emp BIOTECH

Biomolecule Purification

solutions for
downstream processing

excellence made possible

Biomolecule Purification

solutions for
downstream processing

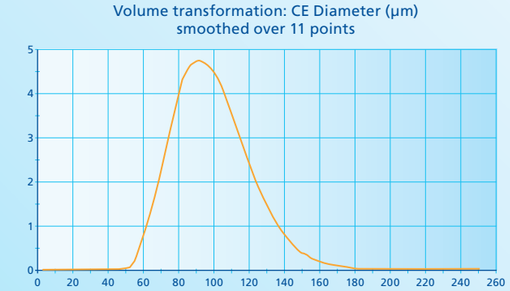
Zetarose Solid Phase

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 µm (45 – 160 µm range, ≤ 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



Representative volume-based particle distribution of Zetarose (Morphologi, Malvern)

Product Code	Product Name	Particle Size ($D_{average}$)*	Exclusion Limit (D)	Agarose Conc.	Velocity Properties**
TM-1108	Zetarose FF4	100 µm	30×10^6	4%	≥ 2 bar Δ-pressure (≥ 750 cm/h)
TM-1105	Zetarose FF6	100 µm	4×10^6	6%	≥ 3 bar Δ-pressure (≥ 1000 cm/h)

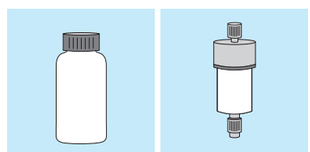
* volume-based particle size
** Pressure and flowrate test with water in 10 mm diameter column and 10 to 15 cm bed height. Resin is able to withstood 2 min without collapsing at that flow rate and Δ-pressure.

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®**, ***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 hIgG/mL resin on an average bead size of 100 µm this makes **Protein A Elevate®** 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®** 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®	≥ 40 mg/mL hIgG/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	≥ 20 mg/mL hIgG/mL resin (SBC)	Proprietary	≥ 300 cm/h, ≤ 3 bar	0.1 M NaOH for 15 min. CIP cycle 10% loss in binding efficiency after 10 CIP cycles	TM-1410	ZS-1410

CHROMATOGRAPHY RESINS
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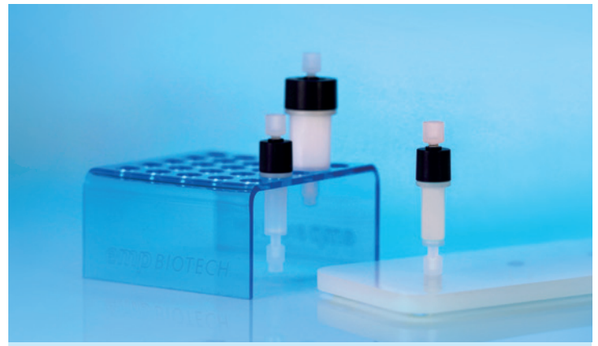
SMIRF™

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® column, a 1 mL Zetarose Phenyl hydrophobic interaction (HIC) column and a 5 mL Zetadex desalting column

Tag Affinity Chromatography

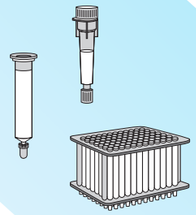
Immobilized-Metal Affinity Chromatography (IMAC) Solid Phases for the purification of polyhistidine-tagged proteins

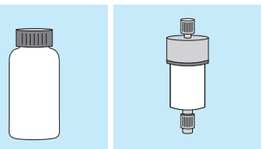
The **Zetarose** range of affinity agarose beads offer a robust platform for repeated purification cycles. By careful engineering of the linker chemistry used to immobilize the active ligand to the bead, **Zetarose** solid phases may be used for repeated purification cycles – making high-end affinity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

On request, all agarose resins can also be supplied as an array, gravitational column or for centrifugation to suit your application needs.





