

# Biomolecule Purification

solutions for  
downstream processing



*excellence  
made possible*

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Solutions for downstream processing



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# Zetarose Solid Phase

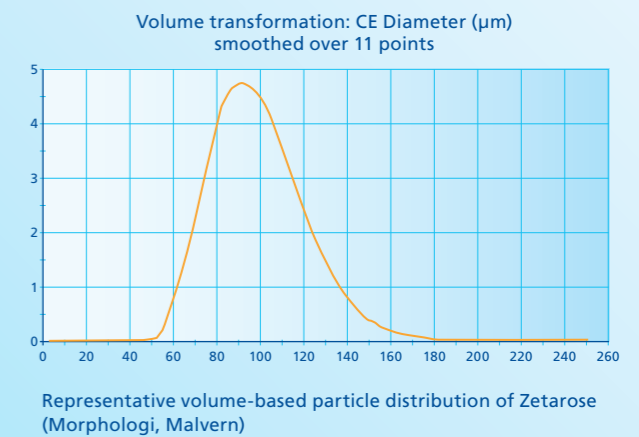
For purification and separation of biomolecules



*emp BIOTECH* developed and manufactured the **Zetarose** platform for the purification of biomolecules. The solid phase is composed of spherical, highly cross-linked beads with either 4% (**Zetarose FF4**) or 6% (**Zetarose FF6**) agarose, available in an average bead size of 100  $\mu\text{m}$  (45 – 160  $\mu\text{m}$  range,  $\leq 95\%$ ). The agarose concentration influences the pore size, effecting the robustness of the beads against pressure. **Zetarose FF6** has smaller channels that provide the bead more rigidity. In addition, a higher percentage of agarose provides a larger surface area for the coupling of ligands and binding of proteins.

The **Zetarose** platform includes underivatized beads for gel filtration or for modification by the user. We also offer a wide range using various modes of interaction between the solid phase and the target biomolecule – Affinity, Ion Exchange, and Hydrophobic Interaction Chromatography.

- Autoclavable at 121 °C for 20 min.
- Storage at 2 – 30 °C in 20% ethanol
- Stable in commonly used aqueous and organic solutions for protein purification
- Can be operated with high flow rates



Product Code	Product Name	Particle Size ( $D_{\text{average}}$ )*	Exclusion Limit (Da)	Agarose Conc.	Velocity Properties**
TM-1108	Zetarose FF4	100 $\mu\text{m}$	$30 \times 10^6$	4%	$\geq 2$ bar $\Delta$ -pressure ( $\geq 750$ cm/h)
TM-1105	Zetarose FF6	100 $\mu\text{m}$	$4 \times 10^6$	6%	$\geq 3$ bar $\Delta$ -pressure ( $\geq 1000$ cm/h)

\* volume-based particle size

\*\* Pressure and flowrate test with water in 10 mm diameter column and 10 to 15 cm bed height. Resin is able to withstand 2 min without collapsing at that flow rate and  $\Delta$ -pressure.

# Antibody Affinity Chromatography

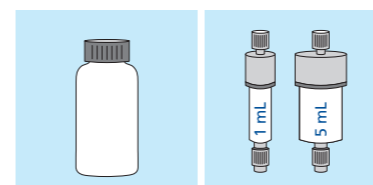
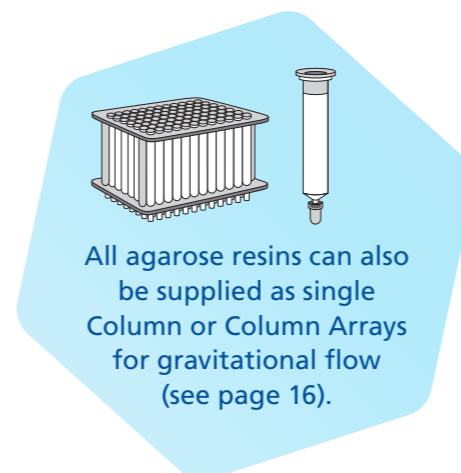
Affinity Solid Phases for the purification of antibodies and antibody fragments



The **Zetarose** range of affinity agarose beads 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.

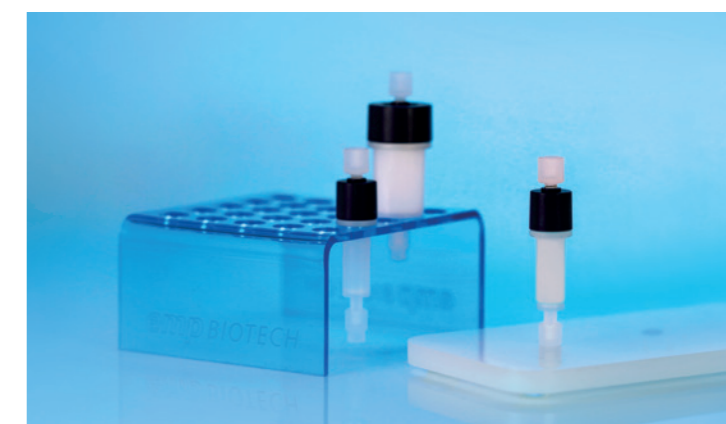
We have developed **Protein A Elevate**<sup>®</sup>, **emp BIOTECH**'s highly cross-linked agarose with immobilized NaOH-tolerant Protein A ligands. In a packed bed, it can withstand pressures up to 3 bar and flow rates of up to 300 cm/h. With a DBC of > 30 mg hlgG/mL resin on an average bead size of 100 µm this makes **Protein A Elevate**<sup>®</sup> a strong contender on the market. Our CIP studies clearly show that the binding capacity after exposure to 1 M NaOH for 15 min remains stable for well over 100 cycles, before starting to decline after 150 cycles. **Protein A Elevate**<sup>®</sup> exhibits minimal loss in antibody binding capacity with standard cleaning-in-place.

Product Name	Binding Capacity	Ligand Density	Velocity Properties	pH-Stability	Bulk Resin	ZetaSep FPLC Column
Zetarose Protein A Elevate <sup>®</sup>	≥ 30 mg/mL hlgG/mL resin (SBC)	Proprietary	≥ 300 cm/h, ≤ 3 bar	1 M NaOH for 15 min. CIP cycle 5/10% loss in binding efficiency after 100/150 CIP cycles	TM-1425	ZS-1425
Zetarose Protein G FF4	≥ 20 mg/mL hlgG/mL resin (SBC)	Proprietary	≥ 300 cm/h, ≤ 3 bar	–	TM-1410	ZS-1410



# SMIRF™

Antibody Purification  
ZetaSep FPLC screening kits



Using our high quality cross-linked agarose-based solid phases, we have developed a range of easy-to-use products for purification process discovery.

The kits are designed for use with most chromatography systems and include not only the capture resin or resins, but also a 5 mL ZetaSep desalting column based on our Zetadex solid phase.

Simply connect the columns to your system, design your protocol and purify and desalt/buffer exchange your target biomolecule.

