RPC
REVERSED PHASE CHROMATOGRAPHY

RPC PRODUCTS

UNIVERSAL RP COLUMNS

TSKgel ODS-100V
TSKgel ODS-100Z

FAST RP COLUMNS

TSKgel ODS-140HTP
TSKgel Super-ODS
TSKgel Super-Octyl
TSKgel Super-Phenyl

RP COLUMNS FOR BIOMOLECULES

TSKgel OligoDNA RP
TSKgel TMS-250

POLYMER BASED RP COLUMNS

TSKgel Octadecyl-NPR
TSKgel Octadecyl-2PW
TSKgel Octadecyl-4PW
TSKgel Phenyl-5PW RP

TRADITIONAL RP COLUMNS

TSKgel ODS-80Ts
TSKgel ODS-80TM
TSKgel Octyl-80Ts
TSKgel CN-80Ts
TSKgel ODS-120A
TSKgel ODS-120T

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.

TSKgel, 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 RP COLUMNS TSKgel ODS-100V / ODS-100Z

HIGHLIGHTS

- Ultra-pure silica minimizes sample adsorption
- High surface area (450 m^2/g) silica
- Spherical 3 and 5 µm particles with 100 Å 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 and TSKgel ODS-100Z column lines were 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	3 and 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 (m^2/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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APPLICATIONS OF TSKgel ODS-100V / ODS-100Z

SRM 870

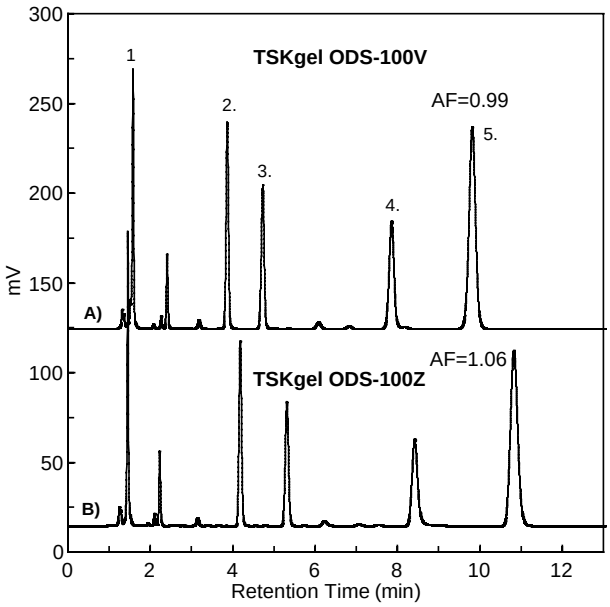
Standard Reference Material SRM 870 was developed by NIST (National Institute of Standards and Technology) as a means to classify the many commercially available reversed phase columns into closely-related groups. Amitriptyline, a tertiary amine, and quinizarin, a strong chelating compound, are included 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

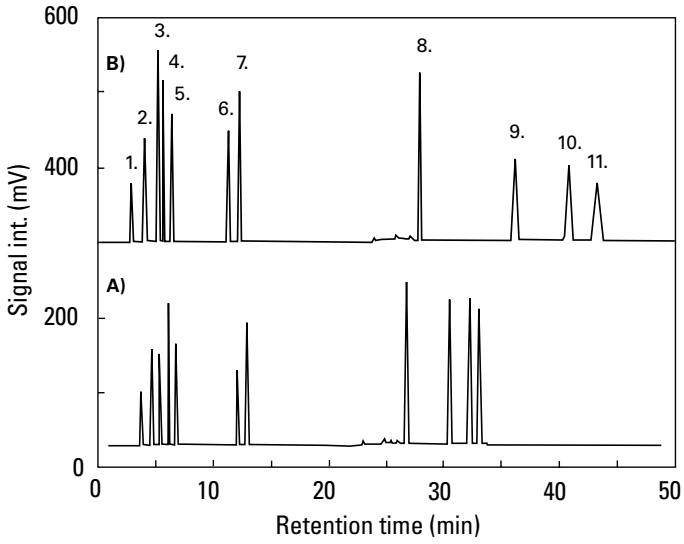
Standard Reference Material SRM 879



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

FIGURE 2

Analysis of Vitamins



Columns: (A) TSKgel ODS-100V (4.6 mm ID x 15 cm L)
(B) TSKgel ODS-100Z (4.6 mm ID x 15 cm L);
Eluent: (A) 0.1% TFA in H_2O; (B) 0.1 % TFA in ACN,
Gradient: 0 min (B: 0%) - 20 min (B: 40%) - 22 min (B: 100%) - 50 min (B: 100%);
Flow rate: 1.0 mL/min.; Temp.: 40°C; Detection: UV@280nm;
Inj. volume: 5 µL; 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 acetateA)