Product Name	Binding Capacity	Ligand Density	Velocity Properties	His-tag Affinity | Specificity		Bulk Resin	ZetaSep FPLC Column
Zetarose NTA (metal-free)	–	≥ 20 µmol Me^{2+}/mL	≥ 500 cm/h, ≤ 3 bar			TM-1414	ZS-1414
Zetarose Cu-NTA	tba (under review)	≥ 20 µmol Ni^{2+}/mL	≥ 500 cm/h, ≤ 3 bar	++++	+	TM-1416	ZS-1416
Zetarose Ni-NTA	≥ 40 mg His-tagged protein*/mL resin	≥ 20 µmol Ni^{2+}/mL	≥ 500 cm/h, ≤ 3 bar	+++	++	TM-1412	ZS-1412
Zetarose Zn-NTA	tba (under review)	≥ 20 µmol Ni^{2+}/mL	≥ 500 cm/h, ≤ 3 bar	++	+++	TM-1418	ZS-1418
Zetarose Co-NTA	tba (under review)	≥ 20 µmol Ni^{2+}/mL	≥ 500 cm/h, ≤ 3 bar	+	++++	TM-1417	ZS-1417

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

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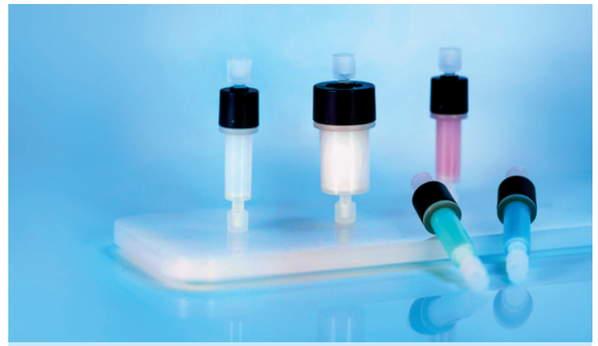
Immobilised Metal Affinity (IMAC) Purification ZetaSep FPLC screening kits



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.

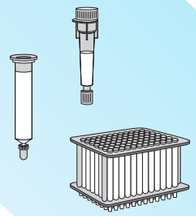
When developing a purification process using HIC, even small changes in hydrophobicity of the ligand can have an effect on the interaction with the target molecule. Generally speaking, hydrophobicity increases with changes in the length of the ligand. ***emp** BIOTECH* offers HIC solid phases with three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

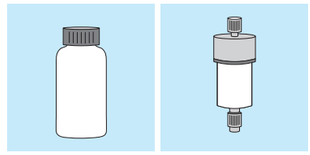
Butyl – Phenyl – Octyl

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.

On request, all agarose resins can also be supplied as an array, gravitational column or for centrifugation to suit your application needs.





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	$-C_4H_9$	> 500 cm/h, 32 mm column ID	TM-1506	ZS-1506
Zetarose Phenyl FF6	100 µm	20 µmol/mL resin	$-C_6H_5$	> 500 cm/h, 32 mm column ID	TM-1503	ZS-1503
Zetarose Phenyl HC	30 µm	40 µmol/mL resin	$-C_6H_5$	> 100 cm/h, 32 mm column ID	TM-1504	ZS-1504
Zetarose Octyl FF6	100 µm	4 µmol/mL resin	$-C_8H_{17}$	> 500 cm/h, 32 mm column ID	TM-1508	ZS-1508

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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.

Zetarene
The **Zetarene** range are strong ion exchange resins based on highly crosslinked polystyrene / divinylbenzene. 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 with low back pressure.

	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^-/mL	strong AEX	quaternary ammonium	> 500 cm/h	TM-1202	ZS-1202
	Zetarose SP FF6	100 µm	0.14 - 0.26 mmol H^+/mL	strong CEX	sulfopropyl	> 500 cm/h	TM-1208	ZS-1208
	Zetarose DEAE FF6	100 µm	0.08 - 0.16 mmol Cl^-/mL	weak AEX	diethylaminoethyl	> 500 cm/h	TM-1205	ZS-1205
	Zetarose CM FF6	100 µm	0.08 - 0.16 mmol H^+/mL	weak CEX	carboxymethyl	> 500 cm/h	TM-1207	ZS-1207
ZETADEX	Zetadex-25 DEAE	100 µm	3 – 4 meq/g	weak AEX	diethylaminoethyl	> 500 cm/h	TM-0206	ZS-0206
	Zetadex-50 DEAE	80 µm	3 – 4 meq/g	weak AEX	diethylaminoethyl	> 50 cm/h	TM-0201	ZS-0201
	Zetadex-25 CM	100 µm	4 – 5 meq/g	weak CEX	carboxymethyl	> 500 cm/h	TM-0203	ZS-0203
ZETARENE	Zetarene Q15	~ 15 µm	≥ 0.08 mmol Cl^-/mL	strong AEX	quaternary ammonium	≥ 1800 cm/h	TM-8201	–
	Zetarene Q30	~ 30 µm	≥ 0.08 mmol Cl^-/mL	strong AEX	quaternary ammonium	≥ 1800 cm/h	TM-8202	–

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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 oligonucleotides based on charge interaction

Advantages of Zetarene:

- for the purification of nucleic acid, peptides, and carbohydrates
- stable performance under high flow rates
- reliable scale up
- chemically stable
- high resolution
- pH resistant
- pressure tolerant

***emp** BIOTECH's* **Zetarene** range are strong ion exchange resins based on highly crosslinked polystyrene / divinylbenzene with a mean diameter of 15 µm or 30 µm.

