

Native Mode Mass Spectrometry

# Aggregate and Charge Variant Analysis of Monoclonal Antibodies

with bioZen SEC & WCX Columns

High Resolution  
Chromatography for Native Mass  
Spectrometry Applications

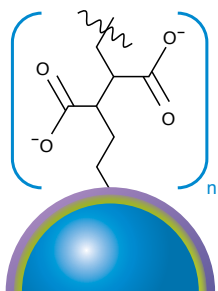
 **bioZen**<sup>™</sup>  
the bio series

 **phenomenex**<sup>®</sup>  
...breaking with tradition<sup>SM</sup>



[www.phenomenex.com/bioZen](http://www.phenomenex.com/bioZen)

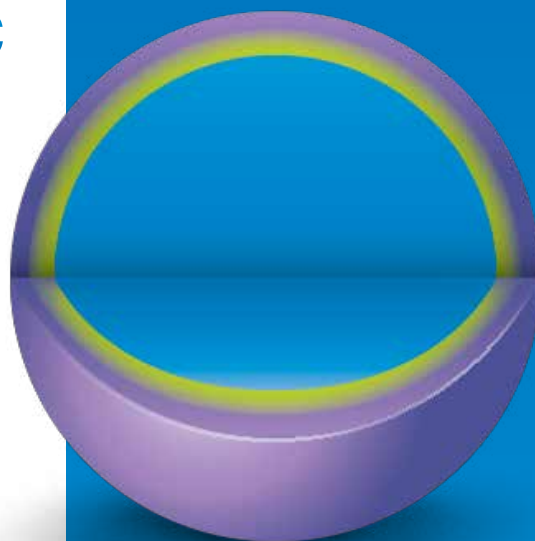
# Monosized Polymeric Non-Porous



**bioZen WCX**  
6  $\mu\text{m}$

Monosized particles grafted with linear polycarboxylate chains to envelop and separate proteins from acidic/basic variants

Meticulously controlled monosized particle technology secures incredible particle consistency that leads to improved and reliable efficiency. This innovative non-porous particle serves as the perfect backbone for complex ion-exchange chemistries.



## 2 Advanced Particle Platforms

Enhance the separation of Monoclonal Antibody Aggregates

# Thermally Modified Fully Porous



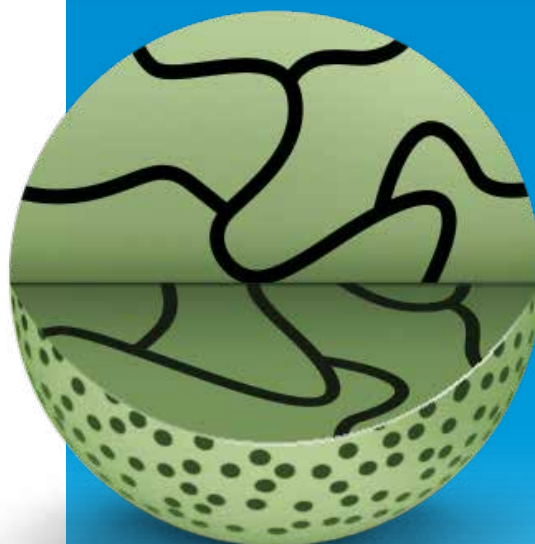
**bioZen SEC-2**  
1.8  $\mu\text{m}$

Extremely inert, high density fully porous particle with high efficiency and low molecular weight (LMW) separation range of 1k–450 kDa.



**bioZen SEC-3**  
1.8  $\mu\text{m}$

Extremely inert, high density fully porous particle with high efficiency and high molecular weight (HMW) separation range of 10k–700 kDa.

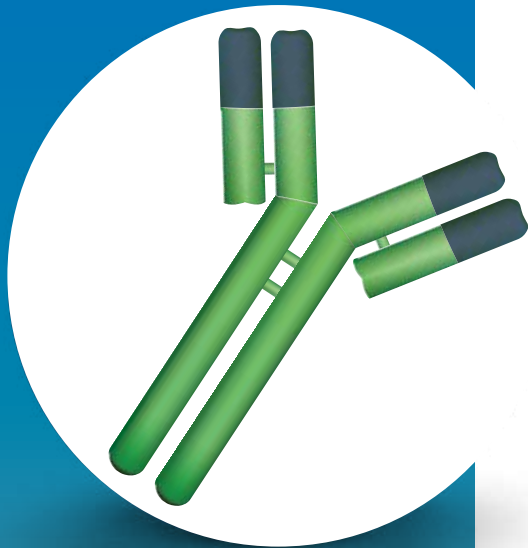


The robust set of bioZen SEC columns were developed with a combination of UHPLC efficiency and higher sensitivity, to drive resolution and identification of even lower level targets.



