

**Fast Semi-Preparative
Analysis and Scaling-up
with TSK-GEL PW Resins**

TSK-GEL PW Series

Introduction

Biopharmaceutical researchers are often challenged with the need to rapidly develop preparative quantities of a product for pre-clinical tests or phase I trials. The direct scale-up of an analytical method is often the most expedient answer to this challenge. As an easy solution Tosoh Bioscience offers 20 µm and 30 µm ion exchange bulk media (TSK-GEL DEAE-5PW, SuperQ-5PW and SP-5PW) and hydrophobic interaction bulk media (TSK-GEL Ether-5PW and Phenyl-5PW) with the same characteristics as the analytical columns.

Characteristics

- Highly crosslinked polymethacrylate
- Particle size 20 µm and 30 µm
- Mechanically stable (up to 20 bar)
- Chemically stable (pH 2-12)
- Very suitable for scaling-up
- High capacity
- Fast semi-preparative analysis
- Identical selectivity as with analytical columns

Scaling-up

TSK-GEL 5PW preparative liquid chromatography resins are made from the same polymer (G5000PW), as in the pre-packed TSK-GEL 5PW analytical columns, and provide identical selectivity, (illustrated in Figure 1). Therefore, methods can easily be transformed from analytical to preparative scale chemistry.



Analytical to preparative scale purification of superoxide dismutase with TSK-GEL DEAE-5PW columns.

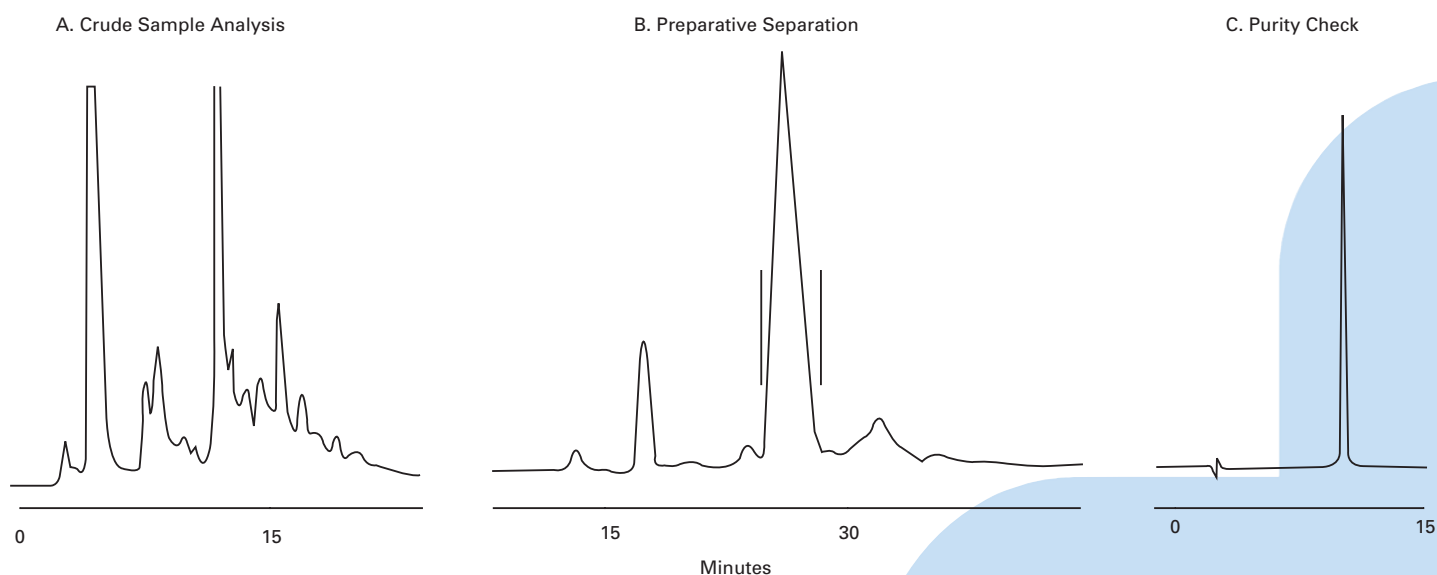


Figure 1

Column: TSKgel DEAE-5PW, A. 7.5 mm ID x 7.5 cm L, 10 µm; B. 55 mm ID x 20 cm L, 20 µm; C. 7.5 mm ID x 7.5 cm L, 10 µm
Sample: Commercially available superoxide dismutase: A. 1.0 mg, B. 300 mg, C. fraction analysis of B.
Elution: A. 120 min, B. 180 min, C. 30 min, linear gradient from 0.1 M to 0.3 M NaCl in 0.02 M Tris-HCl, pH 7.5
Flow rate: A. 1.0 ml/min., B. 30 ml/min., C. 1.0 ml/min.
Detection: UV @ 280 nm