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.

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**).

CHROMATOGRAPHY RESINS
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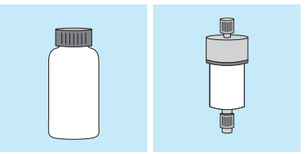
Activated Zetarose Solid Phases

For immobilization of ligands pursuant to targeted purification

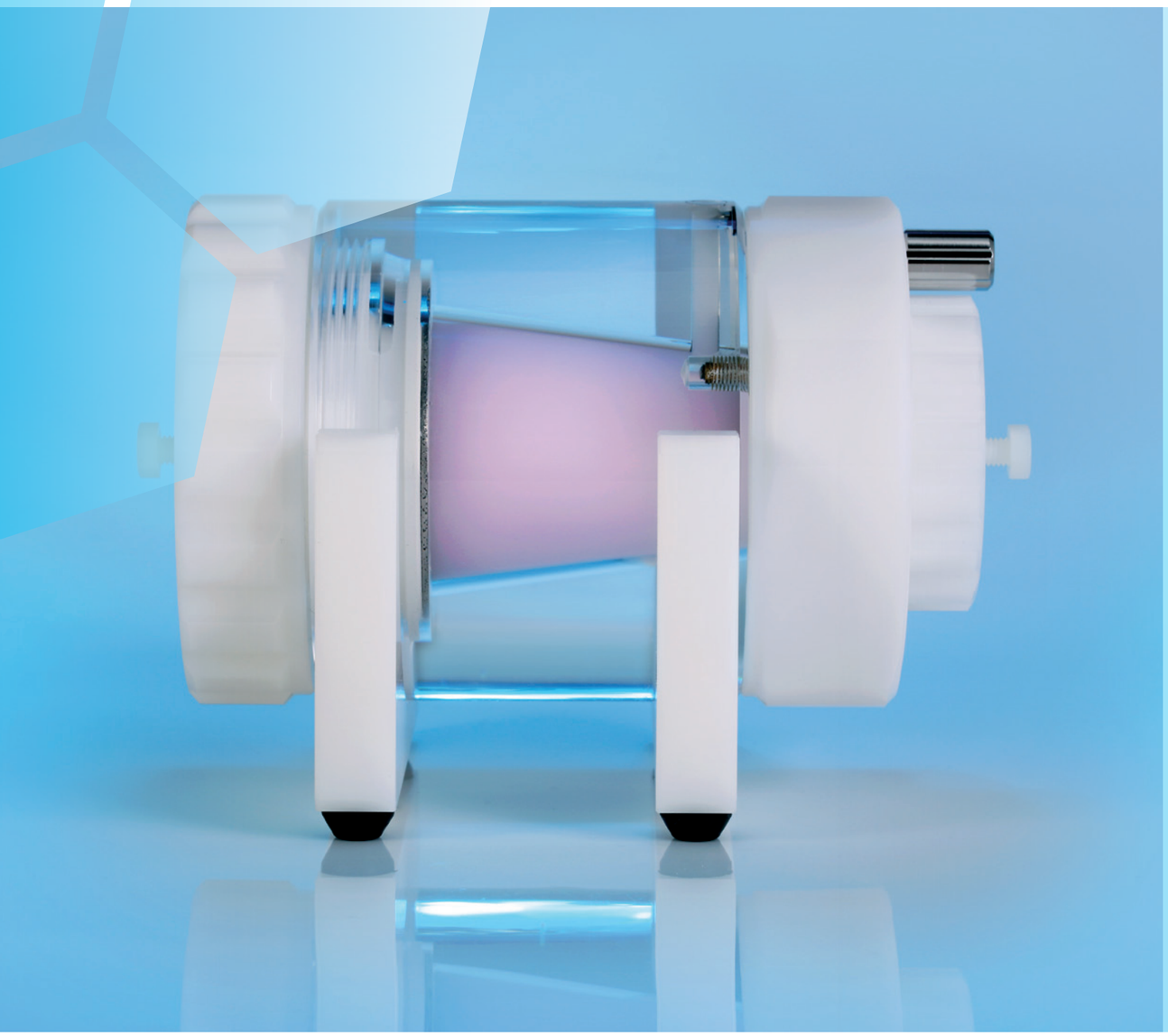
The **Zetarose** range of activated agarose beads puts the power of directed purification firmly in your hands. An first-class assortment of resins and selected covalent binding technologies allows to choose the most advantageous strategy for linking ligand to solid phase, providing optimal performance 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 µmol/mL	$-NH_2$	TM-1319	ZS-1319
Zetarose Epoxy-activated FF6	> 75 µmol/mL	$-NH_2$ -SH -OH	TM-1320	ZS-1320
Zetarose NHS-activated FF6	> 5 µmol/mL	$-NH_2$ Storage buffer: 100% Isopropanol	TM-1309	–