Order-No.	SMIRF™ Antibody Purification
ZK-1401	Contains a 1 mL base-stable (1 M NaOH) Zetarose Protein A Elevate <sup>®</sup> column, a 1 mL Zetarose Phenyl hydrophobic interaction (HIC) column and a 5 mL Zetadex desalting column

# Tag Affinity Chromatography

Immobilized-Metal Affinity Chromatography (IMAC) Solid Phases for the purification of polyhistidine-tagged proteins



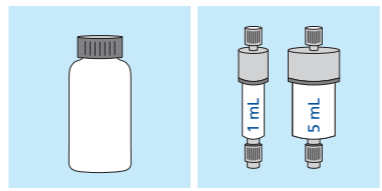
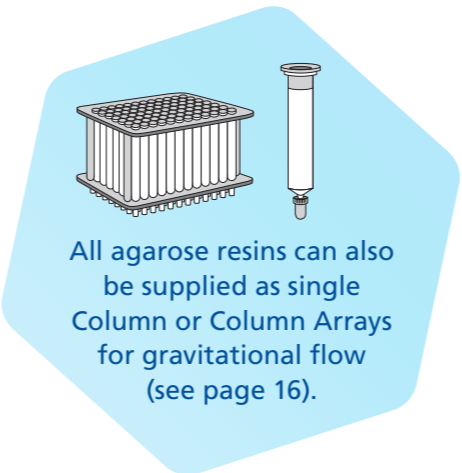
The **Zetarose** range of affinity agarose beads offer a robust platform for repeated purification cycles. By careful engineering of the linker chemistry used to immobilize the active ligand to the bead, **Zetarose** solid phases may be used for repeated purification cycles – making high-end affinity separation a more affordable approach to your separation methodology.

**Zetarose NTA FF6** is a highly cross-linked 6% agarose affinity resin derivatized with the tetravalent chelating ligand nitrilotriacetic acid (NTA). When charged with a bivalent transition metal ions ( $Me^{2+}$ ), recombinant proteins containing polyhistidine (6xHis) residues via their selective affinity to the ligand's vacant positions within the immobilized metal ion coordination sphere are purified. After washing, bound proteins are eluted under native or denaturing conditions with either a low pH buffer or in a buffer containing imidazole or histidine.

Considerations in what metal cation to choose are dependent on the application as they vary strongly in affinity and specificity for His-tagged proteins. For evaluation please refer to our Screening Kit ZK-1402.

Product Name	Binding Capacity	Ligand Density	Velocity Properties	His-tag Affinity   Specificity		Bulk Resin	ZetaSep FPLC Column
Zetarose NTA (metal-free)	–	$\geq 20 \mu\text{mol Ni}^{2+}/\text{mL}$	$\geq 500 \text{ cm/h}, \leq 3 \text{ bar}$			TM-1428	ZS-1428
Zetarose Cu-NTA	tba (under review)	$\geq 20 \mu\text{mol Ni}^{2+}/\text{mL}$	$\geq 500 \text{ cm/h}, \leq 3 \text{ bar}$	++++	+	TM-1431	ZS-1431
Zetarose Ni-NTA	$\geq 40 \text{ mg His-tagged protein}^*/\text{mL resin}$	$\geq 20 \mu\text{mol Ni}^{2+}/\text{mL}$	$\geq 500 \text{ cm/h}, \leq 3 \text{ bar}$	+++	++	TM-1429	ZS-1429
Zetarose Zn-NTA	tba (under review)	$\geq 20 \mu\text{mol Ni}^{2+}/\text{mL}$	$\geq 500 \text{ cm/h}, \leq 3 \text{ bar}$	++	+++	TM-1432	ZS-1432
Zetarose Co-NTA	tba (under review)	$\geq 20 \mu\text{mol Ni}^{2+}/\text{mL}$	$\geq 500 \text{ cm/h}, \leq 3 \text{ bar}$	+	++++	TM-1430	ZS-1430

\*SBC (HNRNPDL-protein, MW ~45-50 kDa)



# SMIRF™

Immobilised Metal Affinity (IMAC) Purification ZetaSep FPLC screening kits



Using our high quality cross-linked agarose-based solid phases, we have developed a range of easy-to-use products for purification process discovery.

The kits are designed for use with most chromatography systems and include not only the capture resin or resins, but also a 5 mL ZetaSep desalting column based on our Zetadex solid phase.

Simply connect the columns to your system, design your protocol and purify and desalt/buffer exchange your target biomolecule.

Order-No.	SMIRF™ Immobilised Metal Affinity (IMAC) Purification
ZK-1402	Includes 1 mL ZetaSep columns packed with Zetarose Ni-NTA, Zetarose Co-NTA, Zetarose Cu-NTA and Zetarose Zn-NTA solid phases and a 5 mL Zetadex desalting column

# 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.

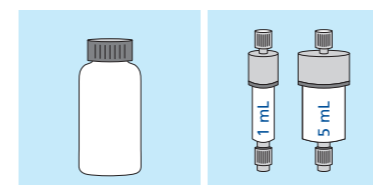
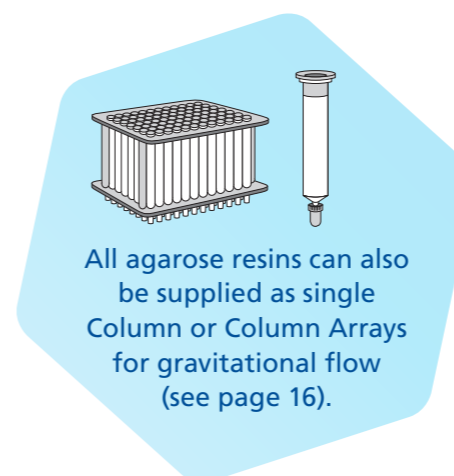
When developing a purification process using HIC, even small changes in hydrophobicity of the ligand can have an effect on the interaction with the target molecule. Generally speaking, hydrophobicity increases with changes in the length of the ligand. **emp BIOTECH** offers HIC solid phases with three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

Product Name	Particle Size	Ligand Density	Functional Group	Maximum Flow Rate	Bulk Resin	ZetaSep FPLC Column
Zetarose Butyl FF6	100 µm	40 µmol/mL resin	-C <sub>4</sub> H <sub>9</sub>	> 500 cm/h, 32 mm column ID	TM-1506	ZS-1506
Zetarose Phenyl FF6	100 µm	20 µmol/mL resin	-C <sub>6</sub> H <sub>5</sub>	> 500 cm/h, 32 mm column ID	TM-1503	ZS-1503
Zetarose Phenyl HC	30 µm	40 µmol/mL resin	-C <sub>6</sub> H <sub>5</sub>	> 100 cm/h, 32 mm column ID	TM-1504	ZS-1504
Zetarose Octyl FF6	100 µm	4 µmol/mL resin	-C <sub>8</sub> H <sub>17</sub>	> 500 cm/h, 32 mm column ID	TM-1508	ZS-1508



# SMIRF™

Hydrophobic Interaction (HIC) Purification ZetaSep FPLC screening kits



Using our high quality cross-linked agarose-based solid phases, we have developed a range of easy-to-use products for purification process discovery.

