

Biomolecule Purification

solutions for
downstream processing



*excellence
made possible*

Biomolecule Purification

solutions for
downstream processing



CHROMATOGRAPHY RESINS FOR CLARIFIED FEED STREAMS

Affinity Chromatography	6
Ion Exchange Purification	8
Hydrophobic Interaction Chromatography	10
Activated Zetarose Solid Phases	12

SOLUTIONS FOR UNCLARIFIED FEED STREAMS

SMART Chromatography™	14
------------------------------	-----------

CHROMATOGRAPHY RESINS FOR POLISHING STEP

Size Exclusion Chromatography	18
ZetaSep FPLC Desalting Columns	22
CentriPure Desalting and Buffer Exchange Columns	26
Terms and Conditions	30

Zetarose Solid Phases

for purification and separation of biomolecules

Affinity Chromatography

Zetarose Affinity Solid Phases
for affinity purification of biomolecules

Ion Exchange Purification

Zetarose and Zetadex IEX Solid Phases
for the separation of biomolecules based on charge interaction

Hydrophobic Interaction Chromatography

Zetarose HIC Solid Phases for separation of biomolecules
based on hydrophobic interaction with the stationary phase

Activated Zetarose Solid Phases

For immobilization of ligands pursuant to targeted purification

Resins are supplied as a 50 % slurry in 20 % ethanol.
The following packaging units are available: 25 mL, 100 mL, 500 mL, 1 L and 5 L.



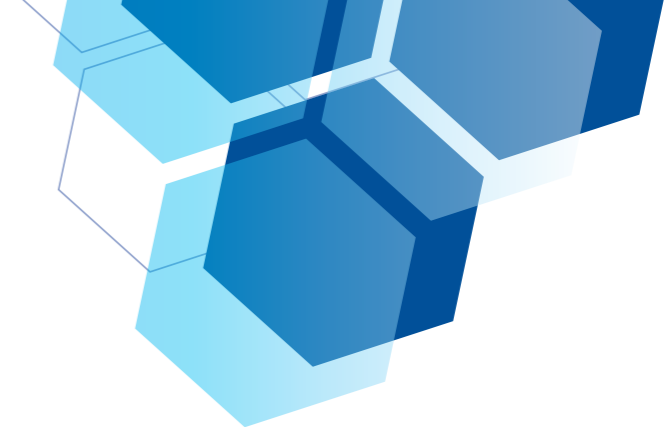
Affinity Chromatography

Zetarose Affinity Solid Phases
for affinity purification of biomolecules



The **Zetarose** range of affinity agarose beads puts the power of directed purification firmly in your hands. An outstanding assortment of affinities enables the exploitation of the unique interaction between certain pairs of biomolecules, allowing for rapid and convenient separation of a complex mixture into a desired single purified fraction.

Product Name	Particle Size	Ligand Density	Velocity Properties	Target	Bulk Resin	ZetaSep FPLC Column	MINI Column	MicroPlate	Multi Column Array	GraviPure Column
Zetarose Protein A Elevate®	100 µm	Proprietary	≥ 300 cm/h, ≤ 3 bar	Antibody	TM-1425	ZS-1425	MS-1425	MP-1425	MC-1425	GP-1425
Zetarose Protein G	100 µm	Proprietary	≥ 300 cm/h, ≤ 3 bar	Antibody	TM-1410	ZS-1426	MS-1426	MP-1426	MC-1426	GP-1426
Zetarose Protein L	100 µm	Proprietary	≥ 300 cm/h, ≤ 3 bar	Antibody	coming soon	coming soon	coming soon	coming soon	coming soon	coming soon
Zetarose NTA (metal-free)	100 µm	≥ 20 µmol Me ²⁺ /mL	≥ 500 cm/h, ≤ 3 bar	His-tag	TM-1414	ZS-1414	MS-1414	MP-1414	MC-1414	GP-1414
Zetarose Ni-NTA	100 µm	≥ 20 µmol Ni ²⁺ /mL	≥ 500 cm/h, ≤ 3 bar	His-tag	TM-1412	ZS-1412	MS-1412	MP-1412	MC-1412	GP-1412



emp BIOTECH's range of affinity solid phases is grouped into three main categories:

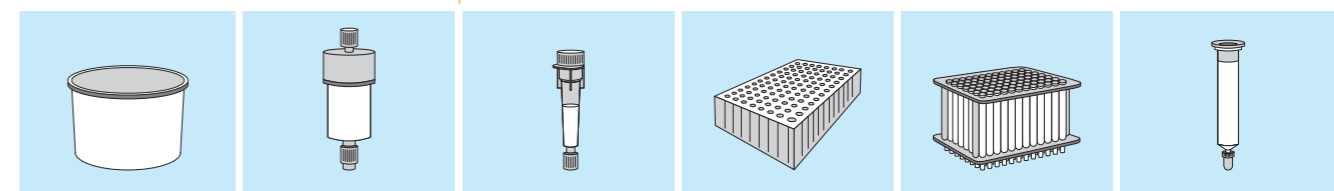
Antibody affinity – For the purification of antibodies and antibody fragments

Tag affinity – For the purification of biomolecules through interaction with a linker tag

General affinity – For purification via specific interactions not covered by the above

Based on porous and stable cross-linked beaded agaroses, **Zetarose** solid phases offer a robust platform for repeated purification cycles. By careful engineering of the linker chemistry used to immobilize the active ligand to the bead, **Zetarose** solid phases may be used for repeated purification cycles – making high-end affinity separation a more affordable approach to your separation methodology.