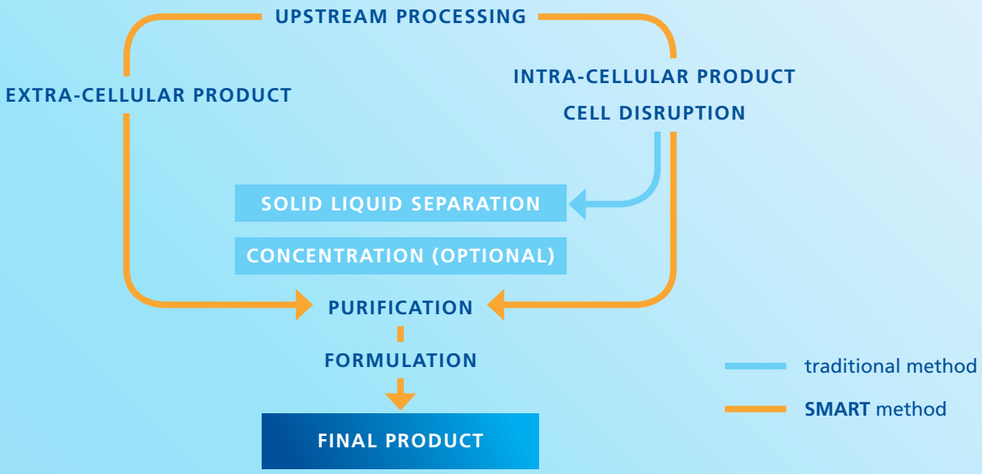
SOLUTIONS
FOR UNCLARIFIED FEED STREAMS

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



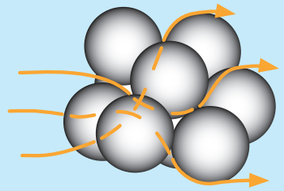
Overview of the downstream purification process

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).

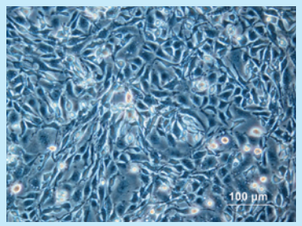
ZetaCell are large cross-linked beaded agarose particles with a well-defined pore structure. The target biomolecule binds to the functionalized solid phase, whilst cells and cell debris pass unhindered through the interstitial spaces in the packed column bed.



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

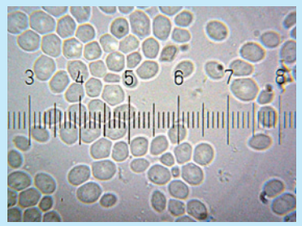
SMART Chromatography™ can be used with all non-clarified feed streams. It has been validated with mammalian cell lines (CHO, HEK, hybridoma; up to 60 x 10^6 cells/mL), yeasts (*Pichia pastoris*, *Saccharomyces cerevisiae*), bacteria (*Escherichia coli*), filamentous fungi (all 10%–30% wet solids), vira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