### Biocompatible Hardware

bioZen SEC and WCX columns come in titanium BioTi™ HPLC/UHPLC hardware that curtails lengthy priming steps, unwanted secondary interactions, problematic carryover, and recovery issues between injection to detection.



## bioZen SEC & WCX Native Mode MS Analysis Resources



Observe and measure the non-covalent interactions and charge variants of proteins at high resolution.




Get dalton-specific mass information on both protein:protein, as well as, protein:molecule complexes.





Transmit proteins into the gas phase in “native-like” conformations and allow the determination of the nature of higher order aggregates with SEC-MS.

## Explore the following bioZen Native MS Technical Resources:




[Exploring the Effect of Mobile Phase Concentration on Sensitivity of Size Exclusion-Mass Spec \(SEC-MS\) for Monoclonal Antibodies using a bioZen SEC-3 Column](#)

[Native MS Aggregate Analysis of NIST mAb using a bioZen 1.8  \$\mu\$ m SEC-2 Column](#)




[Defining the Parameters for Native Mass Spectroscopy Separation using Size Exclusion \(SEC\) Standards and bioZen 1.8  \$\mu\$ m SEC-3 Columns](#)

[Determination of Average DAR of an Antibody Drug Conjugate \(ADC\) Mimic using a bioZen 1.8  \$\mu\$ m SEC-2 Column](#)



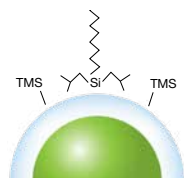
[Charge Variant Analysis of Trastuzumab using a bioZen 6  \$\mu\$ m WCX Column with a pH Gradient and Native MS Detection](#)

[Charge Variant Analysis of NIST mAb using a bioZen 6  \$\mu\$ m WCX Column with a pH Gradient and Native MS Detection](#)



# 8 Particle Chemistries and Growing

Intact	Size Exclusion (SEC)	Peptide	Glycan	Ion-Exchange
--------	----------------------	---------	--------	--------------



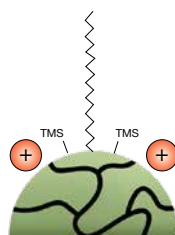
**bioZen Intact XB-C8**  
3.6 µm

Large pore core-shell particle for fast intact biologic entry. C8 provides highly useful moderate hydrophobic selectivity.



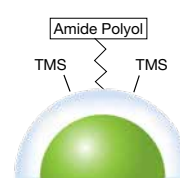
**bioZen SEC-2**  
1.8 µm

Extremely inert, high density fully porous particle with high efficiency and low molecular weight (LMW) separation range of 1 k–450 kDa.



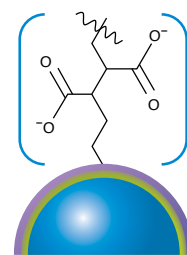
**bioZen Peptide PS-C18**  
1.6 µm and 3 µm

Excellent retention by combined positively charged surface ligand and C18 ligand.



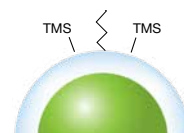
**bioZen Glycan**  
2.6 µm

Provides optimal combination of high efficiency and selectivity for released glycans.



**bioZen WCX**  
6 µm

Monosized particles grafted with linear polycarboxylate chains to envelop and separate proteins from acidic/basic variants



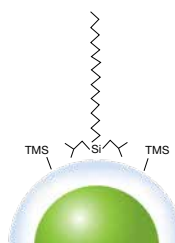
**bioZen Intact C4**  
3.6 µm

Large pore core-shell particle for fast intact biologic entry. C4 stationary phase provides highly sought after low hydrophobic retention, especially important for highly retentive biologics.



**bioZen SEC-3**  
1.8 µm

Extremely inert, high density fully porous particle with high efficiency and high molecular weight (HMW) separation range of 10 k–700 kDa.

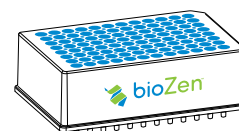


**bioZen Peptide XB-C18**  
1.7 µm and 2.6 µm

Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.

## Sample Preparation Solutions

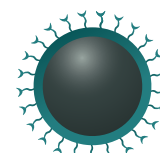
### N-Glycan Clean-Up



### HILIC Solid Phase Extraction (SPE)

High recovery of labeled released N-glycans in a microelution format allowing for streamlined processing and clean-up of small sample volumes.

### MagBeads



### Streptavidin Coated

Higher binding capacity magnetic particles result in faster and reliable purification, clean-up, and isolation of proteins and peptide molecules.

