RPC REVERSED PHASE CHROMATOGRAPHY

RPC PRODUCTS

UNIVERSAL RP COLUMNS

TSKgel ODS-100V
TSKgel ODS-100Z

FAST RP COLUMNS

TSKgel ODS-140HTP

TRADITIONAL RP COLUMNS

TSKgel ODS-80TS
TSKgel ODS-80TM
TSKgel Octyl-80TM
TSKgel CN-80TS
TSKgel ODS-120A
TSKgel ODS-120T
TSKgel Super-ODS
TSKgel Super-Octyl
TSKgel Super-Phenyl
TSKgel OligoDNA RP
TSKgel TMS-250
TSKgel Octadecyl-NPR
TSKgel Octadecyl-2PW
TSKgel Octadecyl-4PW
TSKgel Phenyl-5PW RP

TOSOH FACT

Tosoh Bioscience, part of the Specialty Group Division of Tosoh Corporation, is a leading supplier of chromatographic columns, media and sophisticated clinical diagnostic systems.

TSK-GEL, Toyopearl and our other branded chromatography products have evolved over more than three decades from the measurement and analysis of polymers and organic compounds to development in the bioscience age with the analysis, separation and purification of proteins.

Experts and knowledgeable industry observers in areas from academia, government and scientific institutions praise the achievements of Tosoh Corporation in the fields of bioanalysis and purification.

UNIVERSAL REVERSED PHASE COLUMNS TSK-GEL ODS-100V AND TSK-GEL ODS-100Z

HIGHLIGHTS

- Ultra-pure silica minimizes sample adsorption
- High surface area (450m²/g) silica
- Spherical 3 and 5 µm particles with 100Å pores
- Very high column efficiency
- Moderate column back pressure
- Two levels of hydrophobicity:
  15% carbon (100V)
  20% carbon (100Z)
- Monomeric bonding chemistry
- Low residual silanol content

TSKgel ODS-100V & TSKgel ODS-100Z columns incorporate the best-in-class surface properties to limit secondary interactions of basic, acidic and chelating compounds. The ultra high purity Type B base silica contains negligible amounts of metal ion impurities.

TSKgel ODS-100V provides strong retention for polar compounds due to its lower C18 ligand density (15% carbon content). Proprietary monomeric bonded phase chemistry provides complete wetting and retention stability in 100% aqueous mobile phases.

The TSKgel ODS-100V line was expanded to include 3 µm packed columns. These columns are well suited for high throughput LC/MS applications, providing fast and efficient separations.

TSKgel ODS-100Z contains a high density (20% carbon content) monomeric C18 bonded phase for maximum retention and selectivity of small molecular weight compounds. Exhaustive endcapping prevents secondary interaction with residual silanol groups.

TABLE I

	TSKgel ODS-100V	TSKgel ODS-100Z
Carbon content	15%	20%
Particle size (µm)	3 and 5	5
Endcapped	Yes (1)	Yes (2)
Pore size (Å)	100	100
Preferred sample type	Polar, basic, acidic	Hydrophobic
Bonded phase structure	Monolayer	Monolayer
Specific surface area (m²/g)	450	450
*Asymmetry factor (10%)	0,90 - 1,15	0,90 - 1,15
*Theoretical plates	>14.000	>14.000

* Specifications for 4.6 mm ID x 15 cm L columns packed with 5 µm particles. Conditions: 70% methanol, 30% water; Flow Rate: 1 mL/min; Temp.: 40°C, N and AF are based on naphthalene peak. Typical pressure: 6 MPa

(1) Prepared by an incomplete first reaction with a difunctional octadecylsilane reagent, which is followed by endcapping with a mixture of two difunctional dialkylsilane reagents.

(2) Prepared by bonding the surface with a difunctional octadecylsilane reagent, followed by repeated endcapping with monofunctional trimethylsilane reagent.

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APPLICATION OF TSK-GEL ODS-100V AND TSK-GEL ODS-100Z

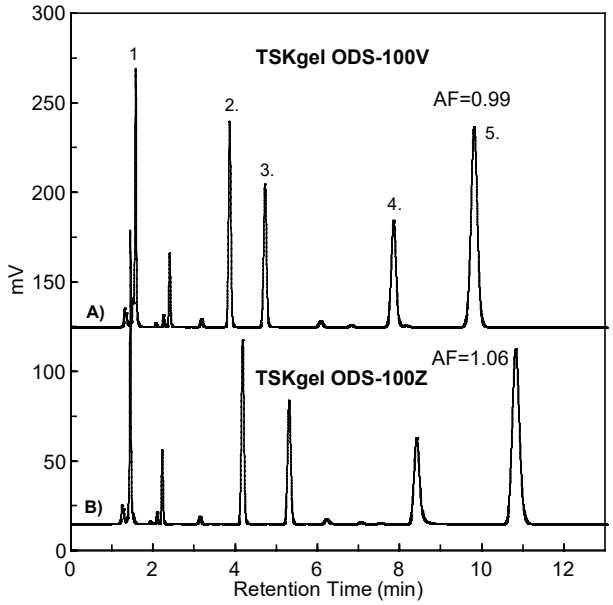
SRM 870

Standard Reference Material SRM 870 was developed by NIST (National Institute of Standards and Technology) as a means to classify the many commercially available reversed phase columns into closely-related groups. Amitriptyline, a tertiary amine, and quinizarin, a strong chelating compound, are included in the SRM 870 mixture, together with more traditional compounds. As shown in FIGURE 1, symmetrical peaks are obtained on TSKgel ODS-100V and TSKgel ODS-100Z for the compounds in this test mixture, clearly demonstrating the superior performance of these columns for the analysis of basic and chelating compounds.

