

Novagen[®]

D-Tube™ Dialyzers and D-Tube Electroelution Kit

Novel Tools for Sample Preparation

Methods such as dialysis and electroelution (for extraction from gels) have long been used to purify proteins and nucleic acids. These traditional methods may lead to sample loss and contamination. D-Tube™ Dialyzers are a new, simpler way to dialyze sample volumes from 10-3000 µl. In addition, D-Tube Dialyzers can be used for electroelution of protein, protein-protein or protein-DNA complexes, oligonucleotides, DNA, and RNA from 1D- and 2D-polyacrylamide and agarose gels.

No sample loss or contamination, just high yields.

- Easy-to-handle dialyzers for buffer exchange and removal of urea and detergents
- One-step dialysis procedure that does not require syringes or any special equipment
- Efficient sample recovery
- Protease-, RNase-, and DNase-free
- Ideal for electroelution of proteins, protein-DNA complexes, oligonucleotides, DNA, and RNA from polyacrylamide and agarose gels
- Procedure compatible with variety of downstream applications including MALDI-MS, functional assays, and HPLC
- Simultaneous electroelution from multiple samples

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D-Tube™ Dialyzers: maximizing convenience and recovery

D-Tube™ Dialyzers are easy-to-handle dialyzers in a capped centrifuge tube format with dialysis membrane windows for buffer exchange and removal of solutes like urea or detergents while providing > 97% sample volume recovery. The disposable, single-use tubes require no syringes, centrifuge, or laborious steps to manipulate small sample volumes. The sample is added and removed using a standard laboratory pipet. D-Tube Dialyzers are available with molecular weight cut-offs from 3.5 to 14 kDa and are designed with

three volume capacities: mini (10–250 µl), midi (50–800 µl), and maxi (100–3000 µl). The membrane is ultra-clean, EDTA-treated regenerated cellulose, sulfur- and heavy metal-free. Each kit contains 10 D-Tube Dialyzers and one floating rack that can hold up to four devices in an exchange buffer.

Volume capacities and molecular weight cutoff (MWCO) values for D-Tube Kits

D-Tube Size	Volume (µl)	MWCO* (kDa)	Cat. No
Mini	10 to 250	6–8	71504-3
		12–14	71505-3
Midi	50 to 800	3.5	71506-3
		6–8	71507-3
Maxi†	100 to 3000	3.5	71508-3
		6–8	71509-3
		12–14	71510-3

* For conversion purposes, 10 bp or 20 nt is approximately 6.5–6.6 kDa

† The D-Tube Dialyzer Maxi kits are provided with two interchangeable caps to adjust the vessel volume to better accommodate smaller samples (100–2000 µl) and larger samples (2000–3000 µl)

D-Tube Dialyzer Features

- Easy-to-handle dialyzers for buffer exchange and removal of urea and detergents
- One-step procedure that does not require syringes or any special equipment
- Sample recovery > 97%
- Protease-, RNase-, and DNase-free
- Ideal for electroelution



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D-Tube™ Dialyzers and
D-Tube Electroelution Kit

Following separation of biomolecules by agarose or polyacrylamide gel electrophoresis, electroelution offers a means to extract the sample of interest by applying an electric current to the excised gel band. The combination of D-Tube™ Dialyzers and the D-Tube Electroelution Accessory Kit provides a unique tool for extraction of any protein, protein-protein, or protein-DNA complexes from non-denaturing and denaturing (SDS) polyacrylamide gels, and for extraction of oligonucleotides, RNA, and DNA from both polyacrylamide and agarose gels. The D-Tube Electroelution Accessory Kit provides three D-Tube supporting trays that fit into most horizontal electrophoresis units and optimized reagents for protein and nucleic acid precipitation following electroelution.

Electroelution: recover proteins and other biological molecules from gels

Minimum electroelution times to extract samples from polyacrylamide and agarose gels

POLYACRYLAMIDE GELS		
	Protein Size (kDa)	Elution Time* (min)
Protein	14	35–45
	19–26	45–55
	29	55–65
	40	60–70
	45	65–75
	50	75–85
	66	85–95
	81	105–115
	116	120–130
	128	140–150
	DNA Fragment Size (bp)	Elution Time† (min)
DNA	100	10–20
	300	15–25
	500	20–30
	822	25–35
	1044	30–40
	2700	45–55
	RNA Fragment Size (nt)	Elution Time† (min)
RNA	100	15–25
	400	25–35
	600	35–45
	1000	45–55
	Oligonucleotide Size (nt)	Elution Time† (min)
Oligos	15–100	10–20
AGAROSE GELS		
	DNA Fragment Size (bp)	Elution Time† (min)
DNA	100–200	10–20
	500–700	15–20
	1000	20–30
	4361	25–35
	6557	45–55
	9416	55–65
	23130	70–80