APPLICATIONS OF TSKgel ODS-100V /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

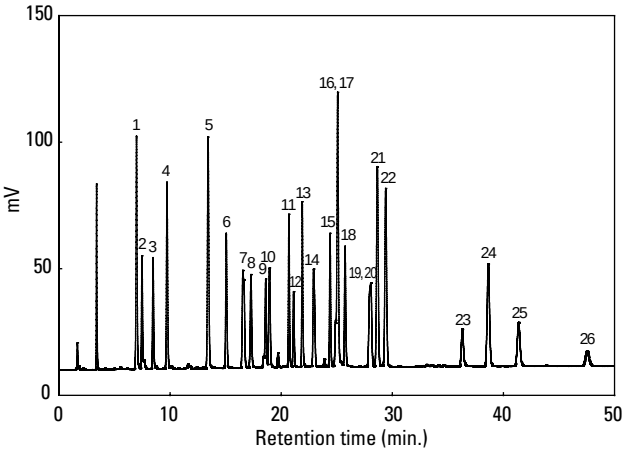
A baseline separation of 26 well known polymer additives is shown in FIGURE 4. Note that while a simple linear acetonitrile gradient was used, the column temperature was increased to 50°C to achieve the required baseline separation on a TSKgel ODS-100V column.

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.

FIGURE 4

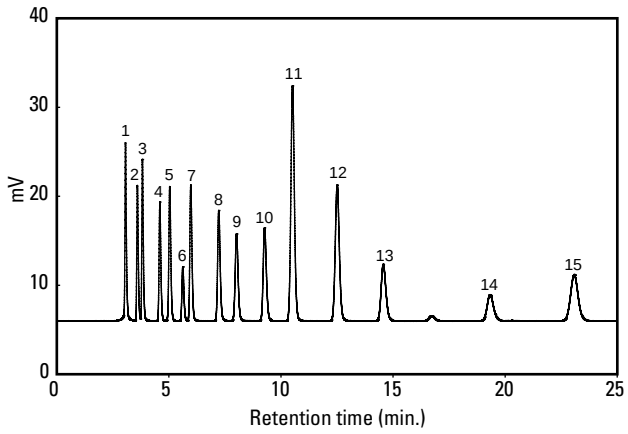
Analysis of Polymer Additives with TSKgel ODS-100V



Column: TSKgel ODS-100V (4.6mm ID × 15 cm L);
Mobile phases: (A) H_2O (B) ACN; Gradient: 0 min (B: 60%) - 20 min (B: 100%);
Flow rate: 1.0 mL/min; Temp: 50 °C; Detection: UV@225nm;
Inj. Volume: 10 µL; Concentration: 10 mg/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 168050100

FIGURE 3

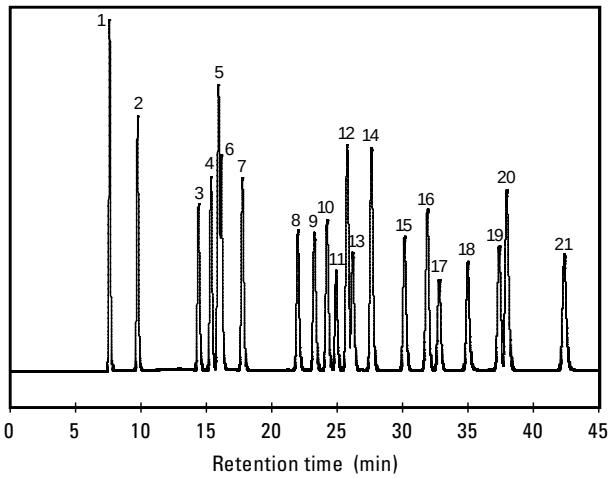
Analysis of Organic Acids with TSKgel ODS-100V



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

FIGURE 5

Analysis of Nucleotices with TSKgel ODS-100V



Column: TSKgel ODS-100V (4.6 mm ID × 25 cm L)
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: 1.0 mL/min; Temp: 25 °C; Detection: UV@260nm; Inj. Volume: 2µL; Concentration: 0.3 g/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