Vitamins

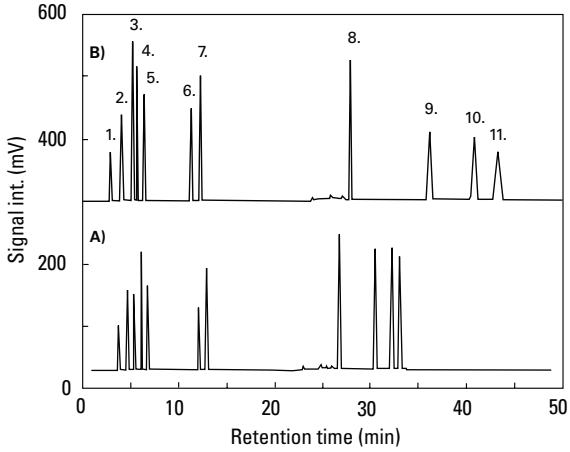
Simple and fast analysis of water- and lipid-soluble vitamins is possible on the TSKgel ODS-100V and TSKgel ODS-100Z columns, as shown in FIGURE 2. Clearly the TSKgel ODS-100Z column provides better overall resolution for the polar compounds in the mixture, while much shorter analysis time was obtained on TSKgel ODS-100V for the late eluting non-polar compounds.

FIGURE 1



Columns: (A) TSKgel ODS-100V 3µm (4.6mmID x 15cm)
(B) TSKgel ODS-100Z 3µm (4.6mmID x 15cm)
Eluent: 20mmol/L Phosphate buffer (pH 7.0) /MeOH (20/80)
Flow rate : 1.0mL/min
Detection: UV @ 254nm
Temp: 40°C
Inj. volume: 10µL
Sample: 1. Uracil, 2. Toluene, 3. Ethyl benzene,
4. Quinizarin, 5. Amitriptyline

FIGURE 2



Columns: A) TSKgel ODS-100V (4.6mm ID x 15cm)
B) TSKgel ODS-100Z (4.6mm ID x 15cm)
Eluent: A) 0.1% TFA in H_2O
B) 0.1% TFA in ACN
Gradient: 0 min (B: 0%) -- 20 min (B: 40%) --
22min (B: 100%) -- 50min (B: 100%)
Flow rate: 1.0mL/min.
Temp.: 40˚C
Detection: UV @ 280nm
Inj. volume: 5µL
Samples: 1. L-Ascorbic acid, 2. Nicotinic acid,
3. Thiamine, 4. Pyridoxal, 5. Pyridoxine,
6. Caffeine, 7. Riboflavin, 8. Retinol,
9. δ-Tocopherol, 10. α-Tocopherol,
11. α-Tocopherol acetate

APPLICATION OF TSK-GEL ODS-100V AND TSK-GEL ODS-100Z

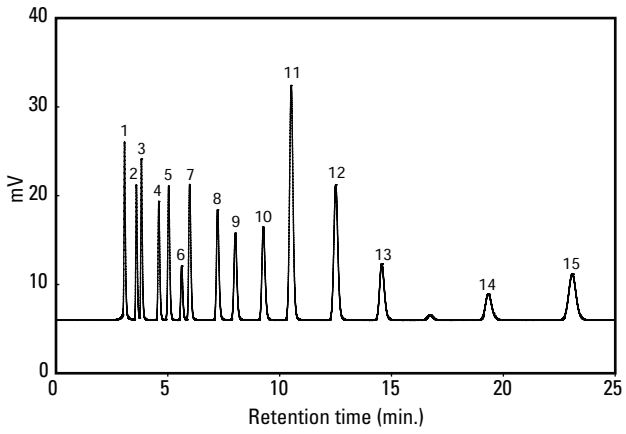
Organic Acids

Organic acids play an important role in many metabolic processes, fermentation and food products. FIGURE 3 shows a baseline separation of 15 organic acids in less than 25 minutes using a simple 0.1% phosphoric acid mobile phase.

Polymer Additives

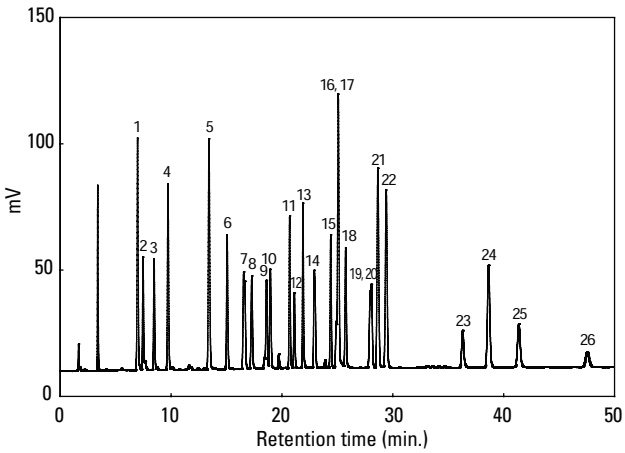
A baseline separation of 26 well known polymer additives is shown in FIGURE 4. Note that while a simple linear acetonitrile gradient was used, the column temperature was increased to 50°C to achieve the required baseline separation on a TSKgel ODS-100V column.