these products will be produced on demand exclusively for your applications



Ion Exchange Purification

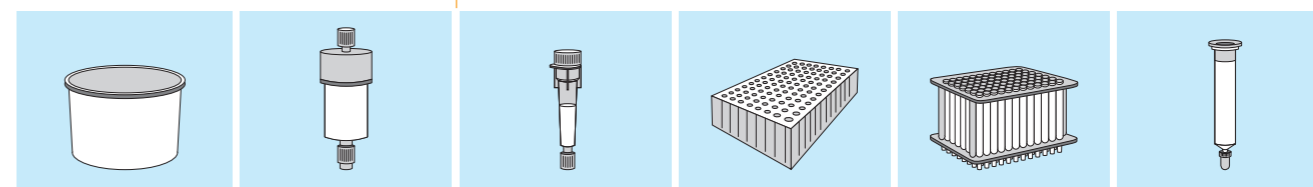
Zetarose and Zetadex IEX Solid Phases for the separation of biomolecules based on charge interaction

Zetarose and Zetadex ion exchange chromatography (AEX, CEX) is, along with hydrophobic interaction chromatography, the work-horse of the modern purification scientist. **emp BIOTECH** enables you to use this technique to its fullest by offering a full range of ion exchange products on two different solid phases and with a wide variety of particle sizes.

Zetarose
Based on porous and stable cross-linked beaded agaroses, Zetarose offers a robust platform for both small and large-scale applications and is utilized for a wide variety of separation techniques. The Zetarose IEX solid phases are centered around particle sizes of 100 µm.

Zetadex
Zetadex IEX solid phases are based on the Zetadex-25 and Zetadex-50 resins, which are then surface modified to give anionic and cationic functionality. Zetadex is useful for both batch and column processes.

these products will be produced on demand exclusively for your applications



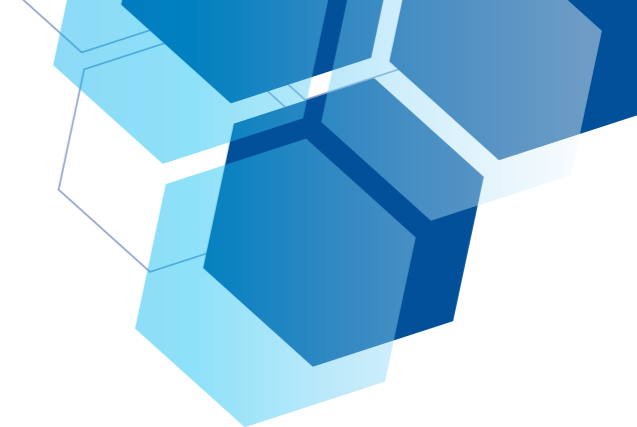
	Product Name	Particle Size	Ionic capacity	Maximum Flow Rate	Bulk Resin	ZetaSep FPLC Column	MINI Column	MicroPlate	Multi Column Array	GraviPure Column
ZETAROSE	Zetarose Q FF6	100 µm	0.12 mmol/mL	>500 cm/h, 32 mm column ID	TM-1202	ZS-1202	MS-1202	MP-1202	MC-1202	GP-1202
	Zetarose SP FF6	100 µm	0.12 mmol/mL	>500 cm/h, 32 mm column ID	TM-1208	ZS-1208	MS-1208	MP-1208	MC-1208	GP-1208
	Zetarose DEAE FF6	100 µm	0.12 mmol/mL	>500 cm/h, 32 mm column ID	TM-1205	ZS-1205	MS-1205	MP-1205	MC-1205	GP-1205
	Zetarose CM FF6	100 µm	0.12 mmol/mL	>500 cm/h, 32 mm column ID	TM-1207	ZS-1207	MS-1207	MP-1207	MC-1207	GP-1207
ZETADEX	Zetadex-25 DEAE	100 µm	3 – 4 meq/g	>500 cm/h, 5 cm bed height	TM-0206	ZS-0206	MS-0206	MP-0206	MC-0206	GP-0206
	Zetadex-50 DEAE	80 µm	3 – 4 meq/g	>50 cm/h, 5 cm bed height	TM-0201	ZS-0201	MS-0201	MP-0201	MC-0201	GP-0201
	Zetadex-25 CM	100 µm	4 – 5 meq/g	>500 cm/h, 5 cm bed height	TM-0203	ZS-0203	MS-0203	MP-0203	MC-0203	GP-0203
	Zetadex-50 CM	80 µm	4 – 5 meq/g	>50 cm/h, 5 cm bed height	TM-0205	ZS-0205	MS-0205	MP-0205	MC-0205	GP-0205

Hydrophobic Interaction Chromatography

Zetarose HIC Solid Phases for separation of biomolecules based on hydrophobic interaction with the stationary phase



Hydrophobic Interaction Chromatography (HIC) is one of the cornerstones of biomolecular separation. By careful control of the selective interaction between hydrophobic groups on the surface of the solid phase and target molecules, successful separation can be achieved by changing the salt concentration of the buffer.