The kits are designed for use with most chromatography systems and include not only the capture resin or resins, but also a 5 mL ZetaSep desalting column based on our Zetadex solid phase.

Simply connect the columns to your system, design your protocol and purify and desalt/buffer exchange your target biomolecule.

Order-No.	SMIRF™ Hydrophobic Interaction (HIC) Purification
ZK-1501	Includes 1 mL ZetaSep columns packed with Zetarose Butyl, Zetarose Phenyl and Zetarose Octyl solid phases and a 5 mL Zetadex desalting column

# Ion Exchange Purification

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

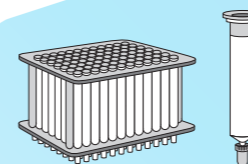
Ion exchange chromatography (AEX, CEX) is the work-horse of the modern purification scientist. **emp BIOTECH** enables you to use this technique to its fullest by offering a full range of ion exchange products on three different solid phases for various applications – Zetarose and Zetadex for protein purification, and Zetarene for oligonucleotides.

## Zetarose

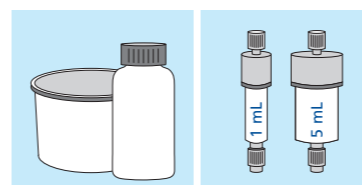
Based on porous and stable cross-linked beaded agaroses, **Zetarose** offers a robust platform for both small and large-scale applications and is utilized for a wide variety of separation techniques. The **Zetarose** IEX solid phases are centered around particle sizes of 100 µm.

## 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.



All agarose resins can also be supplied as single Column or Column Arrays for gravitational flow (see page 16).



	Product Name	Particle Size	Ionic Capacity	Ion Exchanger Type	Ion Exchange Group	Maximum Flow Rate	Bulk Resin	ZetaSep FPLC Column
ZETAROSE	Zetarose Q FF6	100 µm	0.08-0.16 mmol Cl <sup>-</sup> /mL	strong AEX	quaternary ammonium	> 500 cm/h	TM-1202	ZS-1202
	Zetarose SP FF6	100 µm	0.14-0.26 mmol H <sup>+</sup> /mL	strong CEX	sulfopropyl	> 500 cm/h	TM-1208	ZS-1208
	Zetarose DEAE FF6	100 µm	0.08-0.16 mmol Cl <sup>-</sup> /mL	weak AEX	diethylaminoethyl	> 500 cm/h	TM-1205	ZS-1205
	Zetarose CM FF6	100 µm	0.08-0.16 mmol H <sup>+</sup> /mL	weak CEX	carboxymethyl	> 500 cm/h	TM-1207	ZS-1207
ZETADEX	Zetadex-25 DEAE	40-120 µm	3.0-4.0 mmol/g	weak AEX	diethylaminoethyl	> 500 cm/h	TM-0206	-
	Zetadex-50 DEAE	40-120 µm	3.0-4.0 mmol/g	weak AEX	diethylaminoethyl	> 50 cm/h	TM-0201	-
	Zetadex-25 QAE	40-120 µm	2.6-3.4 mmol/g	strong AEX	quaternary ammonium ethyl	> 500 cm/h	TM-0207	-
	Zetadex-50 QAE	40-120 µm	2.6-3.4 mmol/g	strong AEX	quaternary ammonium ethyl	> 50 cm/h	TM-0209	-
	Zetadex-25 CM	40-120 µm	4.0-5.0 mmol/g	weak CEX	carboxymethyl	> 500 cm/h	TM-0203	-
	Zetadex-50 CM	40-120 µm	4.0-5.0 mmol/g	weak CEX	carboxymethyl	> 50 cm/h	TM-0205	-
	Zetadex-25 SP	40-120 µm	2.0-2.6 mmol/g	strong CEX	sulfopropyl	> 500 cm/h	TM-0208	-
	Zetadex-50 SP	40-120 µm	2.0-2.6 mmol/g	strong CEX	sulfopropyl	> 50 cm/h	TM-0210	-

# SMIRF™

Ion Exchange (IEX) Purification  
ZetaSep FPLC screening kits



Using our high quality cross-linked agarose-based solid phases, we have developed a range of easy-to-use products for purification process discovery.

The kits are designed for use with most chromatography systems and include not only the capture resin or resins, but also a 5 mL ZetaSep desalting column based on our Zetadex solid phase.

Simply connect the columns to your system, design your protocol and purify and desalt/buffer exchange your target biomolecule.

Order-No.	SMIRF™ Ion Exchange (IEX) Purification
ZK-1201	Includes 1 mL ZetaSep columns packed with Zetarose CM, Zetarose DEAE, Zetarose Q and Zetarose SP solid phases and a 5 mL Zetadex desalting column

# Ion Exchange Purification

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



**emp BIOTECH's Zetarene** range are strong ion exchange resins based on highly crosslinked polystyrene/divinylbenzene with a mean diameter of 15  $\mu\text{m}$  or 30  $\mu\text{m}$ . The consistency of the particle distribution allows for high resolution and low back pressure. The beads are uniformly shaped with a porous surface, increasing the available surface for binding. This ensures high capacity for biomolecules and a high degree of performance at high flow rates.

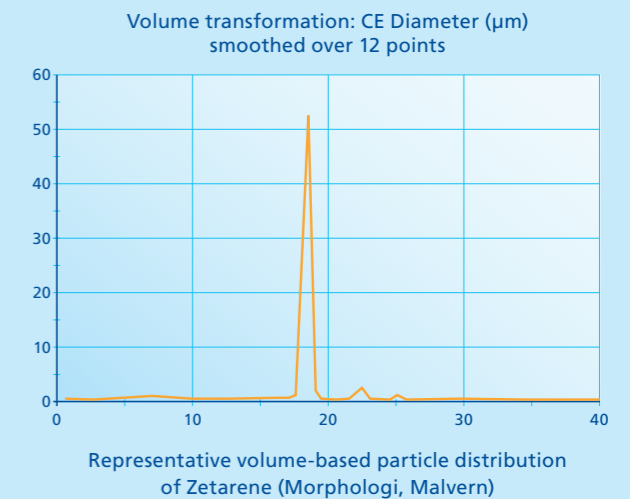
The solid phase is chemically resistant and can be operated under high pressure. This is particularly useful for high throughput purification of biomolecules such as oligonucleotides.

available  
in glass columns  
on request



## Advantages of Zetarene:

- Purification of nucleic acids, peptides, and carbohydrates
- Stable performance under high flow rates
- Reliable scale up
- Chemically stable
- High resolution
- pH resistant
- Pressure tolerant



**Zetarene** resins are available either as a strong anion exchanger activated with quaternary ammonium (**Zetarene Q**) or as a strong cation exchanger charged with sulfyl ligands (**Zetarene S**).