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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 (MPa)
TSKgel Stainless steel columns								
21838	ODS-100V, 100 Å	1.0	3.5	3	≥ 2,900	0.02 - 0.05	0.22	15.0
21839	ODS-100V, 100 Å	1.0	5.0	3	≥ 4,500	0.02 - 0.05	0.22	15.0
21814	ODS-100V, 100 Å, pk 3*	2.0	1.0	3	≥ 500		0.22	30.0
22700	ODS-100V, 100 Å	2.0	2.0	3	≥ 1,500			12.0
21813	ODS-100V, 100 Å	2.0	3.5	3	≥ 4,000	0.15 - 0.18	0.22	15.0
21812	ODS-100V, 100 Å	2.0	5.0	3	≥ 5,700	0.15 - 0.18	0.22	15.0
21811	ODS-100V, 100 Å	2.0	7.5	3	≥ 8,600	0.15 - 0.18	0.22	21.0
21938	ODS-100V, 100 Å	2.0	10.0	3	≥ 11,500	0.15 - 0.18	0.22	24.0
21810	ODS-100V, 100 Å	2.0	15.0	3	≥ 17,500	0.15 - 0.18	0.22	25.0
22701	ODS-100V, 100 Å	2.0	25.0	3	≥ 28,000			30.0
22702	ODS-100V, 100 Å	3.0	2.0	3	≥ 2,000			12.0
22703	ODS-100V, 100 Å	3.0	3.5	3	≥ 4,000			12.0
21842	ODS-100V, 100 Å	3.0	5.0	3	≥ 6,000			15.0
21843	ODS-100V, 100 Å	3.0	7.5	3	≥ 9,000			21.0
21939	ODS-100V, 100 Å	3.0	10.0	3	≥ 12,000			24.0
21844	ODS-100V, 100 Å	3.0	15.0	3	≥ 18,000			24.0
22704	ODS-100V, 100 Å	3.0	25.0	3	≥ 29,000			30.0
22705	ODS-100V, 100 Å	4.6	2.0	3	≥ 2,500			12.0
22706	ODS-100V, 100 Å	4.6	3.5	3	≥ 4,500			12.0
21831	ODS-100V, 100 Å	4.6	5.0	3	≥ 6,500	0.7 - 1.0	1.2	15.0
21830	ODS-100V, 100 Å	4.6	7.5	3	≥ 9,750	0.7 - 1.0	1.2	21.0
21940	ODS-100V, 100 Å	4.6	10.0	3	≥ 13,500	0.7 - 1.0	1.2	24.0
21829	ODS-100V, 100 Å	4.6	15.0	3	≥ 19,500	0.7 - 1.0	1.2	24.0
22707	ODS-100V, 100 Å	4.6	25.0	3	≥ 30,000			30.0
21457	ODS-100V, 100 Å	2.0	5.0	5	≥ 3,000	0.15 - 0.18	0.22	18.0
22708	ODS-100V, 100 Å, pk 3*	2.0	1.0	5	≥ 300			28.0
22709	ODS-100V, 100 Å	2.0	2.0	5	≥ 1,000			9.0
22710	ODS-100V, 100 Å	2.0	3.5	5	≥ 2,500			9.0
22711	ODS-100V, 100 Å	2.0	7.5	5	≥ 5,500			18.0
22712	ODS-100V, 100 Å	2.0	10.0	5	≥ 7,000			18.0
21458	ODS-100V, 100 Å	2.0	15.0	5	≥ 11,000	0.15 - 0.18	0.22	18.0
22713	ODS-100V, 100 Å	2.0	25.0	5	≥ 18,000			18.0
22714	ODS-100V, 100 Å	3.0	2.0	5	≥ 1,000			9.0
22715	ODS-100V, 100 Å	3.0	3.5	5	≥ 3,000			9.0
22716	ODS-100V, 100 Å	3.0	5.0	5	≥ 4,000			12.0
22717	ODS-100V, 100 Å	3.0	7.5	5	≥ 6,000			18.0
22718	ODS-100V, 100 Å	3.0	10.0	5	≥ 8,500			18.0
22719	ODS-100V, 100 Å	3.0	15.0	5	≥ 13,000			18.0
22720	ODS-100V, 100 Å	3.0	25.0	5	≥ 21,000			18.0
22721	ODS-100V, 100 Å	4.6	2.0	5	≥ 1,500			9.0
22722	ODS-100V, 100 Å	4.6	3.5	5	≥ 3,000			9.0
22723	ODS-100V, 100 Å	4.6	5.0	5	≥ 4,500			12.0
22724	ODS-100V, 100 Å	4.6	7.5	5	≥ 7,000			18.0
22725	ODS-100V, 100 Å	4.6	10.0	5	≥ 9,000			18.0
21455	ODS-100V, 100 Å	4.6	15.0	5	≥ 14,000	0.7 - 1.0	1.2	18.0
21456	ODS-100V, 100 Å	4.6	25.0	5	≥ 23,000	0.7 - 1.0	1.2	21.0
22726	ODS-100Z, 100 Å, pk 3*	2.0	1.0	3	≥ 500			30.0
22727	ODS-100Z, 100 Å	2.0	2.0	3	≥ 1,500			12.0