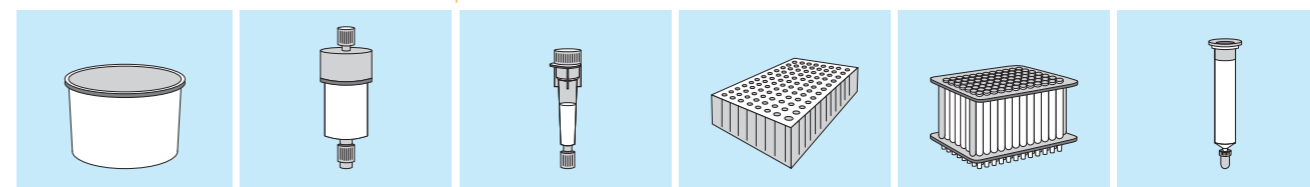
When developing a purification process using HIC, even small changes in hydrophobicity of the ligand can have an effect on the interaction with the target molecule. Generally speaking, hydrophobicity increases with changes in the length of the ligand. **emp BIOTECH** offers HIC solid phases with three distinct ligands: aliphatic butyl, aromatic phenyl and aliphatic octyl.

Butyl – Phenyl – Octyl

Based on porous and stable cross-linked beaded agaroses, **Zetarose** solid phases are used for a wide variety of separation techniques. Optimization is easily performed and can be scaled-up as required.

We would be pleased to discuss your purification and to make recommendations as to the most favorable chemistry for your application. We are open to a wider customized portfolio of ligands for your HIC application.

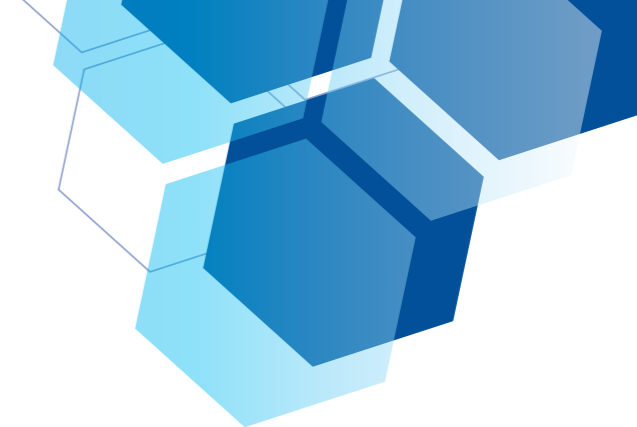
these products will be produced on demand exclusively for your applications



Product Name	Particle Size	Agarose Conc.	Functional Group	Maximum Flow Rate	Bulk Resin	ZetaSep FPLC Column	MINI Column	MicroPlate	Multi Column Array	GraviPure Column
Zetarose Butyl FF6	100 µm	6 %	-C ₄ H ₉	>500 cm/h, 32 mm column ID	TM-1506	ZS-1506	MS-1506	MP-1506	MC-1506	GP-1506
Zetarose Phenyl FF6	100 µm	6 %	-C ₆ H ₅	>500 cm/h, 32 mm column ID	TM-1503	ZS-1503	MS-1503	MP-1503	MC-1503	GP-1503
Zetarose Phenyl HC	30 µm	Proprietary	-C ₆ H ₅	>100 cm/h, 32 mm column ID	TM-1504	ZS-1504	MS-1504	MP-1504	MC-1504	GP-1504
Zetarose Octyl FF6	100 µm	6 %	-C ₈ H ₁₇	>500 cm/h, 32 mm column ID	TM-1508	ZS-1508	MS-1508	MP-1508	MC-1508	GP-1508

Activated Zetarose Solid Phases

For immobilization of ligands pursuant to targeted purification

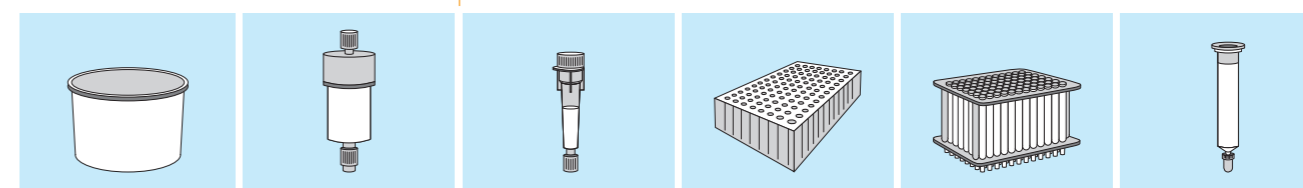


The **Zetarose** range of activated agarose beads puts the power of directed purification firmly in your hands. An first-class assortment of resins and selected covalent binding technologies allows to choose the most advantageous strategy for linking ligand to solid phase, providing optimal performance for your particular purification system.

Based on porous and stable cross-linked beaded agaroses, **Zetarose** offers a robust platform for both small and large-scale applications and is utilized for a wide variety of separation techniques.

We would be pleased to discuss and to make recommendations as to the most favorable activation chemistry for your application. We are open to a wider customized portfolio of ligands. Contact us today!

these products will be produced on demand exclusively for your applications



Product Name	Particle Size	Agarose Conc.	Activation Density	binds to:	Bulk Resin	ZetaSep FPLC Column	MINI Column	MicroPlate	Multi Column Array	GraviPure Column
Zetarose Aldehyde-activated FF6	100 µm	6 %	>5 µmol/mL	-NH ₂	TM-1319	ZS-1319	MS-1319	MP-1319	MC-1319	GP-1319
Zetarose Epoxy-activated FF6	100 µm	6 %	>75 µmol/mL	-NH ₂ -SH -OH	TM-1302	ZS-1302	MS-1302	MP-1302	MC-1302	GP-1302
Zetarose NHS-activated FF6	100 µm	6 %	>5 µmol/mL	-NH ₂ Storage buffer: 100 % Isopropanol	TM-1309	ZS-1309	MS-1309	MP-1309	MC-1309	GP-1309