Product Name	Particle Size*	Ionic Capacity	Ion Exchanger Type	Ion Exchange Group	Maximum Flow Rate**	Bulk Resin
Zetarene Q15	~ 15 $\mu\text{m}$	$\geq 0.08$ mmol $\text{Cl}^-/\text{mL}$	strong AEX	quaternary ammonium	$\geq 1800$ cm/h	TM-8201
Zetarene Q30	~ 30 $\mu\text{m}$	$\geq 0.08$ mmol $\text{Cl}^-/\text{mL}$	strong AEX	quaternary ammonium	$\geq 1800$ cm/h	TM-8202
Zetarene S15	~ 15 $\mu\text{m}$	tba	strong CEX	sulfonate	$\geq 1800$ cm/h	coming soon
Zetarene S30	~ 30 $\mu\text{m}$	tba	strong CEX	sulfonate	$\geq 1800$ cm/h	coming soon

\* volume-based particle size

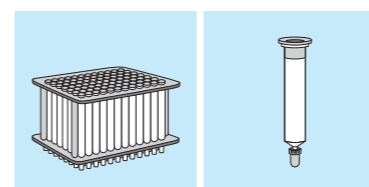
\*\* Pressure and flowrate test with water in 10 mm diameter column and 20 cm bed height. Resin is able to withstand 2 min without collapsing at that flow rate and  $\Delta$ -pressure.



# GraviPure Columns and Multi Column Arrays

Our new product range for purification under gravity flow

**GraviPure Columns** and **Multi Column Arrays** are designed for purifications with a wide range of **Zetarose** chromatography resins. The columns are precision filled with **Zetarose** resin, which has been optimized for gravity flow chromatography. In addition to the **Zetarose** resin the specially treated sinter frits ensure outstanding resolution and high selectivity.

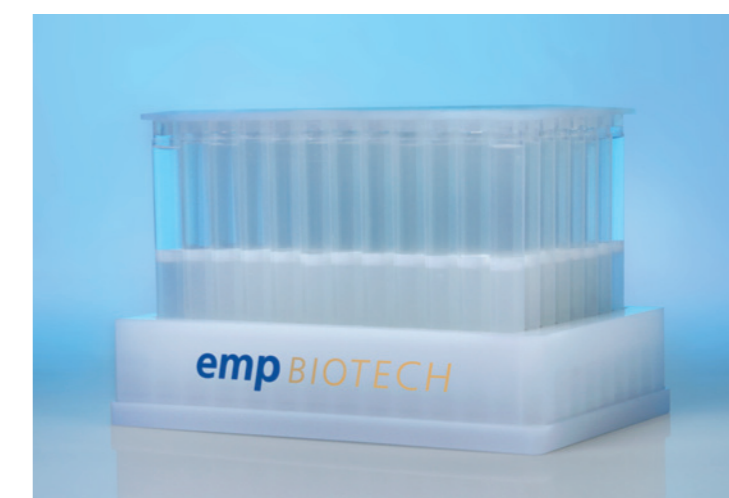


	Product Name	Binding Capacity	Ligand Density	pH-Stability	Multi Column Array	GraviPure Column
AFFINITY	Zetarose Protein A Elevate®	≥ 40 mg/mL hlgG/mL resin (SBC)	Proprietary	1 M NaOH for 15 min. CIP cycle 5/10% loss in binding efficiency after 100/150 CIP cycles	coming soon	GP-1425
	Zetarose NTA (metal-free)	–	≥ 20 μmol Me <sup>2+</sup> /mL	3 – 13  The pH stability of the affinity resin will be ultimately dependent on the pH stability of the metal ion bound to the resin and the incubation time.	coming soon	GP-1428
	Zetarose Cu-NTA	tba (under review)	≥ 20 μmol Ni <sup>2+</sup> /mL		coming soon	GP-1431
	Zetarose Ni-NTA	≥ 40 mg His-tagged protein*/mL resin	≥ 20 μmol Ni <sup>2+</sup> /mL		coming soon	GP-1429
	Zetarose Zn-NTA	tba (under review)	≥ 20 μmol Ni <sup>2+</sup> /mL		coming soon	GP-1432
	Zetarose Co-NTA	tba (under review)	≥ 20 μmol Ni <sup>2+</sup> /mL		coming soon	GP-1430

	Product Name	Ionic Capacity	Ion Exchanger Type	pH-Stability	Column Array	GraviPure Column
IEX	Zetarose DEAE FF6	0.08-0.16 mmol Cl <sup>-</sup> /mL	weak AEX	2 – 14 (short term) 3 – 12 (long term)	coming soon	GP-1205
	Zetarose Q FF6	0.08-0.16 mmol Cl <sup>-</sup> /mL	strong AEX		coming soon	GP-1202
	Zetarose CM FF6	0.08-0.16 mmol H <sup>+</sup> /mL	weak CEX	2 – 14 (short term) 4 – 12 (long term)	coming soon	GP-1207
	Zetarose SP FF6	0.14-0.26 mmol H <sup>+</sup> /mL	strong CEX		coming soon	GP-1208

# Multi Column Arrays

For purification in automated systems



The **Multi Column Array** is engineered for simultaneous purifications with a wide range of **Zetarose** chromatography resins in a convenient microplate format.

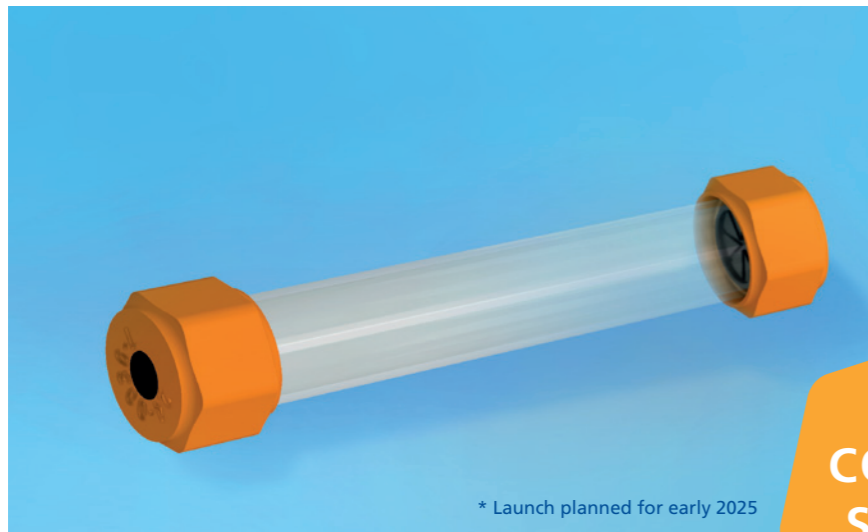
The array format is especially designed for development and execution of high throughput processes facilitated by the use of a variety of congruent columns, enabling more efficient workflows. By using small sample volumes, multiple parameters can be screened efficiently.