## Material Characteristics

Phases	Particle Type	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	pH Stability	Pressure (psi/bar)	Temp (°C)	Mode of Analysis
<b>bioZen 2.6 µm Glycan</b>	Core-shell	100	200	-	2 - 7.5	8,700/600	60	HILIC
<b>bioZen 1.6 µm Peptide PS-C18</b>	Thermally modified fully porous	100	260	9	1.5 - 8.5***	15,000/1,030	90*	RP
<b>bioZen 3 µm Peptide PS-C18</b>								
<b>bioZen 1.7 µm Peptide XB-C18</b>	Core-shell	100	200	10	1.5 - 9***	15,000/1,050	90*	RP
<b>bioZen 2.6 µm Peptide XB-C18</b>								
<b>bioZen 3.6 µm Intact C4</b>	Core-shell	200	25	-	1.5 - 9**	8,700/600	90*	RP
<b>bioZen 3.6 µm Intact XB-C8</b>								
<b>bioZen 1.8 µm SEC-2</b>	Thermally modified fully porous	150	-	-	2.5 - 7.5	7,000/480	50	SEC/GFC
<b>bioZen 1.8 µm SEC-3</b>		300	-	-				
<b>bioZen 6 µm WCX</b>	Non-porous PS-DVB polymer	-	-	-	2 - 12	6,000/415	60	IEX

\* Temperature limits are dependent on method running parameters. The temperature limit of the phase at high pH, for example, would be approximately at 60 °C

\*\* pH range is 1.5-9 under gradient conditions. pH range is 1.5-10 under isocratic conditions.

\*\*\* pH range is 1.5-8.5 under gradient conditions. pH range is 1.5-10 under isocratic conditions.

**Learn More: [Phenomenex.com/bioZen](http://Phenomenex.com/bioZen)**



bioZen Columns (mm)						Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
						/3pk		ea
bioZen 2.6 µm Glycan	<a href="#">00B-4773-AN</a>	<a href="#">00D-4773-AN</a>	<a href="#">00F-4773-AN</a>	—	—	<a href="#">AJ0-9800</a>	—	<a href="#">AJ0-9000</a>
						/3pk		ea
bioZen 1.6 µm Peptide PS-C18	<a href="#">00B-4770-AN</a>	<a href="#">00D-4770-AN</a>	<a href="#">00F-4770-AN</a>	—	—	<a href="#">AJ0-9803</a>	—	<a href="#">AJ0-9000</a>
						/10pk	/10pk	ea
bioZen 3 µm Peptide PS-C18	<a href="#">00B-4771-AN</a>	—	<a href="#">00F-4771-AN</a>	<a href="#">00B-4771-E0</a>	<a href="#">00F-4771-E0</a>	<a href="#">AJ0-7605</a>	<a href="#">AJ0-7606</a>	<a href="#">KJ0-4282</a>
						/3pk		ea
bioZen 1.7 µm Peptide XB-C18	<a href="#">00B-4774-AN</a>	<a href="#">00D-4774-AN</a>	<a href="#">00F-4774-AN</a>	—	—	<a href="#">AJ0-9806</a>	—	<a href="#">AJ0-9000</a>
						/3pk	/3pk	ea
bioZen 2.6 µm Peptide XB-C18	<a href="#">00B-4768-AN</a>	<a href="#">00D-4768-AN</a>	<a href="#">00F-4768-AN</a>	<a href="#">00B-4768-E0</a>	<a href="#">00F-4768-E0</a>	<a href="#">AJ0-9806</a>	<a href="#">AJ0-9808</a>	<a href="#">AJ0-9000</a>
						/3pk	/3pk	ea
bioZen 3.6 µm Intact C4	<a href="#">00B-4767-AN</a>	<a href="#">00D-4767-AN</a>	<a href="#">00F-4767-AN</a>	<a href="#">00B-4767-E0</a>	<a href="#">00F-4767-E0</a>	<a href="#">AJ0-9809</a>	<a href="#">AJ0-9811</a>	<a href="#">AJ0-9000</a>
bioZen 3.6 µm Intact XB-C8	<a href="#">00B-4766-AN</a>	<a href="#">00D-4766-AN</a>	<a href="#">00F-4766-AN</a>	<a href="#">00B-4766-E0</a>	<a href="#">00F-4766-E0</a>	<a href="#">AJ0-9812</a>	<a href="#">AJ0-9814</a>	<a href="#">AJ0-9000</a>

