Technical Info

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ROTI®Dex

Desalination and buffer exchange of biomolecules by gel filtration/size exclusion chromatography

General information

Gel filtration, also known as size exclusion chromatography (SEC), allows biomolecules to be separated based on size differences. It is a fast and efficient method to isolate proteins, enzymes, polysaccharides, nucleic acids and other bio-macromolecules from a solution in just a few minutes.

The principle behind this is the column chromatographic separation of biomolecules by using small particles, which are interspersed with tunnel-like structures of various sizes (Fig. 1). The degree of crosslinking of the particles determines the diameter of the individual "tunnels". Biomolecules larger than these tunnels migrate around the particles during chromatography, while smaller molecules pass through the small tunnels and thus take the longer distance. As a result, smaller molecules pass through the matrix much more slowly than larger molecules.

Fig. 1 Illustration of a particle of a gel filtration matrix

ROTI®Dex is a gel filtration medium based on epichlorohydrin-crosslinked dextran. In contrast to other chromatography modes, there is no interaction between the analyte and the matrix. This provides the ideal basis for the analysis and purification of intact proteins. In addition, dextran has high chemical stability, making this method compatible with many organic and other solvents. Buffer composition does not directly affect molecular separation, making this technique suitable for challenging biomolecules that require a specific buffer environment. Purification can take place in the presence of essential ions, cofactors, detergents, urea or guanidine hydrochloride and is largely temperature independent.

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ROTI®Dex for desalination and buffer exchange

ROTI®Dex provides a form of group separation by size exclusion chromatography, for the removal of salts and other low molecular weight factors from protein or nucleic acid solutions. The ROTI®Dex range can be used for the following **applications**:

- Buffer exchange to transfer biomolecules to a more suitable buffer prior to following applications
- Removal of salts such as EDTA or Tris, which are interfering with downstream experiments
- Removal of unreacted radioactive markers such as adenosine triphosphate (ATP) from nucleic acid labeling reactions
- Removal of non-incorporated nucleotides in DNA sequencing
- Removal of free low molecular weight markers
- Removal of phenol red from culture media prior to anion exchange chromatography or nucleic acid preparations
- Termination of reactions between macromolecules and low molecular weight reactants
- Removal of products, cofactors or inhibitors from enzyme solutions

Desalting/buffer exchange using ROTI®Dex offers several advantages over dialysis. Dialysis is generally a slow technique that requires large amounts of buffer and risks losing material and target protein activity during handling. Below you will find all advantages at a glance:

- Sample preparation in just a few minutes
- Desalting, removal of impurities and buffer exchange in a single step
- No interaction between analyte and medium
- High selectivity, high resolution and high yield (> 95%)
- Also suitable for small sample volumes
- High chemical stability and thus compatible with many organic and other solvents

The ROTI®Dex range offers both various **gel filtration media** in powder form for packing columns individually, as well as **pre-packed ready-to-use columns**. These pre-packed columns are available in the following variants:

- ROTI®Dex Spin for fast separation of biomolecules from small sample volumes by centrifugation
- ROTI®Dex Grav or the separation of biomolecules from sample volumes up to 10 ml by gravity
- ROTI®Dex FPLC for the separation of biomolecules using syringe, pump or FPLC systems

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To achieve efficient separation of your biomolecules, it is important to choose the right gel filtration medium and also the appropriate columns. Your selection should depend on the following factors: sample volume, molecular weight or size of your biomolecule, type of application (Spin, Grav, FPLC).

Table 1 provides an overview of all ROTI®Dex ready-to-use columns with the corresponding gel filtration media. ROTI®Dex 25 Medium (Order No. 21A5) and ROTI®Dex 50 Medium (Order No. 21A6) are also available as dry powder if you wish to pack your columns yourself.

Application	Order No.	Matrix	Particle size (wet)	Gel bed volume	Sample volume	MWCO	Pack Qty.
Spin	21C4.1	ROTI®Dex 25 Medium	85 - 260 µm	0.5 ml	2 - 100 µl (50 µl optimal)	Proteins >5 kDa, Oligonucleotides >10 bp, Nanoparticles >2 nm	25 Pcs.
	21C5.1	ROTI®Dex 50 Medium	100 - 300 µm	0.5 ml	2 - 100 µl (50 µl optimal)	Proteins >25 kDa, Oligonucleotides >20 bp, Nanoparticles >4 nm	25 Pcs.
Grav	21AX.1	ROTI®Dex 25 Medium	85 - 260 µm	1.78 ml	0.15 – 0.3 ml	Proteins >5 kDa, Oligonucleotides >10 bp, Nanoparticles >2 nm	50 Pcs.
	21AY.1			2.75 ml	0,5 ml		50 Pcs.
	21C0.1			4.31 ml	1 ml		50 Pcs.
	21C1.1			10.37 ml	2.5 ml		25 Pcs.
	21C2.1			17.2 ml	5 ml		10 Pcs.
	21C3.1			34.21 ml	10 ml		10 Pcs.
FPLC	21C6.1	ROTI®Dex 25 Superfine	40 - 110 µm	1 ml	0.05 – 0.3 ml	Proteins >5 kDa, Oligonucleotides >10 bp, Nanoparticles >2 nm	5 Pcs.
	21C6.2			1 ml	0.05 – 0.3 ml		100 Pcs.
	21C7.1			5 ml	0.1 – 1.5 ml		5 Pcs.
	21C7.2			5 ml	0.1 – 1.5 ml		25 Pcs.
	21C7.3			5 ml	0.1 – 1.5 ml		100 Pcs. (4x25)

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