\* Launch planned for early 2025



## ZetaPrep FPLC Columns

For protein purification using liquid chromatography systems

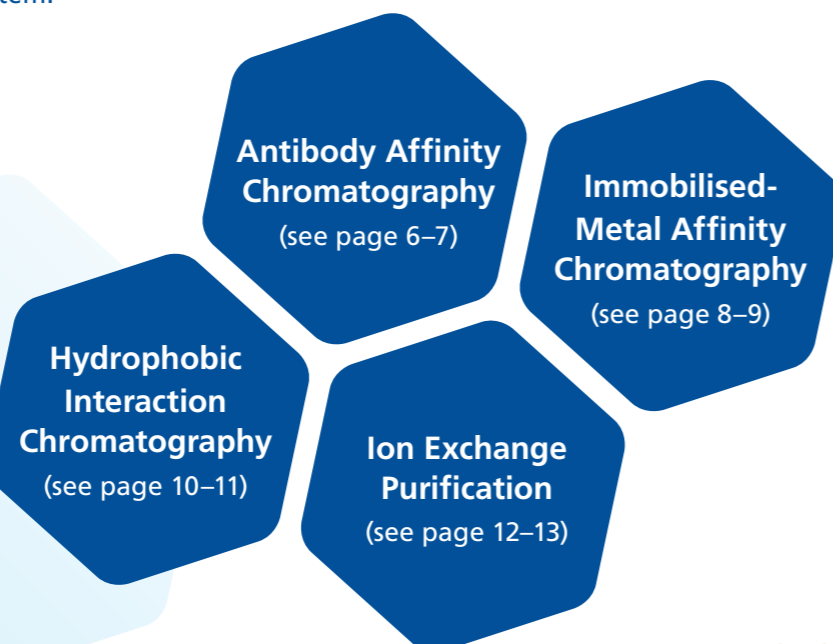


\* Launch planned for early 2025

COMING  
SOON\*

ZetaPrep FPLC purification columns are available with a wide range of Zetarose chromatography resins.

Zetarose is a highly cross-linked beaded agarose resin, which is derivatized with either affinity, ion exchange, or hydrophobic ligands. The high loading capacity enables simple, rapid, and reproducible large-scale purification using a syringe, pump, or liquid chromatography system.



## Activated Zetarose Solid Phases

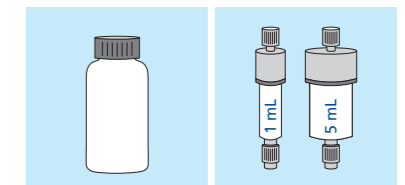
For immobilization of ligands pursuant to targeted purification



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!



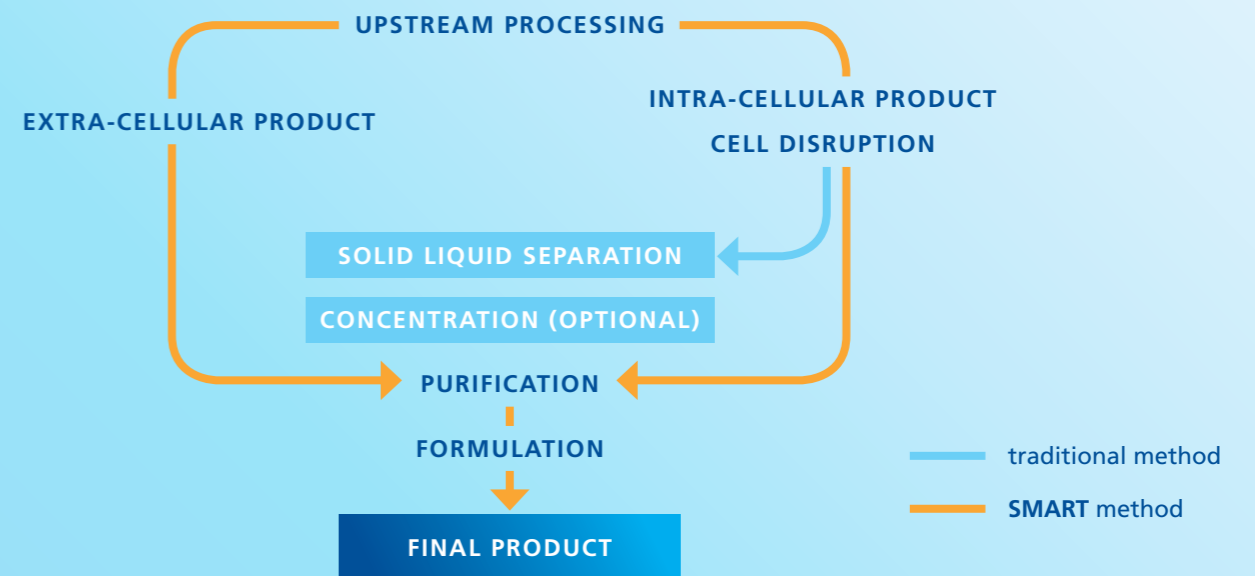
Product Name	Activation Density	binds to:	Bulk Resin	ZetaSep FPLC Column
Zetarose Aldehyde-activated FF6	> 5 $\mu\text{mol/mL}$	-NH <sub>2</sub>	TM-1319	ZS-1319
Zetarose Epoxy-activated FF6	> 75 $\mu\text{mol/mL}$	-NH <sub>2</sub> -SH -OH	TM-1320	ZS-1320
Zetarose NHS-activated FF6	> 5 $\mu\text{mol/mL}$	-NH <sub>2</sub> Storage buffer: 100% Isopropanol	TM-1309	-

# SMART Chromatography™

Purification from cell containing feed streams in packed bed columns

*emp BIOTECH* has developed a technology platform to purify proteins (and other biomolecules) directly from cell culture systems in a packed bed chromatography column without the need for a liquid solid separation: Feed stream clarification and primary capture is combined into a single unit operation. It has been patented and commercialized under the trade name **SMART Chromatography™** (Simplified Method – Applied Radial Technology).

- Purify product directly from raw cell culture without solid matter removal in a packed bed
- Boosts productivity through improved process economics, decreased operational costs and lower environmental impact
- Predictable, linear scale-up from R&D to manufacturing scale
- Promotes higher recovery, greater purity and retention of biological activity of the target molecule



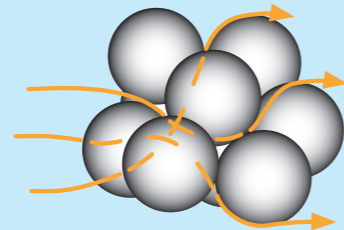
Overview of the downstream purification process

## SMART Chromatography™

Purification from cell containing feed streams  
in packed bed columns

**SMART Chromatography™** combines emp BIOTECH's ZetaCell resin technology with industry-proven radial flow chromatography (RFC).