FIGURE 3



Column:	TSKgel ODS-100V (4.6mm ID × 25cm)
Mobile phase:	0.1% H_3PO_4, pH 2.3
Flow rate:	1.0mL/min
Temp:	40°C
Inj. Volume:	10µL
Samples:	1. Oxalic acid (0.1mg/mL)
	2. L-Tartaric acid (0.5mg/mL)
	3. Formic acid (1.0mg/mL)
	4. L-Malic acid (1.0mg/mL)
	5. L-Ascorbic acid (0.1mg/mL)
	6. Lactic acid (1.0mg/mL)
	7. Acetic acid (1.0mg/mL)
	8. Maleic acid (0.01mg/mL)
	9. Citric acid (1.0mg/mL)
	10. Succinic acid (1.0mg/mL)
	11. Fumaric acid (0.025mg/mL)
	12. Acrylic acid (0.1mg/mL)
	13. Propionic acid (2.0mg/mL)
	14. Glutaric acid (1.0mg/mL)
	15. Itaconic acid (0.025mg/mL)

FIGURE 4



Column:	TSKgel ODS-100V (4.6mm ID × 15cm)
Mobile phases:	A) H_2O
	B) ACN
Gradient:	0 min (B: 60%) -- 20 min (B: 100%)
Flow rate:	1.0mL/min
Temp:	50°C
Detection:	UV (225nm)
Inj. Volume:	10µL
Concentration:	10mg/L each
Samples:	1. Cyasorb UV-24, 2. BHA, 3. Ionox 100,
	4. Seesorb 101, 5. Tinuvin P, 6. Yoshinox SR,
	7. Seesorb 202, 8. BHT, 9. Noclizer M-17,
	10. Yoshinox 2246R, 11. Topanol CA,
	12. Yoshinox 425, 13. Cyanox 1790,
	14. Cyasorb UV-531, 15. Ionox 220,
	16. Nonflex CBP, 17. Tinuvin 326,
	18. Tinuvin 120, 19. Irganox 3114,
	20. Uvtex OB, 21. Tinuvin 327, 22. Tinuvin 328,
	23. Irganox 1010, 24. Irganox 1330,
	25. Irganox 1076, 26. Irgafos 168

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APPLICATION OF TSK-GEL ODS-100V AND TSK-GEL ODS-100Z

Nucleotides

The analysis of mono-, di-, and tri-phosphorylated nucleotides on a TSKgel ODS-100V column is shown below (FIGURE 5). The separation is accomplished by adding a short chain ion pairing agent, *t*-butylamine, and adjusting the mobile phase pH to 6.8.

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www.tosohbioscience.com for additional applications, product specifications and literature.
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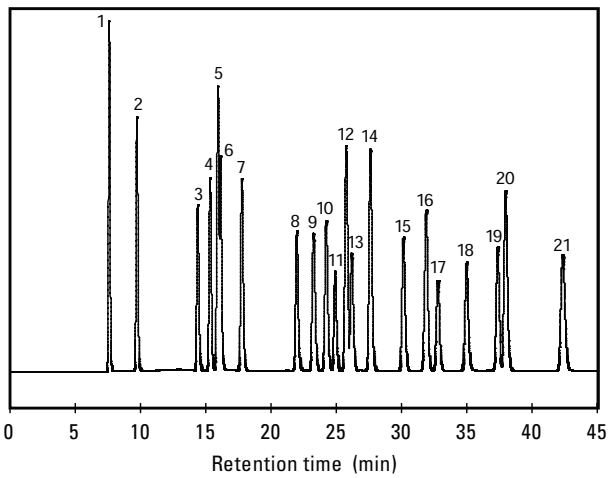
FIGURE 5



Column:	TSKgel ODS-100V (4.6mm ID × 25cm)
Mobile phases:	A) 20 mmol/L *t*-butylamine + H_3PO_4 (pH 6.8)
	B) A/MeOH (90/10)
Gradient:	0 min (B: 0%) -- 35 min (B: 100%)
Flow rate:	1.0mL/min
Temp:	25°C
Detection:	UV (260nm)
Inj. Volume:	2µL
Concentration:	0.3g/L each
Samples:	1. CMP, 2. UMP, 3. CDP, 4. dUMP, 5. GMP, 6. IMP, 7. UDP, 8. CTP, 9. TMP, 10. GDP, 11. IDP, 12. AMP, 13. UTP, 14. dGMP, 15. TDP, 16. GTP, 17. ITP, 18. ADP, 19. TTP, 20. dAMP, 21. ATP

ORDERING INFORMATION

Part #	Description	ID (mm)	Length (cm)	Particle Size (µm)	Number Theoretical Plates	Flow Rate (mL/min) Range	Flow Rate (mL/min) Max.	Maximum Pressure Drop (kg/cm²)
Stainless steel columns								
21838	ODS-100V, 100 Å	1.0	3.5	3	≥ 2,900	0.02 - 0.05	0.22	150
21839	ODS-100V, 100 Å	1.0	5.0	3	≥ 4,500	0.02 - 0.05	0.22	150
21813	ODS-100V, 100 Å	2.0	3.5	3	≥ 4,000	0.15 - 0.18	0.22	150
21812	ODS-100V, 100 Å	2.0	5.0	3	≥ 5,700	0.15 - 0.18	0.22	150
21811	ODS-100V, 100 Å	2.0	7.5	3	≥ 8,600	0.15 - 0.18	0.22	210
21938	ODS-100V, 100 Å	2.0	10.0	3	≥ 11,500	0.15 - 0.18	0.22	240
21810	ODS-100V, 100 Å	2.0	15.0	3	≥ 17,500	0.15 - 0.18	0.22	250
21842	ODS-100V, 100 Å	3.0	5.0	3	≥ 6,000			150
21843	ODS-100V, 100 Å	3.0	7.5	3	≥ 9,000			210
21939	ODS-100V, 100 Å	3.0	10.0	3	≥ 12,000			240
21844	ODS-100V, 100 Å	3.0	15.0	3	≥ 18,000			240
21831	ODS-100V, 100 Å	4.6	5.0	3	≥ 6,500	0.7 - 1.0	1.2	150
21830	ODS-100V, 100 Å	4.6	7.5	3	≥ 9,750	0.7 - 1.0	1.2	200
21940	ODS-100V, 100 Å	4.6	10.0	3	≥ 13,000	0.7 - 1.0	1.2	240
21829	ODS-100V, 100 Å	4.6	15.0	3	≥ 19,500	0.7 - 1.0	1.2	240
21457	ODS-100V, 100 Å	2.0	5.0	5	≥ 3,300	0.15 - 0.18	0.22	180
21458	ODS-100V, 100 Å	2.0	15.0	5	≥ 11,000	0.15 - 0.18	0.22	180
21455	ODS-100V, 100 Å	4.6	15.0	5	≥ 14,000	0.7 - 1.0	1.2	180
21456	ODS-100V, 100 Å	4.6	25.0	5	≥ 23,000	0.7 - 1.0	1.2	210
21460	ODS-100Z, 100 Å	2.0	5.0	5	≥ 3,300	0.15 - 0.18	0.22	180
21459	ODS-100Z, 100 Å	2.0	15.0	5	≥ 11,000	0.15 - 0.18	0.22	180
21461	ODS-100Z, 100 Å	4.6	15.0	5	≥ 14,000	0.7 - 1.0	1.2	180
21462	ODS-100Z, 100 Å	4.6	25.0	5	≥ 23,000	0.7 - 1.0	1.2	180