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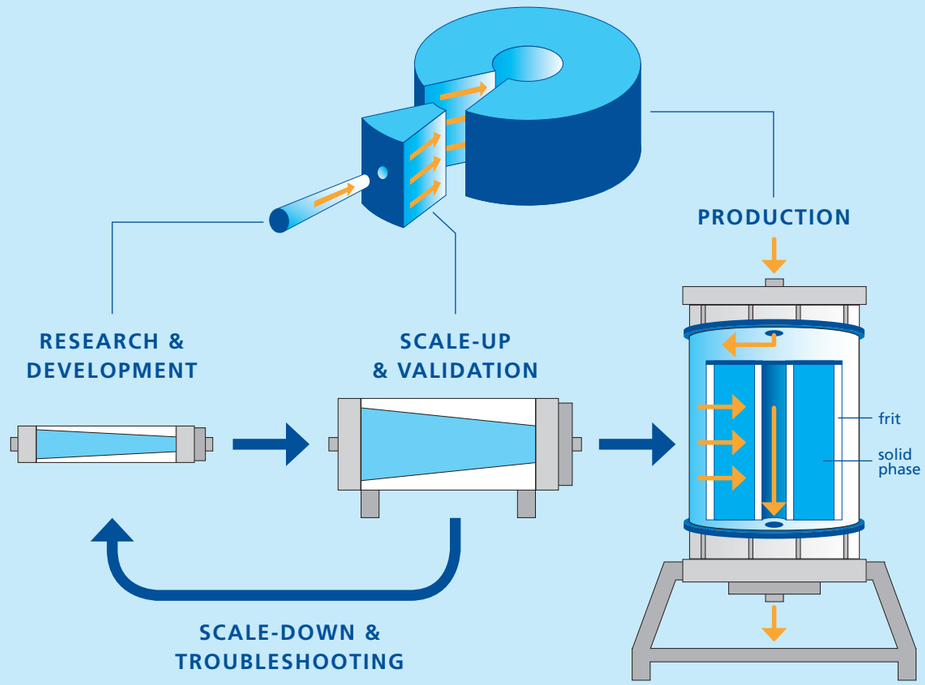
Furthermore, by use of a different column geometry than the traditional "top to bottom" axial format, it has been possible to develop a system that is also linearly scalable. In RFC the flow of the mobile phase is from the outside of the column through the resin bed to the inside of the column.

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.

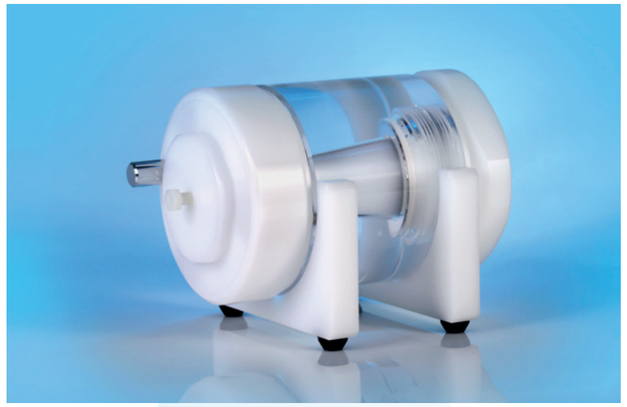


SMART design your process: Choose a bed length suitable to your application. Keep the final production scale in mind. Get started with a R&D column to optimize your process. Validate your parameters in the intermediate stage before realizing the pilot scale project.

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.

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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-4405
	ZetaCell Ni-NTA	Ni^{2+}-Nitrilotriacetic acid	His-tagged proteins	TM-4406
HIC	ZetaCell Phenyl	Phenyl (C_6H_5)	General protein purification	TM-4501
	ZetaCell Butyl	Butyl (C_4H_9)	General protein purification	TM-4502
	ZetaCell Octyl	Octyl (C_8H_{17})	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

Water Regain:	2.15 – 2.25 mL/g	4.80 – 5.20 mL/g
Swelling:	4 – 6 mL/g	9 – 11 mL/g
MWCO (size exclusion):	below 5000 D	below 25000 D
Fractionation Range:	1 – 5 kD (globular proteins)	1 – 30 kD (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**

CHROMATOGRAPHY RESINS
FOR POLISHING STEP

Size Exclusion Chromatography

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

Water Regain:	2.15 – 2.25 mL/g	4.80 – 5.20 mL/g
Swelling:	4 – 6 mL/g	9 – 11 mL/g
MWCO (size exclusion):	below 5000 D	below 25000 D
Fractionation Range:	1 – 5 kD (globular proteins)	1 – 30 kD (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 Code	Product Name	Particle size	Exclusion limit (kD)	Fractionation range (kD)
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

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CHROMATOGRAPHY RESINS
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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.

please see our Zetadex catalog for further information

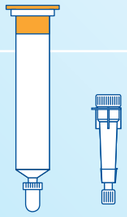
CHROMATOGRAPHY RESINS
FOR POLISHING STEP

CentriPure
Configuration Line Up

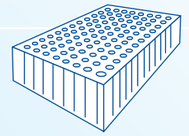
pre-filled and ready-to-use

CENTRIFUGATION

CentriSpin Columns
sample volume: 500 µL
CentriSpin MINI Columns
sample volume: 50 µL

