TOSOH BIOSCIENCE
SEPARATION & PURIFICATION
CONNECTING MINDS. TOUCHING LIVES.

PROCESS RESIN - FIND YOUR BEST FIT!

TOYOPEARL®, TSKgel®, and Ca++Pure-HA™ Chromatography Resins

Affinity Chromatography

TOYOPEARL Super A is a next-generation high-capacity Protein A resin with Fc affinity, engineered for superior process performance and operational flexibility. Its high DBC and high impurity reduction make TOYOPEARL Super A particularly well suited for high titer projects. It maintains high DBC at short residence times and has low backpressure at fast flowrates, making it an excellent resin for intensified process and multi-column chromatography. Additionally, it has improved alkaline stability and fast on/off kinetics for small elution volumes with mild elution conditions.

TOYOPEARL AF-rProtein L-650F binds the kappa-light chain of antibodies and antibody derivatives, including scFvs, Fabs, single domain antibodies and more. It maintains high DBC at short residence times and has low backpressure at fast flowrates, making it an excellent resin for intensified process and multi-column chromatography.

TOYOPEARL Affinity Resins	Capacity	Features
	mAb	
Protein A		
Super A	72 g/L	High DBC, Alkaline stable, Mild elution pH
AF-rProtein A HC-650F	68 g/L	High DBC
AF-rProtein A-650F	45 g/L	-
Protein L		
AF-rProtein L-650F	64 g/L	High DBC for kappa-LC containing Ab fragments

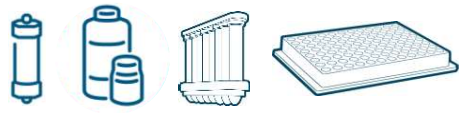
Other Affinity Resins

GROUP SPECIFIC	ACTIVATED RESINS*	REACTIVE RESINS*
AF-Chelate-650M	AF-Tresyl-650M	AF-Formyl-650M
AF-Red-650M	AF-Epoxy-650M	AF-Amino-650M
		AF-Carboxyl-650M

*Activated and reactive resins are used to couple your ligand of choice.

Contact your Account Manager

FREE resin screening samples, available as:
- 1 mL and 5 mL SkillPak™ pre-packed columns
- 10-100 mL loose resin
- Resin Seeker 96-well plate kits
- ToyoScreen® RoboColumn®



Additional product lines from **Tosoh Bioscience**:
- TSKgel HPLC/ UHPLC Analytical Columns
- LenS™3 MALS Detector
- Octave™ BIO and PRO Multi-Column Chromatography Systems

Ion Exchange Chromatography

TOYOPEARL Sulfate-650F is a highly selective, salt tolerant and high capacity cation exchange resin for the capture and intermediate polishing of biomolecules. It offers the ability to use mobile phases at physiological conditions without any loss of capacity or selectivity.

TOYOPEARL NH2-750F is a salt-tolerant anion-exchange resin, commonly used in both flow-through and bind/elute mode. It is ideal for removing impurities from target proteins without dilution, or for intermediate or final purification of monoclonal antibodies. Its unique selectivity can remove many types of impurities in a single step, including aggregates, endotoxins, HCPs, viruses, and host cell DNA.

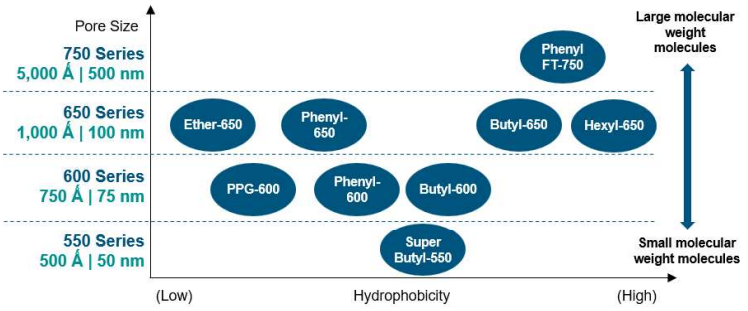
TSKgel SuperQ-5PW (20) is the industry standard for the purification of oligonucleotides.

TOYOPEARL/ TSKgel AEX Resins	Capacity		Features
	mAb	BSA	
Salt Tolerant AEX			
NH2-750F	70 g/L	-	Unique selectivity
Strong AEX			
GigaCap Q-650 (S,M)	170 g/L	150 g/L	Highest capacity
SuperQ-650 (S,M,C)	155 g/L	145 g/L	Proteins <50 kDa
SuperQ-5PW (20,30)	-	70 g/L	Oligonucleotide purification
SuperQ-4PW (20)	-	60 g/L	Oligonucleotide purification <50-mer
QAE-550C	-	-	Small protein capture
Weak AEX			
GigaCap DEAE-650M	-	156 g/L	Highest Capacity
DEAE-650 (S,M,C)	30 g/L	25 g/L	Blood products and nucleic acids
DEAE-5PW (20,30)	-	-	