Process scale

For scale up to process scale, Tosoh Bioscience offers the TOYOPEARL® line of resins in 35, 65 and 100 µm particle sizes. Toyopearl has the same backbone chemistry as TSK-GEL-5PW resins, so selectivity is maintained when scaling up from one resin to the other. This is demonstrated in Figure 2 showing an easy scale up to Toyopearl process resins for the separation of a mix of four standard proteins. Figure 3 demonstrates a separation on a DEAE resin. Only resolution decreases due to the larger particle size of the process resins. So researchers can be assured that chromatographic conditions developed on an analytical or semi-preparative column will work for large productions as well.

TSK-GEL Phenyl-5PW resins for analytical to preparative separations

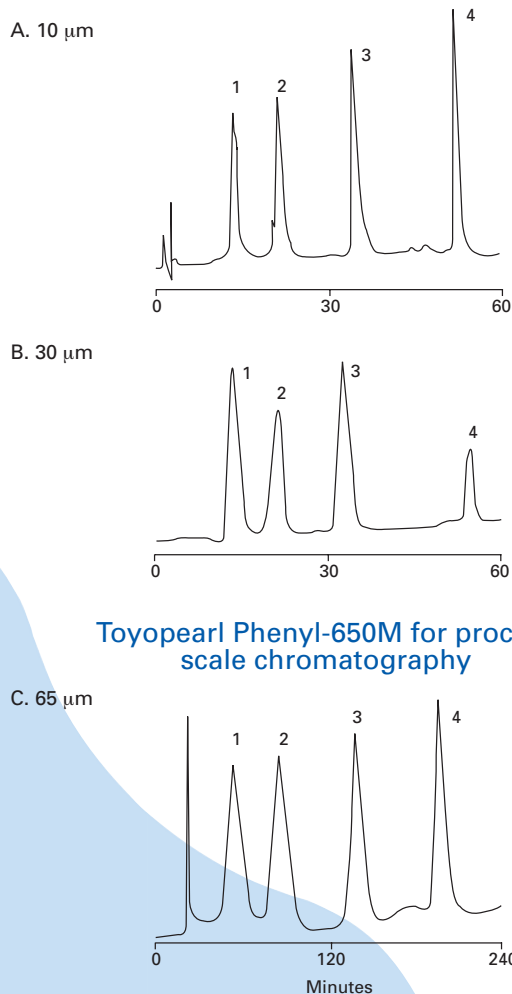


Figure 2

Column: TSKgel Phenyl-5PW, 7.5 mm ID x 7.5 cm L
 Sample: 1. myoglobin, 2. ribonuclease, 3. lysozyme, 4. alpha-chymotrypsinogen
 Injection: 100 µl containing 1 mg/ml of each protein
 Elution: 60 min. linear gradient for 10 and 30 µm TSK-GEL resins; 240 min. linear gradient for 65 µm Toyopearl resin from 1.8 M to 0 M (NH₄)₂SO₄ in 0.1 M phosphate buffer, pH 7.0
 Flow rate: 0.5 ml/min for TSK-GEL resins (A&B), 2.0 ml/min for Toyopearl resin (C)
 Detection: UV @ 280 nm

Mechanical stability

TSK-GEL bulk resins are designed for preparative LC applications and have been used in columns up to 25 cm internal diameter. The mechanical stability and excellent permeability of TSK-GEL bulk resins allow high linear flow rates (Figure 4).