Note: electroelution times shown in this table are for D-Tube Midi; optimum times depend on the sample contents. For each D-Tube Midi, the gel piece should not exceed 0.5 cm × 1 cm. Additional information about optimum electroelution times for D-Tube Mini and Maxi varieties is available in TB422 at www.novagen.com

*Minimum time recommended for elution of protein from a 10% SDS-polyacrylamide gel at 100 V

† Minimum time recommended for elution of DNA or RNA fragments from a native or denaturing 4% polyacrylamide gel at 100–150 V

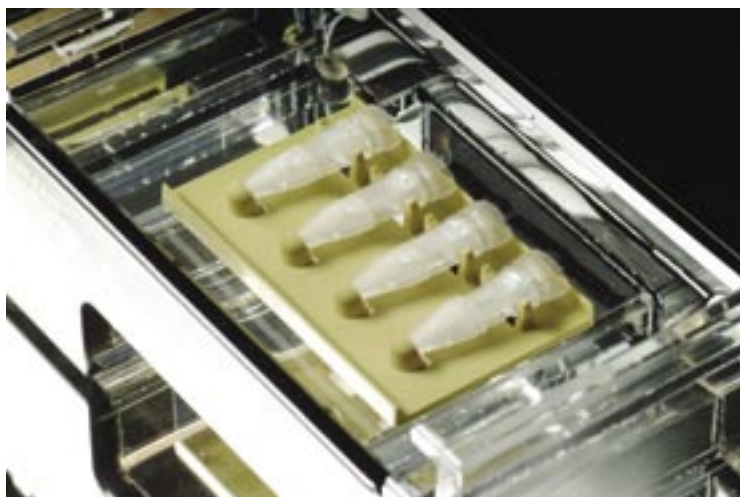
‡ Minimum time recommended for elution of DNA fragments from a 1% agarose gel at 80–110 V

Typical recoveries using D-Tube Dialyzer Kits

Sample Type	Method	Typical Recovery
Sample in solution	Dialysis	> 97%
DNA or RNA in agarose gel slice	Electroelution	> 90%
Oligonucleotides, DNA, or RNA in polyacrylamide gel slice	Electroelution	> 90%
Protein in polyacrylamide gel slice	Electroelution	60%

- Efficient extraction of protein, protein-protein, and protein-DNA complexes, oligonucleotides, DNA, and RNA from 1D- and 2D-polyacrylamide and agarose gels
- More than 60% protein recovery in less than 2 hours
- More than 90% recovery of oligonucleotides, RNA, and DNA of 15 nucleotides to 80 kbp
- Procedure compatible with a variety of downstream applications including MALDI-MS, functional assays, and HPLC
- Simultaneous electroelution from multiple samples

Electroelution Kit Features





Technical Tips for Electroelution

The duration of electroelution depends on a number of factors including: the shape, molecular weight, and diffusion coefficient of the molecule being eluted; the formulation, concentration, and size of the gel slice; and the applied voltage. For highest extraction efficiency, staining and destaining solutions should not contain a fixative (methanol or acetic acid). In a typical protocol, gel pieces that contain the product(s) of interest can be placed in a D-Tube™ Dialyzers containing buffer, inserted in a support tray, and submerged in a horizontal electrophoresis chamber that contains buffer to which an electrical current is applied. In many applications, the eluted sample is adsorbed on dialysis membrane windows. In these cases, reversing the field polarity often increases recovery by releasing the sample from the membrane back into the solution inside the D-Tube Dialyzer.

Product	Size	Cat. No.	Price
D-Tube™ Dialyzer Mini, MWCO 6–8 kDa	1 kit	71504-3	\$47
D-Tube Dialyzer Mini, MWCO 12–14 kDa	1 kit	71505-3	\$47
D-Tube Dialyzer Midi, MWCO 3.5 kDa	1 kit	71506-3	\$72
D-Tube Dialyzer Midi, MWCO 6–8 kDa	1 kit	71507-3	\$72
D-Tube Dialyzer Maxi, MWCO 3.5 KDa	1 kit	71508-3	\$88
D-Tube Dialyzer Maxi, MWCO 6–8 KDa	1 kit	71509-3	\$88
D-Tube Dialyzer Maxi, MWCO 12–14 KDa	1 kit	71510-3	\$88
Components:			
• 10	D-Tube Dialyzers		
• 1	Floating Rack		
D-Tube Electroelution Accessory Kit	1 kit	71511-3	\$45
Components:			
• 1 ml	MS Precipitation Buffer		
• 10 ml	TCA, 20%		
• 2 × 1 ml	3 M NaAc, pH 5.2		
• 3	Supporting Trays, Mini, Midi, Maxi		

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