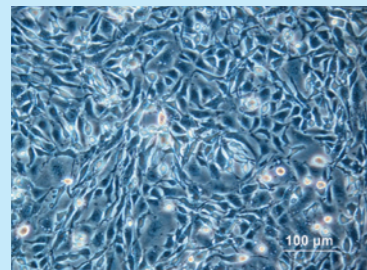
ZetaCell are large cross-linked beaded agarose particles with a well-defined pore structure. The target biomolecule binds to the functionalized solid phase, whilst cells and cell debris pass unhindered through the interstitial spaces in the packed column bed.



Beads are functionalized depending on the desired modality (ion exchange, hydrophobic interaction, immuno-affinity, IMAC etc.).

**SMART Chromatography™** can be used with all non-clarified feed streams. It has been validated with mammalian cell lines (CHO, HEK, hybridoma; up to  $60 \times 10^6$  cells/mL), yeasts (*Pichia pastoris*, *Saccharomyces cerevisiae*), bacteria (*Escherichia coli*), filamentous fungi (all 10%–30% wet solids), vira and plant-based materials.

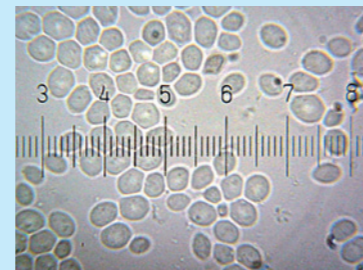
This platform has also been used with vegetable and dairy waste streams for isolation of high-value trace proteins and for the purification of transgenic monoclonal antibodies from rice flour.



CHO cells  
(source: Wikipedia)



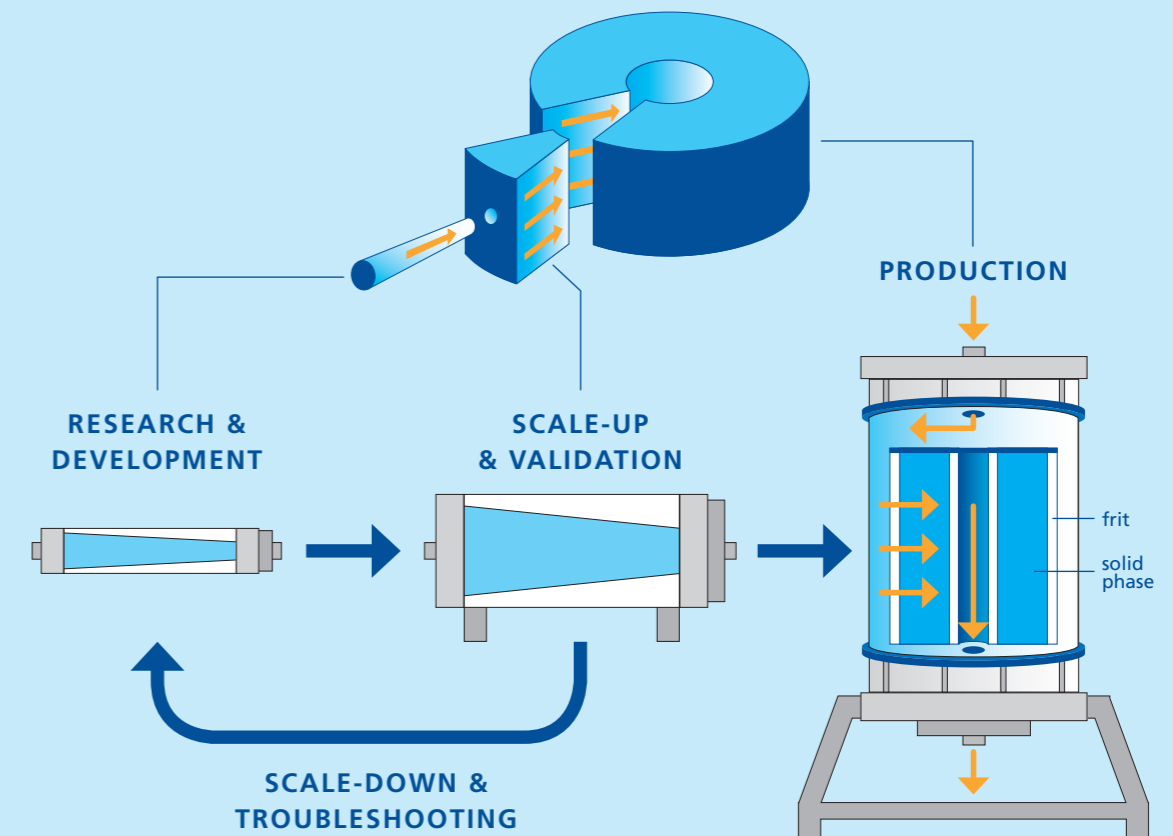
*Escherichia coli*  
(source: Wikipedia)



*Saccharomyces cerevisiae*  
(source: Wikipedia)

Furthermore, by use of a different column geometry than the traditional "top to bottom" axial format, it has been possible to develop a system that is also linearly scalable. In RFC the flow of the mobile phase is from the outside of the column through the resin bed to the inside of the column.

The cell suspension has more room to expand, it has a larger surface area of stationary phase to interact with resulting in higher flow rates with less back pressure. By keeping the bed length, the radius, constant, true linear scalability is achieved, offering process predictability.



**SMART design your process:** Choose a bed length suitable to your application. Keep the final production scale in mind. Get started with a R&D column to optimize your process. Validate your parameters in the intermediate stage before realizing the pilot scale project.

## SMART Chromatography™

Purification from cell containing feed streams  
in packed bed columns



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



Validation columns range from 50 mL to 400 mL, while keeping the bed length from the R&D column constant.

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	Ligand	Target	Prod. Code
AFFINITY	ZetaCell Protein A Elevate®	1 M NaOH-stable Protein A	Antibodies	TM-4425
	ZetaCell Protein G	Protein G	Antibodies	TM-4404
	ZetaCell NTA (metal-free)	Nitrilotriacetic acid	His-tagged proteins	TM-4428
	ZetaCell Ni-NTA	Ni <sup>2+</sup> -Nitrilotriacetic acid	His-tagged proteins	TM-4429
HIC	ZetaCell Phenyl	Phenyl (C <sub>6</sub> H <sub>5</sub> )	General protein purification	TM-4501
	ZetaCell Butyl	Butyl (C <sub>4</sub> H <sub>9</sub> )	General protein purification	TM-4502
	ZetaCell Octyl	Octyl (C <sub>8</sub> H <sub>17</sub> )	General protein purification	TM-4503
ION EXCHANGE (IEX)	ZetaCell Q	Quaternary ammonium	Neg. charged molecules	TM-4205
	ZetaCell Q Boost	Quaternary ammonium	Neg. charged molecules	TM-4206
	ZetaCell SP	Sulfopropyl	Pos. charged molecules	TM-4201
	ZetaCell SP Boost	Sulfopropyl	Pos. charged molecules	TM-4202
	ZetaCell DEAE	Diethylaminoethyl	Neg. charged molecules	TM-4207
	ZetaCell DEAE Boost	Diethylaminoethyl	Neg. charged molecules	TM-4208
	ZetaCell CM	Carboxymethyl	Pos. charged molecules	TM-4203
	ZetaCell CM Boost	Carboxymethyl	Pos. charged molecules	TM-4204
ACTIVATED	ZetaCell Aldehyde-activated	Aldehyde	Custom binding	TM-4301
	ZetaCell Epoxy-activated	Epoxy	Custom binding	TM-4302