SMART Chromatography™

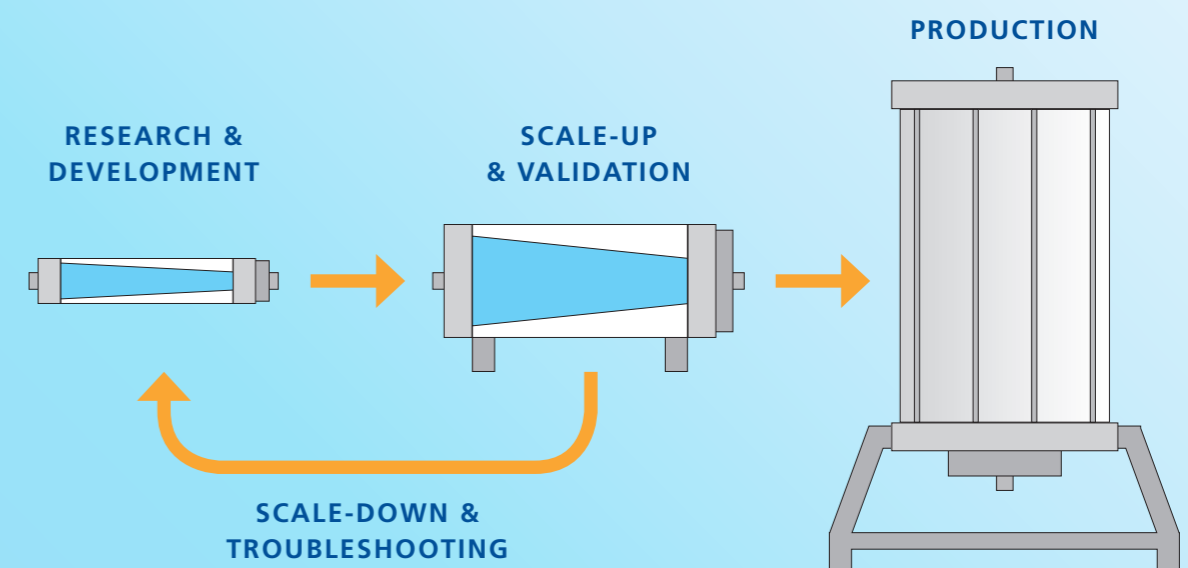
Purification from cell containing feed streams
in packed bed columns

SMART Chromatography™ is one of the most exciting developments in protein purification. **SMART Chromatography™** allows the purification of biomolecules directly from the bioreactor in packed bed columns without first having to clarify the feed stream.

Particle-based biomolecule separation is a well-established technique and has been used successfully for many years. However, preparation of the feed stream is a time-consuming and costly step and the problems associated with this only increase as the bioreactor volume increases in scale. Cell removal steps also result in lower recovery of the desired biomolecule, thus increasing the overall cost of the production process.

SMART Chromatography™ eliminates the requirement to remove cells before application to the chromatography column, reducing the number of steps in the process, reducing time and increasing product recovery.

SMART Chromatography™ offers true linear scalability from the R&D phase through to full-scale manufacturing.



SMART Chromatography™ (Simplified Method – Applied Radial Technology) is covered by US Patents 11,325,104 & 11,731,107.

SMART Chromatography™

Purification from cell containing feed streams
in packed bed columns



SMART Chromatography™ uses proprietary ZetaCell solid phases. These are based on large-particle highly cross-linked agarose, which is surface-modified to provide the desired binding functionality. The beads have been designed to allow cells and cell debris from the bioreactor to pass unhindered through the packed column bed.

our
most popular
SMART columns
for initial R&D
are 5 mL/6 cm and
10 mL/12 cm

SMART Chromatography™ columns are supplied pre-packed and ready-to-use. For larger columns please contact us. All SMART Chromatography™ and ZetaCell products are manufactured in dedicated ISO certified facilities under strict control and according to the highest of internationally recognized quality standards.

emp BIOTECH is also pleased to supply you with fully customized solutions designed specifically for your application. Please contact us for a consultation.

Resin name	Functionality	Ligand	Target	Product Code
ZetaCell Protein A Elevate®	Affinity	1 M NaOH-stable Protein A	Antibodies	TM-4425
ZetaCell Protein G	Affinity	Protein G	Antibodies	TM-4404
ZetaCell Protein L	Affinity	Protein L	Antibodies	coming soon
ZetaCell NTA (metal-free)	Affinity	Nitrilotriacetic acid	His-tagged proteins	TM-4405
ZetaCell Ni-NTA	Affinity	Ni ²⁺ -Nitrilotriacetic acid	His-tagged proteins	TM-4406
ZetaCell Phenyl	HIC	Phenyl (C ₆ H ₅)	General protein purification	TM-4501
ZetaCell Butyl	HIC	Butyl (C ₄ H ₉)	General protein purification	TM-4502
ZetaCell Octyl	HIC	Octyl (C ₈ H ₁₇)	General protein purification	TM-4503
ZetaCell Q	IEX (Strong Anion)	Quaternary ammonium	Neg. charged molecules	TM-4205
ZetaCell Q Boost	IEX (Strong Anion)	Quaternary ammonium	Neg. charged molecules	TM-4206
ZetaCell SP	IEX (Strong Cation)	Sulphopropyl	Pos. charged molecules	TM-4201
ZetaCell SP Boost	IEX (Strong Cation)	Sulphopropyl	Pos. charged molecules	TM-4202
ZetaCell DEAE	IEX (Weak Anion)	Diethylaminoethyl	Neg. charged molecules	TM-4207
ZetaCell DEAE Boost	IEX (Weak Anion)	Diethylaminoethyl	Neg. charged molecules	TM-4208
ZetaCell CM	IEX (Weak Cation)	Carboxymethyl	Pos. charged molecules	TM-4203
ZetaCell CM Boost	IEX (Weak Cation)	Carboxymethyl	Pos. charged molecules	TM-4204
ZetaCell Aldehyde-activated	Activated	Aldehyde	Custom binding	TM-4301
ZetaCell Epoxy-activated	Activated	Epoxy	Custom binding	coming soon