*needs cartridge holder

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 (MPa)
22728	ODS-100Z, 100 Å	2.0	3.5	3	≥ 4,000			15.0
22729	ODS-100Z, 100 Å	2.0	5.0	3	≥ 5,700			15.0
22730	ODS-100Z, 100 Å	2.0	7.5	3	≥ 8,600			21.0
22731	ODS-100Z, 100 Å	2.0	10.0	3	≥ 11,500			24.0
22732	ODS-100Z, 100 Å	2.0	15.0	3	≥ 17,500			24.0
22733	ODS-100Z, 100 Å	2.0	25.0	3	≥ 28,000			30.0
22734	ODS-100Z, 100 Å	3.0	2.0	3	≥ 2,000			12.0
22735	ODS-100Z, 100 Å	3.0	3.5	3	≥ 4,000			12.0
22736	ODS-100Z, 100 Å	3.0	5.0	3	≥ 6,000			15.0
22737	ODS-100Z, 100 Å	3.0	7.5	3	≥ 9,000			21.0
22738	ODS-100Z, 100 Å	3.0	10.0	3	≥ 12,000			24.0
22739	ODS-100Z, 100 Å	3.0	15.0	3	≥ 18,000			24.0
22740	ODS-100Z, 100 Å	3.0	25.0	3	≥ 29,000			30.0
22741	ODS-100Z, 100 Å	4.6	2.0	3	≥ 2,500			12.0
22742	ODS-100Z, 100 Å	4.6	3.5	3	≥ 4,500			12.0
22743	ODS-100Z, 100 Å	4.6	5.0	3	≥ 6,500			15.0
22744	ODS-100Z, 100 Å	4.6	7.5	3	≥ 9,750			21.0
22745	ODS-100Z, 100 Å	4.6	10.0	3	≥ 13,500			24.0
22746	ODS-100Z, 100 Å	4.6	15.0	3	≥ 19,500			24.0
22747	ODS-100Z, 100 Å	4.6	25.0	3	≥ 30,000			30.0
22748	ODS-100Z, 100 Å, pk 3*	2.0	1.0	5	≥ 300			28.0
22749	ODS-100Z, 100 Å	2.0	2.0	5	≥ 1,000			9.0
22750	ODS-100Z, 100 Å	2.0	3.5	5	≥ 2,500			9.0
21460	ODS-100Z, 100 Å	2.0	5.0	5	≥ 3,000	0.15 - 0.18	0.22	18.0
22751	ODS-100Z, 100 Å	2.0	7.5	5	≥ 5,500			18.0
22752	ODS-100Z, 100 Å	2.0	10.0	5	≥ 7,000			18.0
21459	ODS-100Z, 100 Å	2.0	15.0	5	≥ 11,000	0.15 - 0.18	0.22	18.0
22753	ODS-100Z, 100 Å	2.0	25.0	5	≥ 18,000			18.0
22754	ODS-100Z, 100 Å	3.0	2.0	5	≥ 1,200			9.0
22755	ODS-100Z, 100 Å	3.0	3.5	5	≥ 3,000			9.0
22756	ODS-100Z, 100 Å	3.0	5.0	5	≥ 4,000			12.0
22757	ODS-100Z, 100 Å	3.0	7.5	5	≥ 6,000			18.0
22758	ODS-100Z, 100 Å	3.0	10.0	5	≥ 8,500			18.0
22759	ODS-100Z, 100 Å	3.0	15.0	5	≥ 13,000			18.0
22760	ODS-100Z, 100 Å	3.0	25.0	5	≥ 21,000			18.0
22761	ODS-100Z, 100 Å	4.6	2.0	5	≥ 1,500			9.0
22762	ODS-100Z, 100 Å	4.6	3.5	5	≥ 3,000			9.0
22763	ODS-100Z, 100 Å	4.6	5.0	5	≥ 4,500			12.0
22764	ODS-100Z, 100 Å	4.6	7.5	5	≥ 7,000			18.0
22765	ODS-100Z, 100 Å	4.6	10.0	5	≥ 9,000			18.0
21461	ODS-100Z, 100 Å	4.6	15.0	5	≥ 14,000	0.7 - 1.0	1.2	18.0
21462	ODS-100Z, 100 Å	4.6	25.0	5	≥ 23,000	0.7 - 1.0	1.2	21.0