	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	300 x 4.6	for 4.6 mm	Holder
										/3pk	ea
bioZen 1.8 µm SEC-2	<a href="#">00B-4769-AN</a>	—	—	—	—	—	<a href="#">00F-4769-E0</a>	—	<a href="#">00H-4769-E0</a>	<a href="#">AJ0-9850</a>	<a href="#">AJ0-9000</a>
bioZen 1.8 µm SEC-3	<a href="#">00B-4772-AN</a>	—	—	—	—	<a href="#">00D-4772-E0</a>	<a href="#">00F-4772-E0</a>	—	<a href="#">00H-4772-E0</a>	<a href="#">AJ0-9851</a>	<a href="#">AJ0-9000</a>
										for 4.6 mm	Holder
										/10pk	ea
bioZen 6 µm WCX	<a href="#">00B-4777-AN</a>	<a href="#">00D-4777-AN</a>	<a href="#">00F-4777-AN</a>	<a href="#">00G-4777-AN</a>	<a href="#">00B-4777-E0</a>	<a href="#">00D-4777-E0</a>	<a href="#">00F-4777-E0</a>	<a href="#">00G-4777-E0</a>	—	<a href="#">AJ0-9400</a>	<a href="#">KJ0-4282</a>

**Australia**  
t: +61 (0)2-9428-6444  
auinfo@phenomenex.com

**Austria**  
t: +43 (0)1-319-1301  
anfrage@phenomenex.com

**Belgium**  
t: +32 (0)2 503 4015 (French)  
t: +32 (0)2 511 8666 (Dutch)  
beinfo@phenomenex.com

**Canada**  
t: +1 (800) 543-3681  
info@phenomenex.com

**China**  
t: +86 400-606-8099  
cninfo@phenomenex.com

**Denmark**  
t: +45 4824 8048  
nordicinfo@phenomenex.com

**Finland**  
t: +358 (0)9 4789 0063  
nordicinfo@phenomenex.com

**France**  
t: +33 (0)1 30 09 21 10  
franceinfo@phenomenex.com

**Germany**  
t: +49 (0)6021-58830-0  
anfrage@phenomenex.com

**India**  
t: +91 (0)40-3012 2400  
indiainfo@phenomenex.com

**Ireland**  
t: +353 (0)1 247 5405  
eireinfo@phenomenex.com

**Italy**  
t: +39 051 6327511  
italiainfo@phenomenex.com

**Luxembourg**  
t: +31 (0)30-2418700  
nlinfo@phenomenex.com

**Mexico**  
t: 01-800-844-5226  
tecnicomx@phenomenex.com

**The Netherlands**  
t: +31 (0)30-2418700  
nlinfo@phenomenex.com

**New Zealand**  
t: +64 (0)9-4780951  
nzinfo@phenomenex.com

**Norway**  
t: +47 810 02 005  
nordicinfo@phenomenex.com

**Portugal**  
t: +351 221 450 488  
ptinfo@phenomenex.com

**Singapore**  
t: +65 800-852-3944  
sginfo@phenomenex.com

**Spain**  
t: +34 91-413-8613  
espinfo@phenomenex.com

**Sweden**  
t: +46 (0)8 611 6950  
nordicinfo@phenomenex.com

**Switzerland**  
t: +41 (0)61 692 20 20  
swissinfo@phenomenex.com

**Taiwan**  
t: +886 (0) 0801-49-1246  
twinfo@phenomenex.com

**United Kingdom**  
t: +44 (0)1625-501367  
ukinfo@phenomenex.com

**USA**  
t: +1 (310) 212-0555  
info@phenomenex.com

**All other countries**  
**Corporate Office USA**   
t: +1 (310) 212-0555  
info@phenomenex.com

## Sample Preparation

bioZen Solid Phase Extraction	Format	Sorbent Mass	Part No.	Unit
bioZen N-Glycan Clean-Up	Microelution 96-Well Plate	5 mg/well	<a href="#">8M-S009-NGA</a>	1/box



## bioZen MagBeads

Coating	Formats	Part No.
Streptavidin	25 mg (1.25 mL)	<a href="#">KS0-9531</a>
	50 mg (2.50 mL)	<a href="#">KS0-9532</a>
	500 mg (25 mL)	<a href="#">KS0-9533</a>



Your happiness is our mission. Take 45 days to try our products. If you are not happy, we'll make it right.  
[www.phenomenex.com/behappy](http://www.phenomenex.com/behappy)

**Terms and Conditions**  
Offer applies to endusers only and may not be combined with any other discount or promotional item. Valid only for bioZen column phases that your lab has not tried or purchased before. Limit 6 columns at discounted price per company. Offer must be specified at time of purchase and may not be combined with any other discount or promotional item. Subject to Phenomenex Standard Terms and Conditions which may be viewed at [www.phenomenex.com/TermsAndConditions](http://www.phenomenex.com/TermsAndConditions).

**Trademarks**  
bioZen, BioTi, and SecurityLINK are trademarks of Phenomenex.  
*FOR RESEARCH USE ONLY. Not for use in clinical diagnostic procedures.*  
© 2019 Phenomenex, Inc. All rights reserved.

## www.phenomenex.com

Phenomenex products are available worldwide. For the distributor in your country, contact Phenomenex USA, International Department at [international@phenomenex.com](mailto:international@phenomenex.com)