Guard column products					
21814	ODS-100V Guard Cartridge, pk3	2.0	1.0	3	For all ODS-100V 2 mm ID columns
21453	ODS-100V Guard Cartridge, pk3	3.2	1.5	5	For all ODS-100V 4.6 mm ID columns
21841	ODS-100Z Guard Cartridge, pk3	2.0	1.0	5	For all ODS-100Z 2 mm ID columns
21454	ODS-100Z Guard Cartridge, pk3	3.2	1.5	5	For all ODS-100Z 4.6 mm ID columns
19308	Cartridge Holder	2.0	1.0		For 2 mm ID cartridges
19018	Cartridge Holder	3.2	1.5		For 4.6 mm ID cartridges

NOTE: Tosoh Bioscience offers guard columns and guard cartridges to protect your analytical column. Guard cartridges are usually delivered in packages of three and require the appropriate cartridge holder.
In general cartridges for 4.6 mm ID columns are produced in 3.2 mm ID and 1.5 cm length. They require the cartridge holder 19018. Guard cartridges for 2 mm ID columns are 2 mm ID x 1 cm L and require holder 19308.

RPC

FAST REVERSED PHASE COLUMNS TSK-GEL ODS-140HTP

HIGHLIGHTS

- Moderate pressure at high flow rates
- High resolution and high efficiency
- High throughput applications
- Compatible with HPLC and UPLC systems
- Moderate carbon content
- Polylayer bonding chemistry

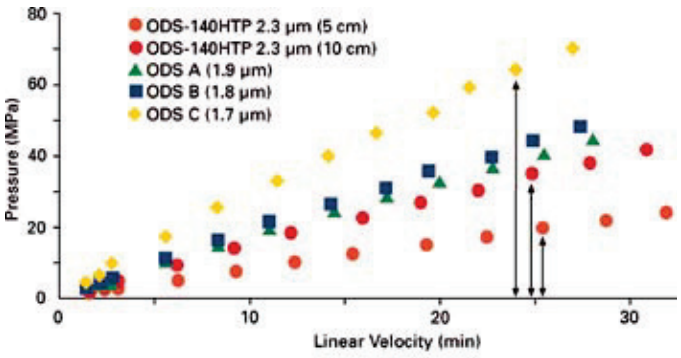
TSK-GEL ODS-140HTP columns were developed for use in high throughput applications, including drug discovery, pharmacokinetics and peptide digest separations. They are available in 2.1 mm ID columns with 5 cm and 10 cm lengths.

TSKgel ODS-140HTP columns are packed with 2.3 µm particles, providing high resolution and short analysis times at moderate pressure. The lower pressure drop reduces the burden on the hardware, allowing TSKgel ODS-140 HTP columns to be used with either UPLC (up to 9000 psi) or conventional HPLC systems. The backpressure of a TSKgel ODS-140 HTP column is less than half of the pressure of a sub-2 µm column of the same dimensions (FIGURE 6).

APPLICATIONS

Excellent resolution at high speed can be achieved on a TSK-gel ODS-140HTP column wih the separation of a ß-lactoglobulin trytic digest (see FIGURE 7). Peak capacity improved when using a longer gradient time.

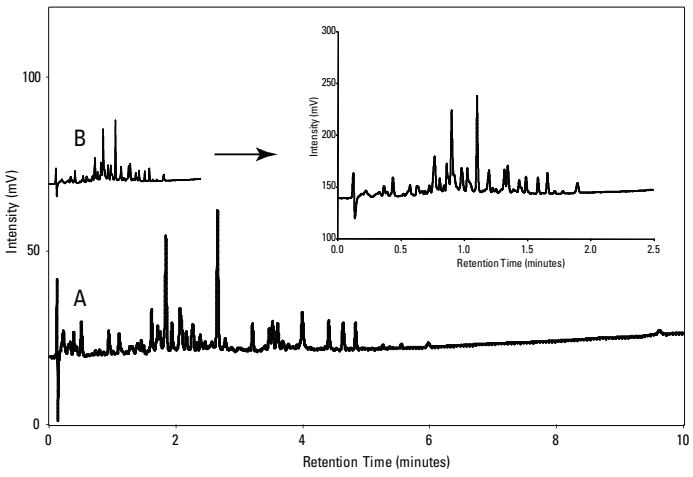
FIGURE 6



Conditions

Column:	TSKgel ODS-140HTP 2.3 µm (2.0 mm ID x 5.0 cm, 10 cm L) Sub-2 µm ODS columns (2,1 mm ID x 5.0 cm L)
Eluent:	H_2O/CH_3CN = 50/50