TSKgel Guard column products

21997	ODS-100V Guardgel Cartridge, pk 3*	2.0	1.0	3	For all 3 µm ODS-100V 2 & 3 mm ID columns
21453	ODS-100V Guard Cartridge, pk 3*	3.2	1.5	5	For all ODS-100V 4.6 mm ID columns
21841	ODS-100V Guard Cartridge, pk 3*	2.0	1.0	5	For all 5 µm ODS-100V 2 & 3 mm ID columns
21454	ODS-100Z Guard Cartridge, pk 3*	3.2	1.5	5	For all ODS-100Z 4.6 mm ID columns
21996	ODS-100Z Guardgel Cartridge, pk 3*	2.0	1.0	3	For all 3 µm ODS-100Z 2 & 3 mm ID columns
21995	ODS-100Z Guardgel Cartridge, pk 3*	2.0	1.0	5	For all 5 µm ODS-100Z 2 & 3 mm ID columns

*needs cartridge holder

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 RP COLUMNS TSKgel 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

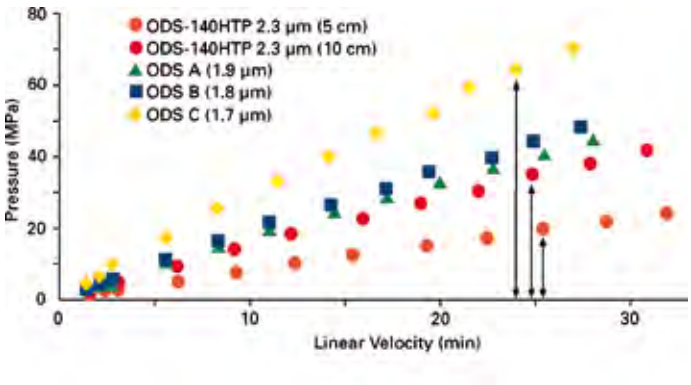
TSKgel ODS-140HTP columns were developed for use in high throughput applications, including drug discovery, pharmacokinetics and peptide digest separations. They are packed with 2.3 µm particles, providing high resolution and short analysis times at moderate pressure. The lower pressure drop reduces the burden on the hardware, allowing TSKgel ODS-140 HTP columns to be used with either UHPLC or conventional HPLC systems. The backpressure of this columns is less than half of the pressure of a sub-2 µm column of the same dimensions (FIGURE 6).

APPLICATIONS

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 7.

FIGURE 6

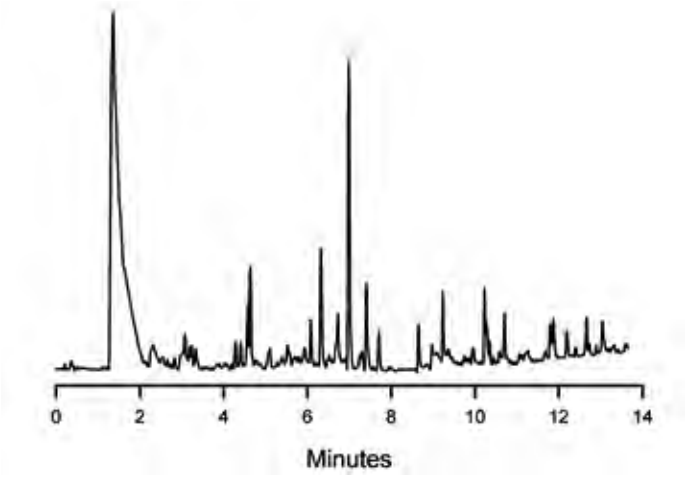
Column Backpressure versus Particle Size