Size Exclusion Chromatography



The oldest of the modern beaded solid phase separation technologies, Size Exclusion Chromatography (or Gel Filtration as it is sometimes known) is a valuable method for separating molecules based on size. **Zetadex** resins can also be used for buffer exchange and desalting of biological solutions, while **DeXtra** and **Zetarose** are used primarily for high resolution fractionation of biomolecules.

emp BIOTECH offers a range of SEC products based on dextran, agarose and agarose-dextran composites:

Zetarose – Agarose-based SEC solid phase

Zetadex – Dextran based SEC solid phases

DeXtra – Agarose-dextran-based SEC solid phases



Size Exclusion Chromatography

Zetadex, DeXtra and Zetarose Solid Phases
for the separation of biomolecules based on molecular size

Water Regain: Swelling: MWCO (size exclusion): Fractionation Range:		2.15 – 2.25 mL/g 4 – 6 mL/g below 5000 Da 1 – 5 kDa (globular proteins)	4.80 – 5.20 mL/g 9 – 11 mL/g below 25000 Da 1 – 30 kDa (globular proteins)
Grade	Zetadex-25	Zetadex-50	
Superfine	Dry Bead Size: 20 – 50 µm (>80 %) Product Code: TM-0101	Dry Bead Size: 20 – 50 µm (>80 %) Product Code: TM-0104	
	Hydrated in phosphate buffered saline pH 7.4, with 0.02 % NaN ₃ on request	Hydrated in phosphate buffered saline pH 7.4, with 0.02 % NaN ₃ Product Code: TM-0121	
	Hydrated in deionized water with 0.15 % ProCline on request	Hydrated in deionized water with 0.15 % ProCline Product Code: TM-0122	
Fine	Dry Bead Size: 20 – 80 µm (>80 %) Product Code: TM-0102	Dry Bead Size: 20 – 80 µm (>80 %) Product Code: TM-0105	
	Hydrated in phosphate buffered saline pH 7.4, with 0.02 % NaN ₃ Product Code: TM-0130	Hydrated in phosphate buffered saline pH 7.4, with 0.02 % NaN ₃ Product Code: TM-0108	
	Hydrated in deionized water with 0.15 % ProCline Product Code: TM-0129	Hydrated in deionized water with 0.15 % ProCline Product Code: TM-0123	
Medium	Dry Bead Size: 50 – 150 µm (>80 %) Product Code: TM-0103	Dry Bead Size: 50 – 150 µm (>80 %) Product Code: TM-0106	
	Hydrated in phosphate buffered saline pH 7.4, with 0.02 % NaN ₃ Product Code: TM-0107	Hydrated in phosphate buffered saline pH 7.4, with 0.02 % NaN ₃ Product Code: TM-0132	
	Hydrated in deionized water with 0.15 % ProCline Product Code: TM-0114	Hydrated in deionized water with 0.15 % ProCline Product Code: TM-0131	

Size Exclusion Chromatography

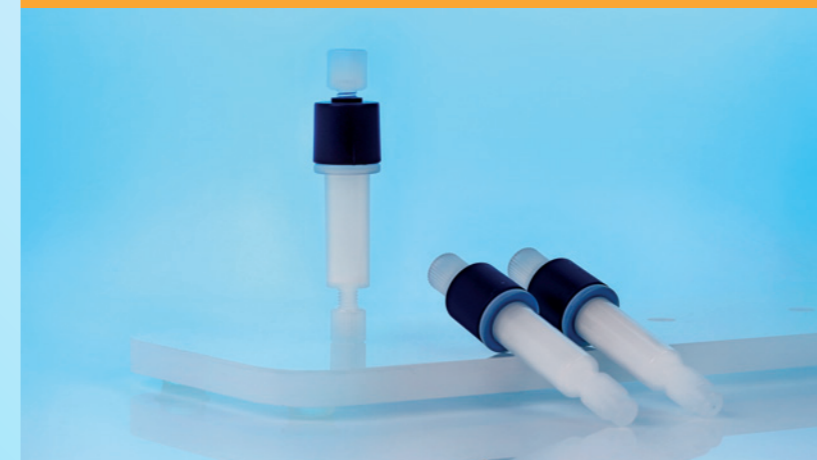
Zetadex, DeXtra and Zetarose Solid Phases
for the separation of biomolecules based on molecular size