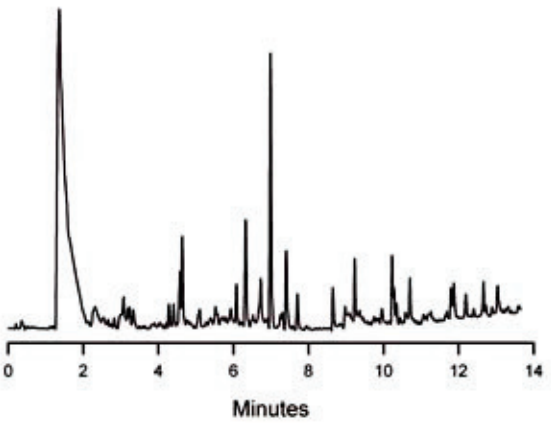
FIGURE 7



Column:	TSKgel ODS-140HTP, 2.3 µm, (2.1mm ID x 5 cm)
Eluent:	A: H_2O/ACN (95/5) + 0.1% TFA B: H_2O/ACN (50/50) + 0.1% TFA
Flow rate:	1.0 mL/min
Detection:	UV@220nm
Temperature:	40ºC
Injection volume:	10 µL
Gradient:	0-100%B (Linear gradient)
Gradient time:	A: 10 min, B: 2.5 min
Sample:	β-lactoglobulin tryptic digest

In Vietnamese and Chinese traditional medicine, hot aqueous extract of Crinum latifolium is used because of its antitumor activity. Crinum latifolium is thought to possess antiviral and immunostimulative properties and shows immunomodulatory properties in human peripheral blood mononuclear cells. The analysis of products derived from plant extracts is a challenging chromatographic task. Due to the high number ob components the column needs to provide a high peak capacity, as shown in FIGURE 8.

FIGURE 8



Column:	TSKgel ODS-140HTP 2.3 µm, 2.1 mm ID x 10 cm L
Sample:	Crinum latifolium L extract, 2 µl
Eluent:	A: water B: acetonitrile
Gradient:	0 min (5%B) 1.2 min (5%B) 4 min (30%B) 15 min (68%B) 15.1 min (100%B) 20min (100%B)
Flow rate:	0.4 ml/min
Temp.:	40°C
Detection:	UV @ 220 nm
Sampling rate:	80 Hz

ORDERING INFORMATION

Part #	Description	ID (mm)	Length (cm)	Particle Size (µm)	Pore Size (Å)	Matrix
Stainless steel columns						
21927	TSKgel ODS-140HTP	2.1	5.0	2.3	140	Silica
21928	TSKgel ODS-140HTP	2.1	10.0	2.3	140	Silica

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TRADITIONAL RP COLUMNS
TSK-GEL ODS-80TS TSK-GEL ODS-80TM TSK-GEL OCTYL-80TS TSK-GEL CN-80TS

HIGHLIGHTS

- ODS-80 is prepared from spherical silica with 80 Å pores
- Silica surface is metal free, minimizing solute interactions with residual silanol groups
- Monomeric-bonded phase chemistry for optimal lot-to-lot reproducibility
- Very high column efficiency
- High (80TM) or complete (80TS) endcapping shields the silica surface from participating in solute retention through ionic interaction
- Particles contain 80 Å pores for fast mass transfer of solutes in the 100 to 6,000 Da MW range
- Available in particle sizes of 5 µm, 10 µm, and 20 µm
- Large surface area and high sample capacity
- Hardware: stainless steel columns for analytical, semi-preparative, and preparative separations

2 mm ID Columns

TSKgel ODS-80TS columns are available with a 2 mm ID. Compared with conventional 4.6 mm ID columns, these columns offer the benefits of improved sensitivity and reduced solvent consumption. 2 mm ID columns are operated at lower flow rates, making them more suitable for LC/MS applications.

APPLICATIONS

TSK-GEL ODS-80TM

- Hydrophobic and hydrophilic peptides, synthetic peptides, purity check, peptide mapping
- General purpose column for low MW pharmaceuticals, basic compounds, nucleosides, nucleotides, purines and pyrimidines

TSK-GEL ODS-80TS

- Complete endcapping makes the TSKgel ODS-80TS a good choice for strongly basic compounds and for applications that require operation at pH 7.5

TSK-GEL Octyl-80TS

- Faster kinetics than ODS, but lower hydrophobic selectivity
- Lower hydrophobic selectivity of Octyl versus ODS

TSK-GEL CN-80TS

- Alternative to ODS and Octyl columns for analysis of polar compounds
- Solvent strength should be reduced to obtain similar retention to Octyl and ODS columns when separating non-polar compounds

TSK-GEL ODS-120A TSK-GEL ODS-120T

HIGHLIGHTS

- TSKgel ODS-120 contains polymeric-bonded octadecyl groups on 120Å pore size silica
- TSKgel ODS-120A is not endcapped; TSKgel ODS-120T is endcapped with trimethylsilyl groups
- TSKgel 120T columns are available in 2 mm ID format
- Available in 5 µm and 10 µm particle sizes in analytical and semi-preparative columns respectively. Larger particle sizes are available in preparative columns
- Hardware: stainless steel columns for analytical, semi-preparative, and preparative separations

APPLICATIONS

TSK-GEL ODS-120A

- Polymeric bonded ODS exhibits improved peak shape for the separation of complex geometric isomers, such as polynuclear aromatic hydrocarbons (PAH)
- TSKgel ODS-120A and 120T provide a similar separation at low pH for a mixture of catecholamines, while at pH 6 the basic solutes interact with negatively charged silanol groups on 120A, but not on 120T

TSK-GEL ODS-120T

- Endcapped ODS-120T is an alternative to ODS-80TM for peptide and protein separations

TSK-GEL SUPER-ODS TSK-GEL SUPER-OCTYL TSK-GEL SUPER PHENYL

HIGHLIGHTS

- The silica particles used in Super series columns are monodisperse spherical 2 µm beads with 110 Å pores
- TSKgel Super-ODS, Super-Octyl and Super-Phenyl packings are bonded with, respectively, C18, C8 and phenyl functional groups. The bonded phases have a polymeric structure. An exhaustive endcapping reaction minimizes the presence of residual silanol groups
- 2 µm particles provide superior resolution and speed, as well as improved sensitivity
- Pressure drop is not excessive due to the monodisperse particle size distribution
- Stainless steel columns are available with 4.6 mm and 2 mm ID formats

APPLICATIONS

Super-ODS, Super-Octyl, Super-Phenyl

- Recommended for small molecular weight compounds (<10,000Da) such as peptides, amino acids, tryptic digests, nucleotides, pharmaceutical molecules, and food and beverage samples.