TOYOPEARL/ TSKgel CEX Resins	Capacity		Features
	mAb	Insulin	
Salt Tolerant CEX			
Sulfate-650F	115 g/L	-	Unique selectivity
Strong CEX			
GigaCap S-650 (S,M)	150 g/L	140 g/L	Highest capacity
SP-650 (S,M,C)	10 g/L	50 g/L	Cost efficient
SP-550C	15 g/L	80 g/L	Small protein capture
MegaCap II SP-550EC	-	90 g/L	Insulin capture
SP-3PW (30)	-	65 g/L	Insulin polishing
SP-5PW (20,30)	-	30 g/L	Highest resolution
Weak CEX			
GigaCap CM-650M	100 g/L	-	Highest capacity
CM-650 (S,M,C)	-	-	Cost efficient

Hydrophobic Interaction Chromatography

Tosoh offers a wide variety of HIC resins with a choice of pore size, particle size, base matrix. A range of ligands in various hydrophobicities are available, including unique ligands such as PPG.



TOYOPEARL HIC resins	Capacity		Features
	Lysozyme	mAb	
Ether-650 (S,M)	20 g/L		Very hydrophobic proteins
PPG-600M	-	30 g/L	Antibodies and ADCs
Phenyl-600M	-	50 g/L	Aggregate removal
Phenyl-650 (S,M,C)	-	30 g/L	Larger pore size, DMT-on/off Oligo purification
Phenyl FT-750F	-	-	Low salt conditions, FT
SuperButyl-550C	40 g/L	-	Smallest pore size
Butyl-600M	-	50 g/L	Aggregate removal
Butyl-650 (S,M,C)	40 g/L	-	Larger pore size
Hexyl-650C	40 g/L	-	Low salt conditions, FT

TSKgel HIC resins	Capacity		Features
	Lysozyme	mAb	
Ether-5PW (20,30)	20 g/L	-	Very hydrophobic proteins
Phenyl-3PW (20)	45 g/L	-	DMT-on/off Oligo purification
Phenyl-5PW (20,30)	20 g/L	-	Highest resolution

Hydroxyapatite

Ca^{++}Pure-HA provides exceptional separation properties and unequaled selectivity and resolution for multiple classes of biomolecules. The robust nature of Ca^{++}Pure-HA offers the flexibility to use this resin at any stage in a process from capture to final polishing.

HA resin	Capacity	Features
	Human IgG	
Ca^{++}Pure-HA	>30 g/L	High selectivity and resolution

Mixed Mode Chromatography

TOYOPEARL MX-Trp-650M is a mixed mode resin, with a tryptophan ligand, that has cationic and hydrophobic properties. The ability to separate by both charge and hydrophobicity provides unique separation for purifying challenging molecules. It also has high DBC, high recovery, and is excellent at removing mAb aggregates.

TOYOPEARL MXC resin	Capacity	Features
	mAb	
MX-Trp-650M	95 g/L	Unique selectivity

Size Exclusion Chromatography

All SEC resins use TOYOPEARL hydroxylated polymethacrylate beads with no ligand. A wide variety of pore and bead sizes are available.

TOYOPEARL SEC resins	Pore Size (nm)	Features
HW-40 (S,F,C)	5	Low MW compounds/ buffer exchange
HW-50 (S,F)	12.5	Peptide fragments
HW-55 (S,F)	50	Proteins, antibodies
HW-65 (S,F,C)	100	Proteins, antibodies
HW-75 (F)	>100	Large nucleic acids, viruses, plasmid DNA

What's in a Name?

Tosoh Bioscience offers three base beads: TOYOPEARL, TSKgel, and Ca^{++}Pure-HA.

TOYOPEARL and TSKgel products are hydroxylated methacrylic polymer resins and are offered in many different pore sizes and particle diameters. The key differences between the two types are particle size availability, degree of crosslinking, dynamic binding capacity, and operating pressures. Since similarly functionalized TOYOPEARL and TSKgel resins have the same backbone polymer chemistry, the selectivity remains the same when scaling up or down.

Unlike all other TOYOPEARL and TSKgel products, Ca^{++}Pure-HA is a hydroxyapatite resin. Ca^{++}Pure-HA is a spherical, macroporous form of the hexagonal crystalline structure of $Ca_{10}(PO_4)_6(OH)_2$.

Particle Size

Grade	TOYOPEARL	TOYOPEARL GigaCap®	TSKgel	Ca^{++}Pure-HA
EC	200 µm			
C	100 µm (SEC are 75 µm)			
M	65 µm (MX-Trp is 75 µm)	75 µm		
F	45 µm			
S	35 µm (SEC are 30 µm)	35 µm		
(30)			30 µm	
(20)			20 µm	
HA				39 µm

Pore Size

TOYOPEARL 550 resins	HW-55 base resin	50 nm
TOYOPEARL 600 resins	HW-60 base resin	75 nm
TOYOPEARL 650 resins	HW-65 base resin	100 nm
TOYOPEARL 750 resins	HW-75 base resin	500 nm
TSKgel 3PW resin	PW-3000 base resin	25 nm
TSKgel 5PW resin	PW-5000 base resin	100 nm