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_2CN - 50/50

FIGURE 7

Analysis of Crinum Latifolium



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)*	*Number theoretical plates*	*Maximum pressure drop (MPa)*
TSKgel Stainless steel columns							
21927	TSKgel ODS-140HTP	2.1	5.0	2.3	140	≥ 7,000	60.0
21928	TSKgel ODS-140HTP	2.1	10.0	2.3	140	≥ 14,000	60.0

FAST RP COLUMNS TSKgel SUPER-ODS / SUPER-OCTYL / SUPER PHENYL

HIGHLIGHTS

- The silica particles used in Super series columns are monodisperse spherical 2.3 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

APPLICATIONS

TSKgel SUPER-ODS, SUPER-OCTYL, SUPER-PHENYL

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

OPTIMIZING RESULTS WITH FAST RP 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 UHPLC system.

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.

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 (MPa)*
TSKgel Stainless Steel Columns								
20015	Super-ODS, 110 Å	1.0	5.0	2.3	≥ 15,000	0.03 - 0.05	0.06	15.0
19541	Super-ODS, 110 Å	2.0	5.0	2.3	≥ 6,000	0.15 - 0.2	0.25	25.0
19542	Super-ODS, 110 Å	2.0	10.0	2.3	≥ 12,000	0.15 - 0.2	0.25	25.0
18154	Super-ODS, 110 Å	4.6	5.0	2.3	≥ 8,000	1.0 - 2.5	4.0	30.0
18197	Super-ODS, 110 Å	4.6	10.0	2.3	≥ 16,000	1.0 - 2.5	4.0	30.0
20013	Super-Octyl, 110 Å	2.0	5.0	2.3	≥ 15,000	0.15 - 0.20	0.25	15.0
20014	Super-Octyl, 110 Å	2.0	10.0	2.3	≥ 1,500	0.15 - 0.20	0.25	30.0
18275	Super-Octyl, 110 Å	4.6	5.0	2.3	≥ 8,000	1.0 - 2.5	4.0	30.0
18276	Super-Octyl, 110 Å	4.6	10.0	2.3	≥ 16,000	1.0 - 2.5	4.0	30.0
20017	Super-Phenyl, 110 Å	2.0	5.0	2.3	≥ 3,000	0.15 - 0.20	0.25	8.0
20018	Super-Phenyl, 110 Å	2.0	10.0	2.3	≥ 6,000	0.15 - 0.20	0.25	15.0
18277	Super-Phenyl, 110 Å	4.6	5.0	2.3	≥ 8,000	1.0 - 2.5	4.0	30.0
18278	Super-Phenyl, 110 Å	4.6	10.0	2.3	≥ 16,000	1.0 - 2.5	4.0	30.0
Guard column products								
19672	Guard cartridge, pk 3*	2.0	1.0	2.3	For 2 mm ID Super-ODS columns			
19308	Cartridge holder				For P/N 19672			
18207	Guard filter, pk 3*	4.0	0.4		For 4.6 mm ID columns (Super-ODS, -Octyl, -Phenyl)			
18206	Guard filter holder				For P/N 18207			

*needs cartridge holder

RPC

RP COLUMNS FOR BIOMOLECULES TSKgel OLIGODNA RP / TMS-250

HIGHLIGHTS

- TSKgel OligoDNA RP and TSKgel TMS-250 both incorporate 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

TSKgel OLIGODNA RP

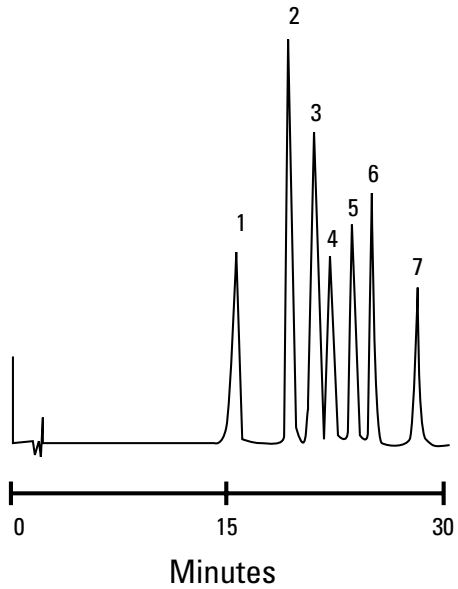
- Ideal for the purification and analysis of oligonucleotides (up to 500-mer), RNAs, and DNA fragments
- Possesses high-resolving power for octamers of similar sequence
- Proteins exhibit sharp peaks relative to wide pore C8 or C18 columns