Optimizing Results with Super Series Columns

Super series columns can be used on a regular HPLC system if the dead volume is minimized, although optimal results are obtained with an HPLC system designed for 2 mm or smaller ID columns.

The following recommendations are for 4.6 mm ID columns. Use proportionately lower values for 2 mm ID columns.

1. A guard filter is highly recommended to reduce particulate contamination from the sample or system components.
2. Keep sample volume less than 10 µL.
3. To ensure minimal extra-column volume, keep tubing as short as possible (extra-column volume less than 5 µL between column and detector).
4. Conventional 0.1 mm ID connecting tubing may be used (0.005).
5. The smallest detector time constant should be selected (if possible, less than 50 ms).
6. The detector flow cell should be 2 µL or less for best results. A standard HPLC flow cell (10 µL) can be used as an alternative, however, it is recommended that the heating coil is removed.

TSK-GEL OLIGODNA RP TSK-GEL TMS-250

HIGHLIGHTS

- TSKgel OligoDNA RP and TSKgel TMS-250 both incorporate 5 µm spherical porous silica with 250 Å pores to allow unhindered access by large oligonucleotides and proteins respectively
- TSKgel OligoDNA RP contains a monomeric C18 bonded phase that is not endcapped
- TSKgel TMS-250 is exhaustively and repeatedly reacted with trimethyl silyl groups. Standard nomenclature designates the bonded phase as C1
- TSKgel OligoDNA RP is available in 4.6 mm ID and 7.8 mm ID (both 15 cm length), while TSKgel TMS-250 is only available in 4.6 mm ID x 7.5 cm L

APPLICATIONS

TSK-GEL OLIGODNA RP

- Ideal for the purification and analysis of oligonucleotides (up to 500-mer), RNAs, and DNA fragments
- Possesses high-resolving power for octamers of similar sequence

TSK-GEL TMS-250

- Recommended for the analysis of proteins
- The “wide-pore” TMS-250 packing can accommodate large proteins, such as aldolase (158,000 Da).

RPC

TSK-GEL OCTADECYL-NPR TSK-GEL OCTADECYL-2PW TSK-GEL OCTADECYL-4PW TSK-GEL PHENYL-5PW RP

HIGHLIGHTS

- Polymer-based RPC columns are chemically stable at pH 2-12, allowing operation at basic pH where silica-based columns have limited chemical stability.
- Polymer-based TSK-GEL RPC columns can be cleaned and impurities removed by using either strong acid or base.
- Polymer-based TSK-GEL RPC columns are available packed with nonporous resins (NPR) or with porous resins of various pore sizes. The proper column to use is selected based on sample MW or application.
- 2.5 µm particle size TSKgel Octadecyl-NPR resin features fast kinetics resulting in high column efficiency and quantitative protein recovery at sub-microgram loads.
- TSKgel Octadecyl-2PW is based on 5 µm particle size G2000PW resin with 125 Å pores.
- TSKgel Octadecyl-4PW is based on 7 µm particle size G4000PW resin, which contains 500 Å pores.
- TSKgel Phenyl-5PW RP is based on 10 µm particle size G5000PW resin, which has an average pore size of 1000 Å. In comparison with the Phenyl-5PW packing material used in HIC, the greater level of hydrophobicity in TSKgel Phenyl-5PW RP makes this material more suitable for use in RPC.

APPLICATIONS

TSK-GEL OCTADECYL-NPR

- High efficiency purification of proteins and peptides at sub-microgram loads
- Nonporous particles are stable to higher pressures than porous particles
- Improved recovery at low sample concentration over traditional porous resins

TSK-GEL OCTADECYL-2PW

- For analyzing small MW pharmaceutical compounds at basic pH
- Faster analysis than competitive polymeric reversed phase packings

TSK-GEL OCTADECYL-4PW

- Recommended for peptides and small proteins

TSK-GEL PHENYL-5PW RP

- Ideal for the separation of proteins, including high MW
- Able to handle high loads (high capacity)

VISIT OUR WEBSITE

www.tosohbioscience.com for additional applications, product specifications and literature.

Or, contact our Technical Service specialists to discuss your specific application:

techsupport.sep@tosoh.com

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Please see next page for ordering information.