Scale-up easily with TSK-GEL Columns

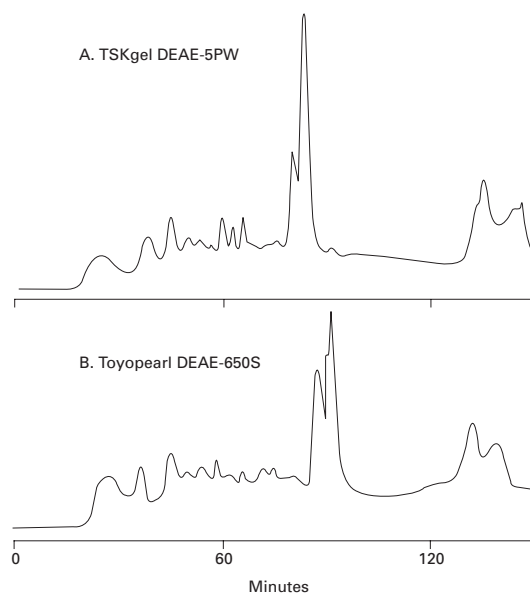


Figure 3

Column: TSKgel DEAE-5PW, A. 7.5 mm ID x 7.5 cm L, 10 µm
 B. 55 mm ID x 20 cm L, 20 µm
 Sample: 1. ovalbumin, 2. soybean trypsin inhibitor
 Injection: A. 0.2 mg each in 0.1 ml, B. 4.7 mg each in 4.7 ml
 Elution: A. 60 min, B. 120 min, linear gradient from 0 M to 0.5 M NaCl in 0.02 M Tris-HCl, pH 8.0
 Flow rate: A. 0.1 ml/min, B. 20 ml/min.
 Detection: UV @ 280 nm

Pressure/flow relationship for 30 µm TSK-GEL Phenyl-5PW

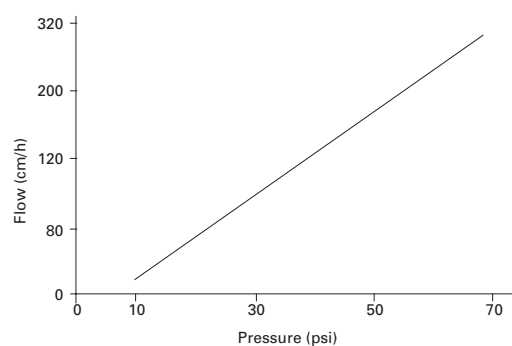


Figure 4

Column: TSK-GEL Phenyl-5PW, 55 mm ID x 20 cm L, 20 µm
 Eluent: distilled water

TSK-GEL PW Series

Ordering Information

TSK-GEL anion exchange resins

Part #	Product description**	Container size (mL)	Particle size (µm)	Ion exchange capacity (meq/mL resin)	Adsorption capacity (mg/mL resin) (BSA)
43383	SuperQ-5PW (20)	25	15-25	0.12-0.18	52-88
18535		250			
18546		1,000			
18547		5,000			
43283	SuperQ-5PW (30)	25	20-40	0.12-0.18	52-88
18536		250			
18548		1,000			
18549		5,000			
43381	DEAE-5PW (20)	25	15-25	0.05-0.11	25-45
14710		250			
14711		1,000			
18436		5,000			
43281	DEAE-5PW (30)	25	20-40	0.05-0.11	20-40
14712		250			
14713		1,000			
18370		5,000			

TSK-GEL cation exchange resins

Part #	Product description**	Container size (mL)	Particle size (µm)	Ion exchange capacity (meq/mL resin)	Adsorption capacity (mg/mL resin) (lysozyme)
43382	SP-5PW (20)	25	15-25	0.06-0.12	20-40
14714		250			
14715		1,000			
18435		5,000			
43282	SP-5PW (30)	25	20-40	0.06-0.12	20-40
14716		250			
14717		1,000			
18384		5,000			

TSK-GEL 5PW HIC resins

Part #	Product description**	Container size (mL)	Particle size (µm)	Adsorption capacity (mg/mL resin) (lysozyme)
43276	Ether-5PW (20)	25	10-30	10-30
16052		250		
16053		1,000		
43176	Ether-5PW (30)	25	20-40	10-30
16050		250		
16051		1,000		
43277	Phenyl-5PW (20)	25	10-30	10-30
14718		250		
14719		1,000		
43177	Phenyl-5PW (30)	25	20-40	10-30
14720		250		
14721		1000		

TSK-GEL LABPAK

Part #	Product description	Container size (mL)	Particle size (µm)
43278	HICPAK PW (20) (Ether-5PW, Phenyl-5PW)	2 x 25 mL	10-30
43175	HICPAK PW (30) (Ether-5PW, Phenyl-5PW)	2 x 25 mL	20-40
43380	IEXPAK PW (20) (SP-5PW, DEAE-5PW, SuperQ-5PW)	3 x 25mL	15-25
43280	IEXPAK PW (30) (SP-5PW, DEAE-5PW, SuperQ-5PW)	3 x 25mL	20-40