, perform steps 11 and 12 and then repeat with the second half of the sample.
12. Close the cap and centrifuge for 60 seconds at 10,000 – 14,000 x g.
13. Discard the flow-through and re-use the receiver tube for the next step.
14. Open the NAB Nanosep device and add 500 μL Buffer AW1.
15. Close the cap and centrifuge for 60 seconds at 10,000 – 14,000 x g.
16. Discard the collection tube and flow-through and transfer the NAB Nanosep device insert into a clean collection tube (provided).
17. Add 500 μL Buffer AW2 to the device insert.
18. Close the cap and centrifuge for 3 minutes at 10,000 – 14,000 x g.
19. Discard the flow-through and re-use the receiver tube for the next step.
20. Centrifuge for 60 seconds at 10,000 – 14,000 x g to remove possible Buffer AW2 carry-over.
21. Discard the receiver tube with the flow-through and transfer the device insert to the final, clean collection tube (provided).
22. To elute the DNA, add 100 μL of DNase-free distilled water (or AE Buffer) and incubate at room temperature for 5 minutes.
23. Centrifuge for 60 seconds at 10,000 – 14,000 x g.
24. Optional: For maximum DNA yield, repeat the above elution steps with a further 100 μL of DNase-free distilled water.

Storage of DNA

If you intend to store the purified DNA, we recommend elution with Buffer AE from Qiagen and storage at $-30\text{ }^{\circ}\text{C}$ to $-15\text{ }^{\circ}\text{C}$. As high pH or EDTA can affect sensitive downstream applications, water can be used for elution. However, ensure that the pH of the water is a minimum of 7.0 as acid hydrolysis will occur to DNA stored in water which will result in degradation.

Quantification of DNA

DNA concentration can be determined by measuring the absorbance at 260 nm (A_{260}) in a spectrophotometer (See details below). For small quantities of DNA however, it can be difficult to determine these amounts photometrically. Smaller quantities of DNA can be accurately quantified using fluorometric quantification.

Spectrophotometric quantification of DNA

A_{260} readings should be greater than 0.10 and lower than 1.0 to ensure significance. An absorbance reading of 1.0 at 260 nm corresponds to 50 μg of DNA per mL. This is only valid for measurements at neutral pH however. As a result, if it is necessary to dilute the DNA sample, ensure that the dilution Buffer is of neutral pH.



Laboratory


Corporate Headquarters

25 Harbor Park Drive
Port Washington, New York 11050

Filtration. Separation. Solution.SM

Visit us on the Web at www.pall.com/lab

E-mail us at LabCustomerSupport@pall.com

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