Water Regain: Swelling: MWCO (size exclusion): Fractionation Range:		2.15 – 2.25 mL/g 4 – 6 mL/g below 5000 Da 1 – 5 kDa (globular proteins)	4.80 – 5.20 mL/g 9 – 11 mL/g below 25000 Da 1 – 30 kDa (globular proteins)
Grade	Zetadex-25	Zetadex-50	
Coarse	Dry Bead Size: 100 – 300 µm (>80 %) Product Code: TM-0112	Dry Bead Size: 100 – 300 µm (>80 %) Product Code: TM-0113	
Agglutination Grade (Gel Card)	Dry Bead Size: 20 – 50 µm (>80 %) on request	Dry Bead Size: 20 – 50 µm (>80 %) Product Code: TM-0111	
	Hydrated in phosphate buffered saline pH 7.4, with 0.02 % NaN ₃ on request	Hydrated in phosphate buffered saline pH 7.4, with 0.02 % NaN ₃ Product Code: TM-0120	
	Hydrated in deionized water with 0.15 % ProCline on request	Hydrated in deionized water with 0.15 % ProCline on request	

Product Name	Particle size	Exclusion limit (kD)	Fractionation range (kD)	Product Code
Zetadex 20 LH	50 µm	4 – 5 (dependent on solvent)	For use with organic solvents Dependent on solvent used	TM-0501
Zetarose 6	35 µm	not applicable	6 – 5000	TM-1109
DeXtra 75	35 µm	not applicable	3 – 70	TM-5101
DeXtra 200	35 µm	not applicable	6 – 600	TM-5102

ZetaSep FPLC Desalting Columns

For desalting, removal of small molecules, and buffer exchange
using liquid chromatography systems



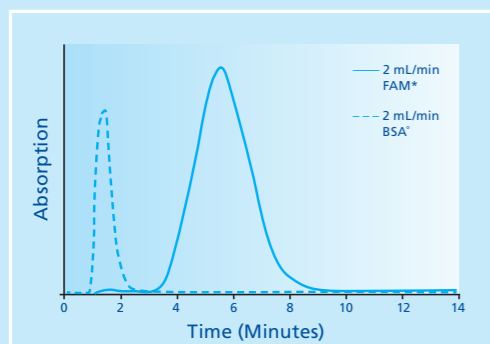
ZetaSep FPLC Desalting Columns are designed for:

- Separating larger biomolecules (i.e. proteins such as antibodies, enzymes or larger nucleic acids) from unwanted smaller molecules
- Buffer exchange (after a pre-equilibration), desalting, removal of low molecular weight contaminants, and reaction terminations
- Simple, rapid and reproducible separation using a syringe, pump or liquid chromatography system

ZetaSep FPLC Desalting Columns are available with Zetadex-25 Superfine, which has a molecular weight cut-off (MWCO) of approximately 5 kD, in 1 mL and 5 mL sizes. Proteins, oligonucleotides, spheroidal nanoparticles or other biomolecules larger than 5 kD are gently and efficiently separated from salts, metal cations, urea, dyes, inhibitors, biotin, haptens, and other low molecular weight impurities.

ZetaSep FPLC Desalting Columns

For desalting, removal of small molecules, and buffer exchange using liquid chromatography systems



High Performance Results:

Sample: 1 mL of 2 mg/mL BSA & 100 μ M of 5-Carboxyfluorescein in PBS pH 7.4 (0.05 % NaN_3).

Flow rate: 2 mL/min.

Eluent: PBS pH 7.4 (0.05 % NaN_3)

Detection: Abs. at 280 nm and 490 nm

Specifications

Column bed volume	5 mL
Size of eluted Proteins	> 5 kD
System compatibility	- Automated liquid chromatography systems (MPLC, FPLC, ÄKTA™, etc.) - Peristaltic pump - Syringe
Column dimensions	1.6 cm inner diameter x 2.5 cm height
Column body material	Polypropylene
Column ports	Inlet 10 – 32 (1/16") female Outlet 10 – 32 (1/16") male
Support	Zetadex-25 Superfine
Bead size	40 – 110 μ m (hydrated)
Maximum back pressure	3 bar (0.3 MPa)
Recommended flow rate	1 to 5 mL/min
Maximum recommended flow rate	10 mL/min
Storage temperature	ambient
Storage solution	20 % (v/v) ethanol

emp Biotech acknowledges and recognizes ownership of trademarks used in this publication by the respective owners of said trademarks.

ZetaSep FPLC Desalting Columns

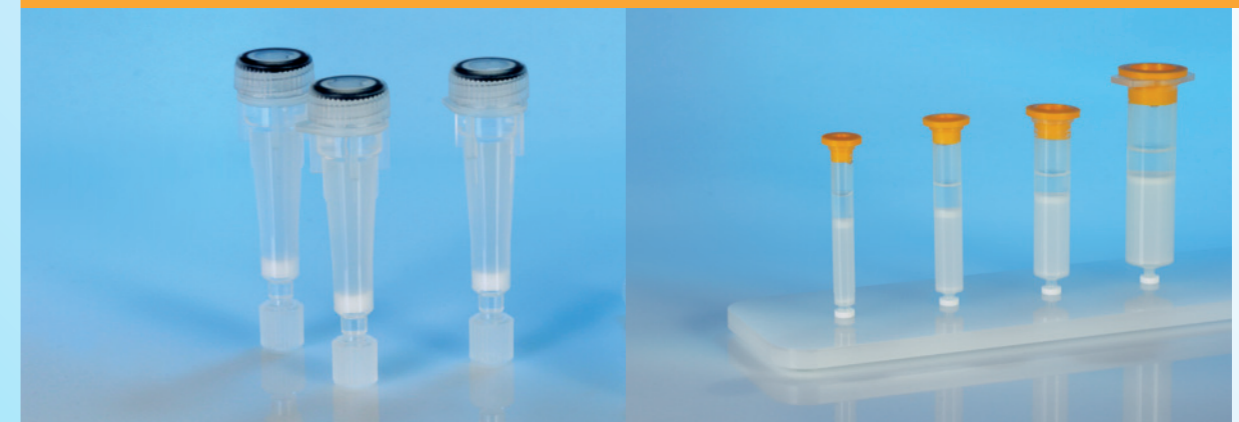
For desalting, removal of small molecules, and buffer exchange using liquid chromatography systems