ORDERING INFORMATION

Part #	Description	ID (mm)	Length (cm)	Particle Size (µm)	Number Theoretical Plates	Flow Rate (mL/min) Range	Flow Rate (mL/min) Max.	Maximum Pressure Drop (kg/cm²)
Stainless steel columns								
18150	ODS-80Ts, 80 Å	2.0	15.0	5	≥≥ 11,000	0.15 - 0.18	0.22	200
18151	ODS-80Ts, 80 Å	2.0	25.0	5	≥ 18,000	0.15 - 0.18	0.22	300
17200	ODS-80Ts, 80 Å	4.6	7.5	5	≥ 4,500	0.8 - 1.0	1.2	100
17201	ODS-80Ts, 80 Å	4.6	15.0	5	≥ 11,000	0.8 - 1.0	1.2	200
17202	ODS-80Ts, 80 Å	4.6	25.0	5	≥ 18,000	0.8 - 1.0	1.2	300
17380	ODS-80Ts, 80 Å	21.5	30.0	10	≥ 6,000	4.0 - 6.0	12.0	60
16651	ODS-80TM, 80 Å	4.6	7.5	5	≥ 4,500	0.8 - 1.0	1.2	100
08148	ODS-80TM, 80 Å	4.6	15.0	5	≥ 11,000	0.8 - 1.0	1.2	200
08149	ODS-80TM, 80 Å	4.6	25.0	5	≥ 18,000	0.8 - 1.0	1.2	300
14001	ODS-80TM, 80 Å	7.8	30.0	10	≥ 6,000	1.0 - 2.0	3.0	80
14002	ODS-80TM, 80 Å	21.5	30.0	10	≥ 6,000	4.0 - 6.0	12.0	60
17344	Octyl-80Ts, 80 Å	4.6	15.0	5	≥ 11,000	0.8 - 1.0	1.2	200
17345	Octyl-80Ts, 80 Å	4.6	25.0	5	≥ 18,000	0.8 - 1.0	1.2	300
17348	CN-80Ts, 80 Å	4.6	15.0	5	≥ 11,000	0.8 - 1.0	1.2	200
17349	CN-80Ts, 80 Å	4.6	25.0	5	≥ 18,000	0.8 - 1.0	1.2	300
Guard column products								
19325	ODS-80Ts Guard cartridge, pk 3	2.0	1.0	5	For all 2 mm ID ODS-80Ts columns			
19011	ODS-80Ts Guard cartridge, pk 3 -NEW-	3.2	1.5	5	For all 4.6 mm ID ODS-80Ts columns, replaces P/N 17242			
19012	Octyl-80Ts Guard cartridge, pk 3 -NEW-	3.2	1.5	5	For all 4.6 mm ID Octyl-80Ts columns, replaces P/N 17378			
17385	ODS-80Ts Guard column	21.5	7.5	10	For P/N 17380			
14098	ODS-80TM Guard column	21.5	7.5	10	For P/N 14002			
19004	ODS-80TM Guard cartridge, pk 3 -NEW-	3.2	1.5	5	For 4.6 mm ID ODS-80TM columns, replaces P/N 17242			
19013	CN-80Ts Guard cartridge, pk 3 -NEW-	3.2	1.5	5	For 4.6 mm ID CN-80Ts columns, replaces P/N 17379			
19308	Cartridge holder				For 2.0 mm ID Guard cartridges			
19018	Cartridge holder				For 3.2 mm ID Guard cartridges, replaces P/N 14100			
Stainless steel columns								
07636	ODS-120A, 120 Å	4.6	15.0	5	≥ 7,000	0.8 - 1.0	1.2	150
07124	ODS-120A, 120 Å	4.6	25.0	5	≥ 10,000	0.8 - 1.0	1.2	200
07129	ODS-120A, 120 Å	7.8	30.0	10	≥ 6,000	1.0 - 2.0	3.0	75
06172	ODS-120A, 120 Å	21.5	30.0	10	≥ 6,000	4.0 - 6.0	12.0	60
18152	ODS-120T, 120 Å	2.0	15.0	5	≥ 6,500	0.15 - 0.18	0.22	150
18153	ODS-120T, 120 Å	2.0	25.0	5	≥ 10,000	0.15 - 0.18	0.22	200
07637	ODS-120T, 120 Å	4.6	15.0	5	≥ 7,000	0.8 - 1.0	1.2	150
07125	ODS-120T, 120 Å	4.6	25.0	5	≥ 10,000	0.8 - 1.0	1.2	200
07130	ODS-120T, 120 Å	7.8	30.0	10	≥ 6,000	1.0 - 2.0	3.0	75
07134	ODS-120T, 120 Å	21.5	30.0	10	≥ 6,000	3.0 - 6.0	12.0	60
07433	ODS-120T, 120 Å	55.0	30.0	20	≥ 4,500	45.0 - 80.0	100.0	20
07434	ODS-120T, 120 Å	55.0	60.0	20	≥ 9,000	40.0 - 60.0	75.0	35
Guard column products								
19325	ODS-120T Guard cartridge, pk 3	2.0	1.0	5	For all 2 mm ID ODS-120T columns			
07642	ODS-120T/A Guard column	21.5	7.5	10	For P/Ns 06172 and 07134			
19006	ODS-120T Guard cartridge, pk 3 -NEW-	3.2	1.5	5	For 4.6 mm ID ODS-120T columns, replaces P/N 14125			
19005	ODS-120A Guard cartridge, pk 3 -NEW-	3.2	1.5	5	For 4.6 mm ID ODS-120A columns, replaces P/N 14125			
19018	Guard cartridge holder	3.2	1.5		For 3.2 mm ID Guard cartridges, replaces P/N 14100			
19308	Guard cartridge holder	2.0	1.5		For all 2 mm ID Guard cartridges			