## 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

	Zetadex-25	Zetadex-50
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%) <b>Product Code: TM-0101</b>	Dry Bead Size: 20 – 50 µm (> 80%) <b>Product Code: TM-0104</b>
	Hydrated in phosphate buffered saline pH 7.4, with 0.02% NaN <sub>3</sub> <b>on request</b>	Hydrated in phosphate buffered saline pH 7.4, with 0.02% NaN <sub>3</sub> <b>Product Code: TM-0121</b>
	Hydrated in deionized water with 0.15% ProCline <b>on request</b>	Hydrated in deionized water with 0.15% ProCline <b>Product Code: TM-0122</b>
Fine	Dry Bead Size: 20 – 80 µm (> 80%) <b>Product Code: TM-0102</b>	Dry Bead Size: 20 – 80 µm (> 80%) <b>Product Code: TM-0105</b>
	Hydrated in phosphate buffered saline pH 7.4, with 0.02% NaN <sub>3</sub> <b>Product Code: TM-0130</b>	Hydrated in phosphate buffered saline pH 7.4, with 0.02% NaN <sub>3</sub> <b>Product Code: TM-0108</b>
	Hydrated in deionized water with 0.15% ProCline <b>Product Code: TM-0129</b>	Hydrated in deionized water with 0.15% ProCline <b>Product Code: TM-0123</b>
Medium	Dry Bead Size: 50 – 150 µm (> 80%) <b>Product Code: TM-0103</b>	Dry Bead Size: 50 – 150 µm (> 80%) <b>Product Code: TM-0106</b>
	Hydrated in phosphate buffered saline pH 7.4, with 0.02% NaN <sub>3</sub> <b>Product Code: TM-0107</b>	Hydrated in phosphate buffered saline pH 7.4, with 0.02% NaN <sub>3</sub> <b>Product Code: TM-0132</b>
	Hydrated in deionized water with 0.15% ProCline <b>Product Code: TM-0114</b>	Hydrated in deionized water with 0.15% ProCline <b>Product Code: TM-0131</b>
Coarse	Dry Bead Size: 100 – 300 µm (> 80%) <b>Product Code: TM-0112</b>	Dry Bead Size: 100 – 300 µm (> 80%) <b>Product Code: TM-0113</b>

## Size Exclusion Chromatography

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

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

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

## 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.



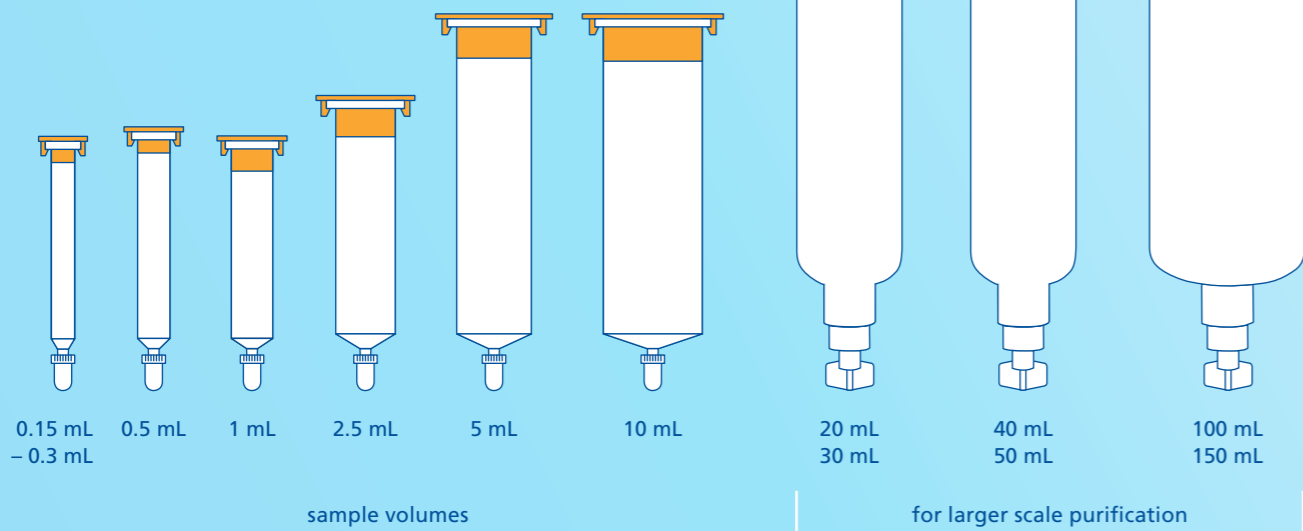
# CentriPure Configuration Line Up

pre-filled and ready-to-use

please see  
our Zetadex  
catalog for further  
information

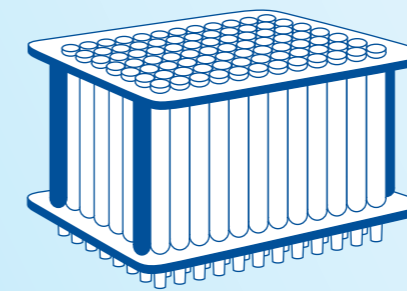
## GRAVITATIONAL FLOW

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.



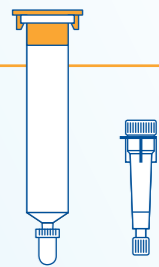
## GRAVITATIONAL FLOW

CentriPure Arrays for automated systems  
sample volume: 150 – 500  $\mu$ L

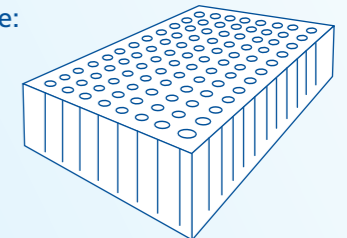


## CENTRIFUGATION

CentriPure MIDI Columns  
sample volume: 500  $\mu$ L  
CentriPure MINI Columns  
sample volume: 50  $\mu$ L