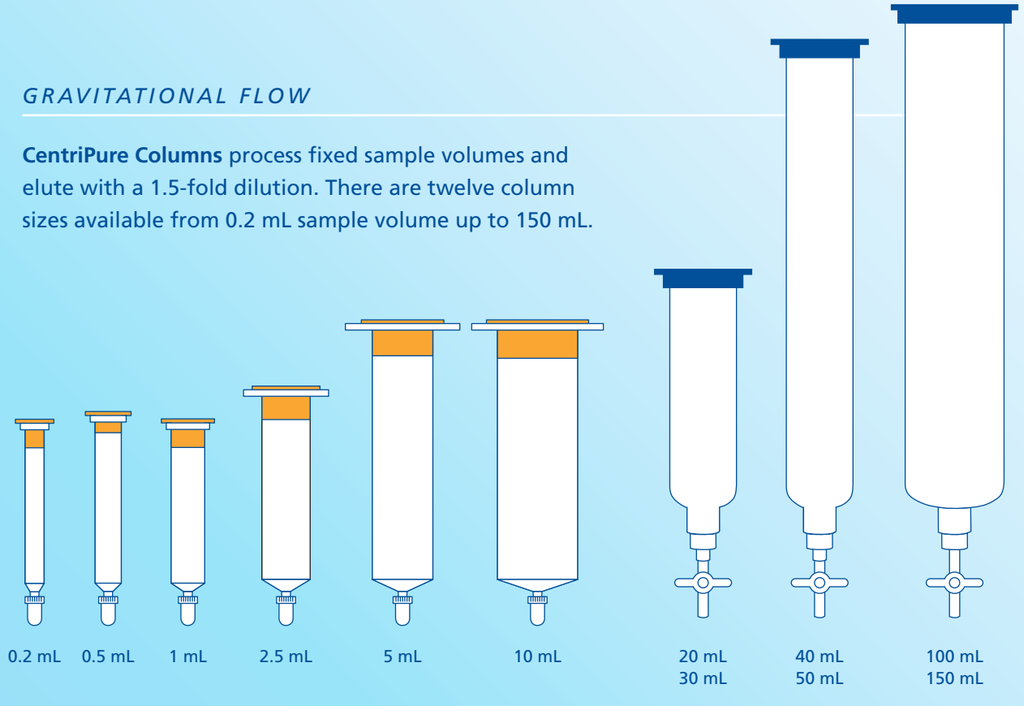


CentriPure Plates
sample volume:
up to 70 µL



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.



sample volumes

for larger scale purification

CHROMATOGRAPHY RESINS
FOR POLISHING STEP

ZetaSep FPLC Desalting Columns

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

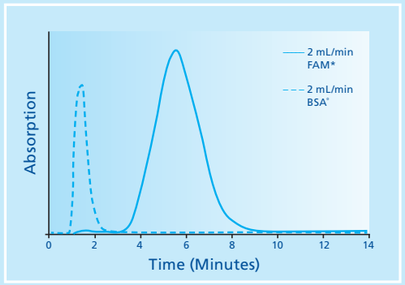
ZetaSep FPLC Desalting Columns are designed for:

- 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 µM 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 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

CHROMATOGRAPHY RESINS
FOR POLISHING STEP

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 × 5 mL Columns
ZS-0101-M005.0-025	ZetaSep FPLC Desalting	25 × 5 mL Columns
ZS-0102-M001.0-100	ZetaSep FPLC Desalting	100 × 1 mL Columns

Terms and Conditions

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

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

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for automated oligonucleotide synthesis

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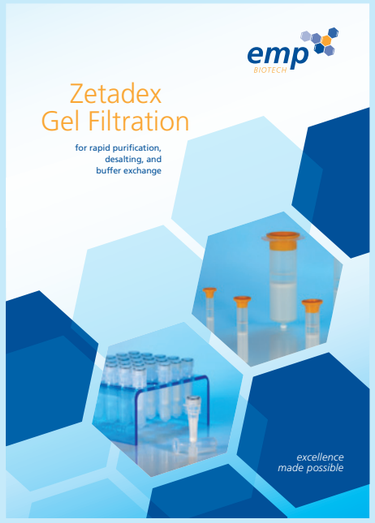
- Capping Reagents
- Oxidizer
- Cleavage & Deprotection
- CE-ß-Elimination
- Sulphurizing Reagents
- Solvents & Solvent Mixtures

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

catalog of our Dyes coming soon

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