RPC

Part #	Description	ID (mm)	Length (cm)	Particle Size (µm)	Number Theoretical Plates	Flow Rate (mL/min) Range	Flow Rate (mL/min) Max.	Maximum Pressure Drop (kg/cm²)
Stainless steel columns								
20015	Super-ODS, 110 Å	1.0	5.0	2	≥ 15,000	0.03 - 0.05	0.06	150
20016	Super-ODS, 110 Å	1.0	10.0	2		0.03 - 0.05	0.06	150
19541	Super-ODS, 110 Å	2.0	5.0	2	≥ 6,000	0.15 - 0.2	0.25	250
19542	Super-ODS, 110 Å	2.0	10.0	2	≥ 12,000	0.15 - 0.2	0.25	250
18154	Super-ODS, 110 Å	4.6	5.0	2	≥ 8,000	1.0 - 2.5	4.0	300
18197	Super-ODS, 110 Å	4.6	10.0	2	≥ 16,000	1.0 - 2.5	4.0	300
20013	Super-Octyl, 110 Å	2.0	5.0	2	≥ 15,000	0.15 - 0.20	0.25	150
20014	Super-Octyl, 110 Å	2.0	10.0	2	≥ 5,000	0.15 - 0.20	0.25	300
18275	Super-Octyl, 110 Å	4.6	5.0	2	≥ 8,000	1.0 - 2.5	4.0	300
18276	Super-Octyl, 110 Å	4.6	10.0	2	≥ 16,000	1.0 - 2.5	4.0	300
20017	Super-Phenyl, 110 Å	2.0	5.0	2	≥ 3,000	0.15 - 0.20	0.25	80
20018	Super-Phenyl, 110 Å	2.0	10.0	2	≥ 6,000	0.15 - 0.20	0.25	150
18277	Super-Phenyl, 110 Å	4.6	5.0	2	≥ 8,000	1.0 - 2.5	4.0	300
18278	Super-Phenyl, 110 Å	4.6	10.0	2	≥ 16,000	1.0 - 2.5	4.0	300
Guard column products								
19672	Guard cartridge, pk 3	2.0	1.0	2	For 2 mm ID Super-ODS columns			
19308	Cartridge holder				For P/N 19672			
18207	Guard cartridge, pk 3	4.0	4.0	2	For 4.6 mm ID columns (Super-ODS, -Octyl, -Phenyl)			
18206	Cartridge holder				For P/N 18207			
Stainless steel columns								
13352	OligoDNA RP, 250 Å	4.6	15.0	5	≥ 7,000	0.6 - 1.0	1.2	120
13353	OligoDNA RP, 250 Å	7.8	15.0	5	≥ 7,000	2.0 - 3.0	3.2	120
07190	TMS-250, 250 Å	4.6	7.5	10	≥ 1,500	0.5 - 0.8	1.0	20
Glass columns								
14006	Phenyl-5PW RP Glass, 1000 Å	5.0	5.0	10	≥ 400	0.5 - 1.0	1.2	20
14007	Phenyl-5PW RP Glass, 1000 Å	8.0	7.5	10	≥ 700	1.0 - 2.0	2.5	20
Stainless steel columns								
14005	Octadecyl-NPR nonporous	4.6	3.5	2.5	≥ 1,000	1.0 - 1.5	1.6	200
18754	Octadecyl-2PW, (100 - 200 Å)	2.0	15.0	5	≥ 5,000	0.07 - 0.11	0.14	70
17500	Octadecyl-2PW, (100 - 200 Å)	4.6	15.0	5	≥ 6,000	0.4 - 0.6	1.2	100
17501	Octadecyl-2PW, (100 - 200 Å)	6.0	15.0	5	≥ 6,000	0.5 - 1.0	1.5	100
18755	Octadecyl-4PW, 500 Å	2.0	15.0	7	≥ 2,000	0.08 - 0.17	0.22	100
13351	Octadecyl-4PW, 500 Å	4.6	15.0	7	≥ 2,000	0.5 - 1.0	1.2	120
16257	Octadecyl-4PW, 500 Å	21.5	15.0	13	≥ 2,000	3.0 - 6.0	8.0	35
16258	Octadecyl-4PW, 500 Å	55.0	20.0	20	≥ 1,700	30.0 - 50.0	60.0	5
18756	Phenyl-5PW RP, 1000 Å	2.0	7.5	10	≥ 400	0.05 - 0.1	0.12	10
08043	Phenyl-5PW RP, 1000 Å	4.6	7.5	10	≥ 500	0.5 - 1.0	1.2	30
16260	Phenyl-5PW RP, 1000 Å	21.5	15.0	13	≥ 1,000	6.0 - 8.0	8.0	30
16261	Phenyl-5PW RP, 1000 Å	55.0	20.0	20	≥ 700	–	–	–

Part #	Description	ID (mm)	Length (cm)	Particle Size (µm)	
Guard column products					
14022	Phenyl-5PW RP Guardgel Kit, Glass			20	For P/Ns 14006 and 14007
42159	Phenyl-5PW RP Cartridge, pk 3	2.0	1.0	10	For P/N 18756
19007	Phenyl-5PW RP Cartridge, pk 3 -NEW-	3.2	1.5	10	For P/N 08043, Replaces 14126
16262	Phenyl-5PW RP Guard column	45.0	5.0	20	For P/N 16261
42161	Octadecyl-2PW Cartridge, pk 3	2.0	1.0	5	For P/N 18754
17502	Octadecyl-2PW Guard column	4.6	1.0	5	For P/N 17500
17503	Octadecyl-2PW Guard column	6.0	1.0	5	For P/N 17501
42160	Octadecyl-4PW Cartridge, pk 3	2.0	1.0	7	For P/N 18755
19008	Octadecyl-4PW Cartridge, pk 3 -NEW-	3.2	1.5	7	For P/N 13351, Replaces P/N14127
16749	Octadecyl-4PW Prep Guardgel Kit			13	For P/N 16257
16259	Octadecyl-4PW Guard column	45.0	5.0	20	For P/N 16258
19308	Guard cartridge holder	2.0	1.0		For all 2 mm ID Guard cartridges
19018	Guard cartridge holder	3.2	1.5		For 4.6 mm ID Octadecyl 4-PW and Phenyl-5PW RP Guard cartridges, Replaces P/N 14100

NOTE: Tosoh Bioscience offers guard columns and guard cartridges to protect your analytical column. Guard cartridges are usually delivered in packages of three and require the appropriate cartridge holder.

In general cartridges for 4.6 mm ID columns are produced in 3.2 mm ID and 1.5 cm length. They require the cartridge holder 19018. Guard cartridges for 2 mm ID columns are 2 mm ID x 1 cm L and require holder 19308.