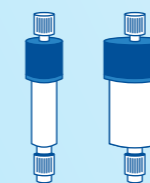


CentriPure Plates  
sample volume:  
up to 40  $\mu$ L

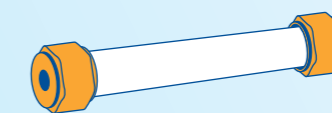


## LIQUID CHROMATOGRAPHY SYSTEMS

ZetaSep FPLC Columns  
bed volume: 1/5 mL



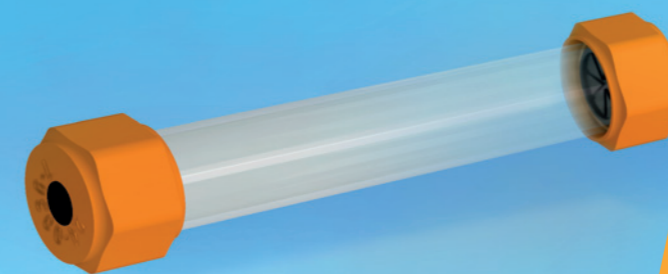
ZetaPrep FPLC Columns  
bed volume: 10 mL



NEW  
PRODUCT

## ZetaSep & ZetaPrep FPLC Desalting Columns

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



**NEW  
PRODUCT**  
ZetaPrep FPLC  
Column

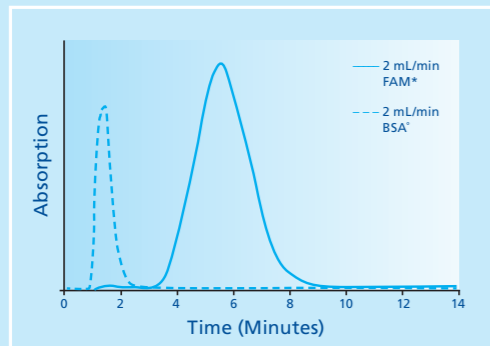
ZetaSep and ZetaPrep FPLC Desalting Columns are designed for:

- 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 and ZetaPrep FPLC Desalting Columns are available with Zetadex-25, which has a molecular weight cut-off (MWCO) of approximately 5 kDa, in 1 mL, 5 mL and 10 mL sizes. Proteins, oligonucleotides, spheroidal nanoparticles or other biomolecules larger than 5 kDa are gently and efficiently separated from salts, metal cations, urea, dyes, inhibitors, biotin, haptens, and other low molecular weight impurities.

## ZetaSep & ZetaPrep 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 µM of 5-Carboxyfluorescein in PBS pH 7.4 (0.05% NaN<sub>3</sub>).

**Flow rate:** 2 mL/min.

**Eluent:** PBS pH 7.4 (0.05% NaN<sub>3</sub>)

**Detection:** Abs. at 280 nm and 490 nm

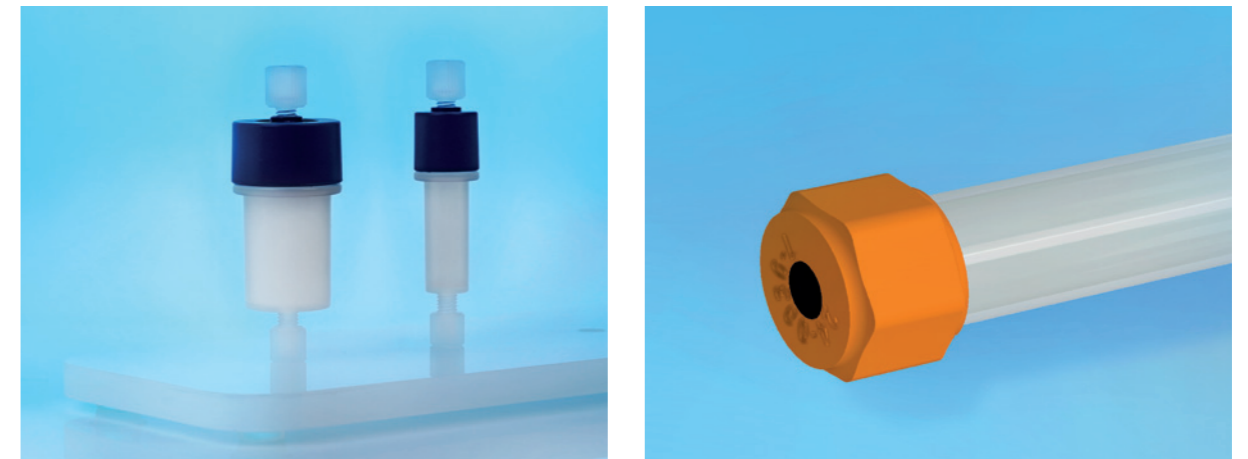
### Specifications

Column bed volume	5 mL
Size of eluted Proteins	> 5 kDa
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 µm (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

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## ZetaSep & ZetaPrep FPLC Desalting Columns

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



Prod. Code	Description	Bed Volume	Zetadex Z25	Recom. Flow Rate	Max. Back Pressure	Pack Size
ZS-0101	ZetaSep Desalt	5 mL	Superfine	1-10 mL/min	3 bar	5/100 col.
ZS-0101	ZetaSep Desalt	1 mL	Superfine	0.2-2 mL/min	3 bar	100 col.
ZP-0101	ZetaPrep Desalt 16/10	10 mL	Fine	5-10 mL/min	5 bar	1 column

# Terms and Conditions



For conducting business with **emp BIOTECH**, please review our general terms and conditions as listed on our website [www.empbiotech.com](http://www.empbiotech.com).

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# More to Discover

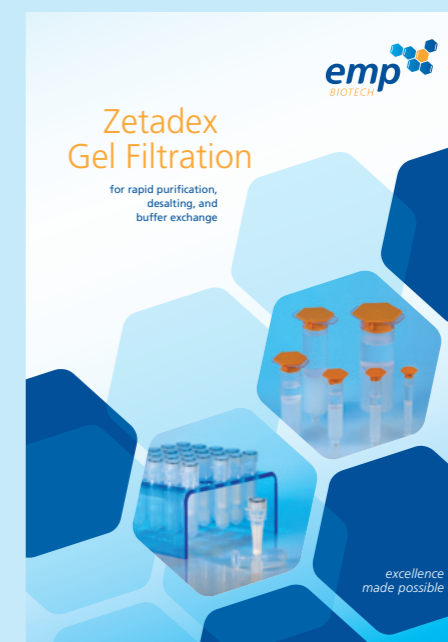


**Synthesis Reagents**  
 for automated oligonucleotide synthesis

- Solvents and Reagents**
- Deblocking / Detritylation
  - Activators
  - Capping Reagents
  - Oxidizer
  - Cleavage & Deprotection
  - CE-β-Elimination
  - Sulphurizing Reagents
  - Solvents & Solvent Mixtures

**Moisture Control**  
 – Molecular Sieves & Moisture Traps

- Labeling and Purification**
- Oligo Labeling
  - Oligo Purification
  - Oligo Desalting



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

- Zetadex Gel Filtration Resin**  
**CentriPure Gel Filtration Columns**  
**CentriPure Gel Filtration Column Arrays**  
**CentriPure MINI Columns**  
**TurboTag™ Labeling Kits**  
**CentriPure MIDI Columns**  
**CentriPure Gel Filtration Plates**  
**ZetaSep / ZetaPrep FPLC Desalting Columns**

Catalog  
 of our Dyes  
 coming soon