Order Number	Description	Pack Size
ZS-0101-M005.0-005	ZetaSep FPLC Desalting	5 x 5 mL Columns
ZS-0101-M005.0-100	ZetaSep FPLC Desalting	100 x 5 mL Columns
ZS-0102-M001.0-100	ZetaSep FPLC Desalting	100 x 1 mL Columns

CentriPure

Desalting and Buffer Exchange Columns



CentriPure Gel Filtration Columns are specifically designed for rapid and efficient removal of small molecules (dyes, salts, biotin, haptens, etc.) from larger proteins, nucleic acids, or nanoparticles, which are simultaneously purified and desalted in a single step.

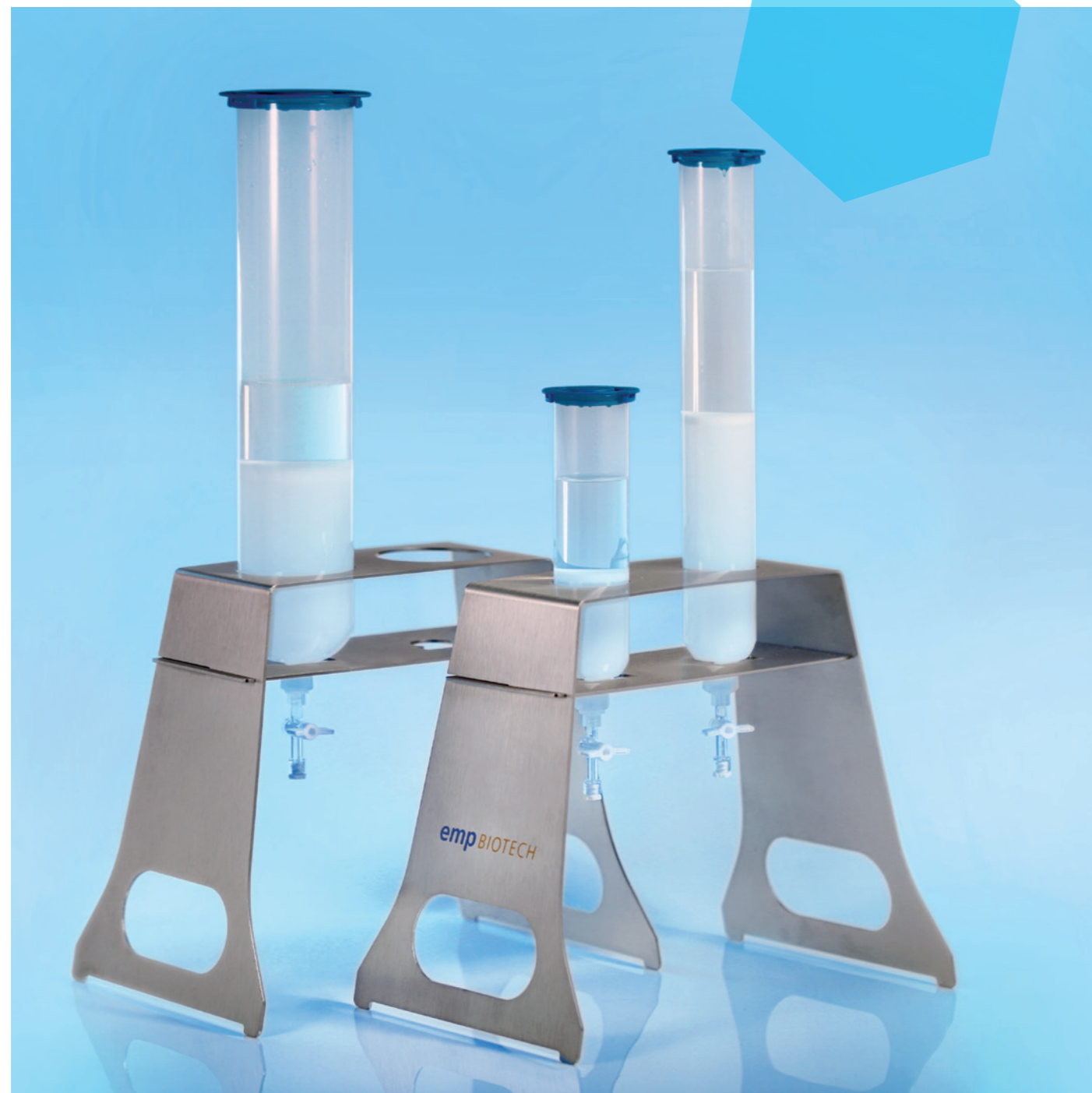
Ultrapure gel and specially treated sinter frits ensure outstanding resolution, low cross-contamination and high selectivity.

CentriPure columns are precision filled with **Zetadex Medium**, which has been optimized for gravity flow chromatography. **CentriPure** columns can be pre-washed with pure water for desalting or pre-equilibrated with a buffer of choice for a customized buffer exchange. The gravity column provides a significantly faster and far more efficient alternative to lengthy dialysis.

