

May 10, 2023

DNase treatment with Invitrogen kit

DOI

<https://dx.doi.org/10.17504/protocols.io.14egn3ymI5dy/v1>

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Protocol Citation: Anna JSzékely 2023. DNase treatment with Invitrogen kit. **protocols.io**
<https://dx.doi.org/10.17504/protocols.io.14egn3ymI5dy/v1>

Manuscript citation:

Mechanisms determining the fate of dispersed bacterial communities in new environments
AJ Székely, M Berga, S Langenheder
The ISME journal 7 (1), 61



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Protocol status: Working

We use this protocol and it's working

Created: October 04, 2016

Last Modified: May 10, 2023

Protocol Integer ID: 3827

Keywords: dnase treatment with invitrogen kit, dnase treatment, dnase, dna kit, invitrogen kit, dna from dna, rna extraction, simultaneous dna, dna, rna mix, filtered water samples protocol, water samples protocol, extraction, rna

Abstract

We use this protocol to remove DNA from DNA/RNA mix isolated with Easy-DNA Kit (see Simultaneous DNA/RNA extraction for filtered water samples protocol).

Guidelines

SAFETY: One of the kit components contains the following chemicals:

- 8-10% of human urine (potential biohazard)
- 0.1-0.3% bovine serum albumin (harmful)
- ≤0.09% sodium azid (very toxic).

As both the amount and the concentration of the very toxic compound (sodium azid) is very low, the risk is also low.

Avoid contact with eyes, skin and other mucous membranes. Wash thoroughly after handling. Avoid breathing vapor/mist/spray.

QUALITY ASSURANCE:

1. **Controls:** Run a negative DNase treatment sample for every batch of DNase treatment to control for potential contaminations of reagents or during the treatment procedure.
2. **Kit properties:** Always write down the LOT number of the kit you use. Avoid using expired kits or reagents.
3. **Test PCR for treatment:** always perform test PCR (step 10-11.) to confirm the success of the DNase treatment.

VERY IMPORTANT: RNA is much more sensitive to degradation than DNA, therefore contamination with RNase has to be avoided (the main source is your own skin) and the samples have to be kept on ice all the time to slow degradation. The following steps help avoid degradation before and during RNA work:

1. Before starting to work clean bench, pipettes and the racks with MQ water (against DNA and RNA contamination), 70% ethanol (disinfection) and **RNaseAway spray**.
2. Use only nuclease-free filter tips and tubes.
3. Keep thawed RNA samples on ice all the time.
4. Use new gloves to touch samples and RNase-free pipettes and racks (cleaned in point 1). If you touch anything else (for example freezer handle), immediately change gloves. Change gloves regularly anyway during work with RNA, at least after every few steps. Before starting to work, spray RNaseAway on your gloves.

Special care should be applied until RNA is completely transcribed to DNA (end of RT process).



Materials

MATERIALS

⊗ DNase I, Amplification Grade Invitrogen - Thermo Fisher Catalog #18068015

Before start

- Clean all surfaces (bench, pipettes, racks) before starting to ensure removal of contaminants. To do this wipe sequentially with a combination of (1) MQ, (2) 70% ethanol and (3) **RNAse Away**.
- Get ice
- Take out from the freezer and thaw: 10xBuffer, EDTA (included in kit)
- Get samples from -80°C
- Label tubes or strips, one for each sample and one as negative control.
- Leave DNase in freezer until use. DNase is sensitive to physical denaturation, therefore **never vortex it!**
- You can also apply 10 minutes UV exposure in the UV-box for pipettes, tips, racks, etc.



Mix preparation

- 1 Prepare incubation mix (for few samples) and continue at step 5:

	Amount (μL)
DEPC-treated water (not MQ)	0-7
10xbuffer	1
DNase I	1
Sample or diluted sample	1-8
Total	10

There are no exact indications for the amount of sample to use but I usually start with the maximum amount (8 μl) and reduce it only for the samples where the test PCR is positive.

For more samples prepare master mix (MM) of 10x buffer and DNase I (never vortex!), put back to freezer after preparing MM).

	For 1 sample (μL)	For n sample (μL)
10xbuffer	1	$1 \cdot n \cdot 1.15$ (e.g. for 20 samples, add 23 μL)
DNase I	1	$1 \cdot n \cdot 1.15$

- 2 Add RNase-free water to tubes if needed.
Calculate the amount like this: $(8\mu\text{L} - \text{amount of sample}) \cdot n \cdot 1.15$
For higher DNA/RNA content samples use less than 8μL.
- 3 Mix gently and spin MM, and distribute in labelled PCR tubes/strips.
- 4 Add 1-8 μL of DNA/RNA sample or diluted sample to each tube, keep tubes on ice.

5 Mix gently and spin tubes.

Digestion

6 Incubate tubes in PCR machine at 25°C for 15' (DNA digestion).

 00:15:00

Inactivation

7 Move tubes back to ice and add **1 µL EDTA** to each, vortex and spin.

8 Incubate tubes in PCR machine at 65°C for 10' (DNase inactivation).

 00:10:00

9 Spin and store tubes at -20°C until next step.

Test PCR

10 Perform test PCR. Always use a **positive control** and a negative control!

We do everything the same way as we will generate the amplicons for Illumina sequencing with the transcribed cDNAsing except that we do only one longer PCR. We also use only half amount of template (0.5 µl) as the cDNA will also be diluted during the RT reaction.

Primers:

Illumina adapter-N4-341F:

3'-ACACTCTTTCCCTACACGACGCTCTTCCGATCTNNNNCCTACGGGNGGCWGCAG-5'

Illumina adapter-805NR:

3'-AGACGTGTGCTCTTCCGATCTGACTACNVGGGTATCTAATCC-5'

PCR reactions

	Com pon ents	Wor king con c.	Final con c.	1 reac tion (20 µl)	(N) reac tions	

	5xQ 5 Reac tion Buff er	5X	1X	4 μ l		
	Forw ard Prim er (illu- ada- 341F)	10 μ M	0.25 μ M	0.5 μ l		
	Reve rse Prim er (illu- ada- 805 NR)	10 μ M	0.25 μ M	0.5 μ l		
	dNT Ps	2 mM	200 μ M	2 μ l		
	Q5 HF DNA poly mer ase	2 U/ μ l	0.02 U/ μ l	0.2 μ l		
	Tem plate DNA			0.5 μ l		
	Nucl ease - Free wate r			12.3 μ l		
	Σ			20 μ l		

DNase-test PCR program

	STE P	TEM P.	TIM E
	Initia l Den	98° C	30 seco nds



	atur ation		
	35 c ycle s	98° C	10 seco nds
	48° C	30 seco nds	
	72°C	30 seco nds/ kb	
	Final Exte nsio n	72°C	2 minu tes
	Hold	6°C	∞

11 Check PCR products in 1% Agarose gel.

If there is product only in the postivie control but not in the others, continue with RT protocol.

If there is product in a sample, repeat the DNase treatment for that product with less template or diluted template.