CentriPure – Desalting and Buffer Exchange Columns

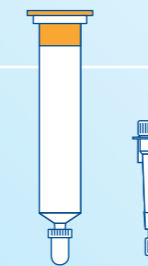
for rapid and efficient removal of small molecules

please see our Zetadex catalog for further information

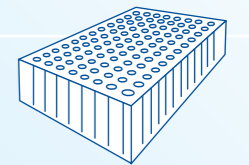


CENTRIFUGATION

CentriSpin Columns
sample volume: 500 μ L
CentriSpin MINI Columns
sample volume: 50 μ L

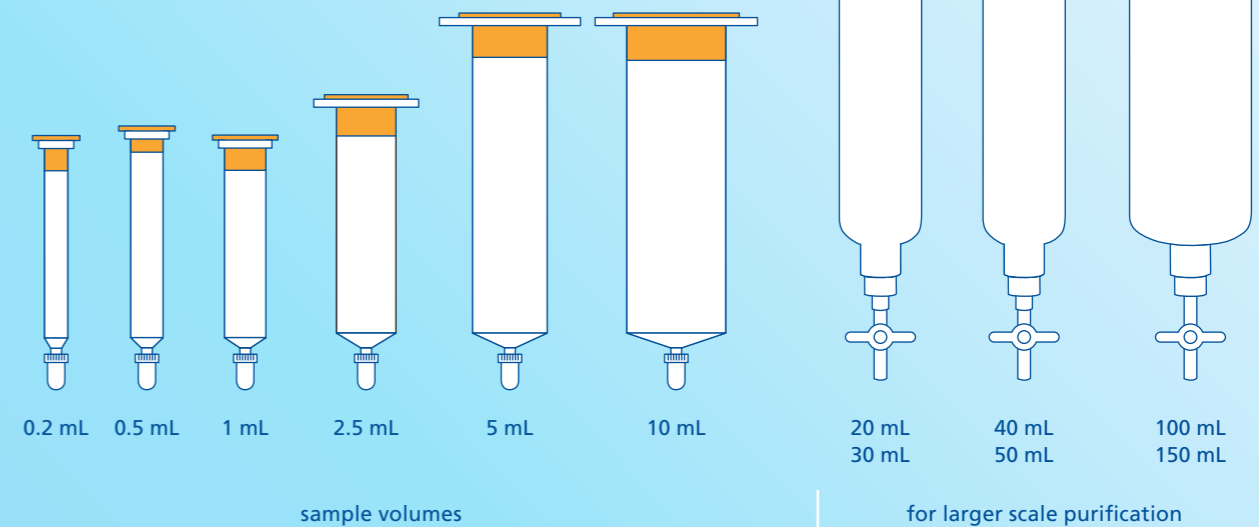


CentriPure Plates
sample volume:
up to 70 μ L



GRAVITATIONAL FLOW

CentriPure Columns process fixed sample volumes and elute with a 1.5-fold dilution. There are twelve column sizes available from 0.2 mL sample volume up to 150 mL.



Terms and Conditions



For conducting business with **emp BIOTECH**, please review our general terms and conditions as listed on our website www.empbiotech.com.

emp BIOTECH GmbH
Robert-Rössle-Str. 10
13125 Berlin · Germany
Tel. +49 (0)30 94 89 22 01

info@empbiotech.com
www.empbiotech.com

emp BIOTECH is ISO 9001:2015 and 13845:2016 certified.
Registration number 011001300789 (TÜV Rheinland)

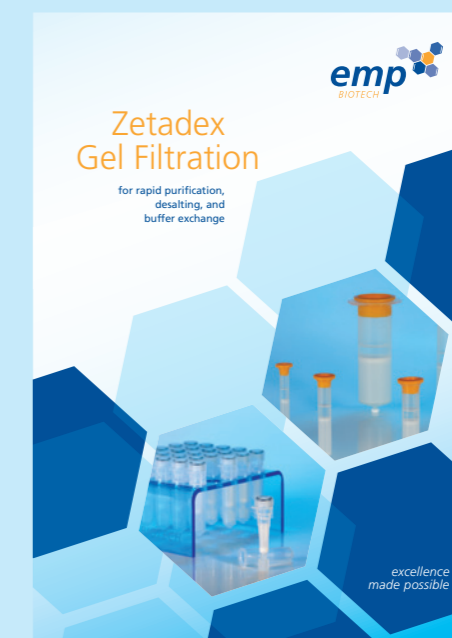
emp BIOTECH LLC
151 New Jersey 33, Suite 255
Manalapan, NJ 07726 · USA
Tel. +1 732-409-2600

More to Discover



Synthesis Reagents
for automated oligonucleotide synthesis

- Solvents and Reagents
- Deblocking / Detritylation
- Activators
- Capping Reagents
- Oxidizer
- Cleavage & Deprotection
- CE- β -Elimination
- Sulphurizing Reagents
- Solvents & Solvent Mixtures
- Labeling and Purification
- Moisture Traps & Molecular Sieves
- Oligo Labeling
- Oligo Desalting



Zetadex Gel Filtration
for rapid purification, desalting, and buffer exchange

- Zetadex Gel Filtration Resin
- CentriPure Columns
- CentriPure Column Arrays
- CentriSpin Columns
- CentriSpin MINI Columns
- CentriPure Gel Filtration Plates
- ZetaSep FPLC Desalting Columns