TSKgel TMS-250

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

FIGURE 8

High Resolution Protein Separation on TSKgel TMS-250



Column: TSKgel TMS-250, 4.6 mm ID x 7.5 cm L;
Sample: 5 µg each of: 1. ribonuclease A, 2. cytochrome C, 3. lysozyme, 4. bovine serum albumin, 5. aldolase, 6. carbonic anhydrase, 7. ovalbumin;
Elution: 60 min (TMS-250) linear gradient from 20% to 95% CH_3CN in 0.05% TFA, pH 2.2; Flow Rate: 0.61 mL/min; Detection: UV@220 nm

ORDERING INFORMATION

Part #	*Description*	*ID (mm)*	*Length (cm)*	*Particle size (µm)*	*Number theoretical plates*	*Flow rate (mL/min) Range*	*Max.*	*Maximum pressure drop (MPa)*
TSKgel Stainless Steel Columns								
13352	OligoDNA RP, 250 Å	4.6	15.0	5	7,000	0.6 - 1.0	1.2	12.0
13353	OligoDNA RP, 250 Å	7.8	15.0	5	7,000	2.0 - 3.0	3.2	12.0
07190	TMS-250, 250 Å	4.6	7.5	10	1,500	0.5 - 0.8	1.0	2.0

POLYMER BASED RP COLUMNS TSKgel OCTADECYL-NPR / -2PW / -4PW/ -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 columns can be cleaned and impurities removed by using either strong acid or base.
- Non-porous resins (NPR) or porous resins of various pore sizes available. Column selection is 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 with 5 µm particle size and 125 Å pores size.
- TSKgel Octadecyl-4PW with 7 µm particle size and 500 Å pores size.
- TSKgel Phenyl-5PW with 10 µm particle size and 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

TSKgel OCTADECYL-NPR

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

TSKgel OCTADECYL-2PW

- For analyzing small MW pharmaceutical compounds at basic pH
- Faster analysis than competitive polymeric RPC columns

TSKgel OCTADECYL-4PW

- Recommended for peptides and small proteins

TSKgel PHENYL-5PW RP

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

ORDERING INFORMATION

Part #	*Description*	*ID (mm)*	*Length (cm)*	*Particle size (µm)*	*Number theoretical plates*	*Flow rate (mL/min) Range*	*Max.*	*Maximum pressure drop (MPa)*
TSKgel Stainless Steel Columns								
14005	Octadecyl-NPR nonporous	4.6	3.5	2.5	≥ 1,000	1.0 - 1.5	1.6	20.0
18754	Octadecyl-2PW, (100 - 200 Å)	2.0	15.0	5	≥ 5,000	0.07 - 0.11	0.14	7.0
17500	Octadecyl-2PW, (100 - 200 Å)	4.6	15.0	5	≥ 6,000	0.4 - 0.6	1.2	10.0
17501	Octadecyl-2PW, (100 - 200 Å)	6.0	15.0	5	≥ 6,000	0.5 - 1.0	1.5	10.0
18755	Octadecyl-4PW, 500 Å	2.0	15.0	7	≥ 2,000	0.08 - 0.17	0.22	10.0
13351	Octadecyl-4PW, 500 Å	4.6	15.0	7	≥ 2,000	0.5 - 1.0	1.2	12.0
16257	Octadecyl-4PW, 500 Å	21.5	15.0	13	≥ 2,000	3.0 - 6.0	8.0	3.5
18756	Phenyl-5PW RP, 1000 Å	2.0	7.5	10	≥ 400	0.05 - 0.1	0.12	1.0
08043	Phenyl-5PW RP, 1000 Å	4.6	7.5	10	≥ 500	0.5 - 1.0	1.2	3.0
16260	Phenyl-5PW RP, 1000 Å	21.5	15.0	13	≥ 1,000	6.0 - 8.0	8.0	3.0
Glass columns								
14007	Phenyl-5PW RP Glass, 1000 Å	8.0	7.5	10	≥ 700	1.0 - 2.0		2.0
Guard column products								
19007	Phenyl-5PW RP Cartridge, pk 3 *	3.2	1.5	10	For P/N 08043			
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			
19008	Octadecyl-4PW Cartridge, pk 3 *	3.2	1.5	7	For P/N 13351			
19308	Guard cartridge holder	2.0	1.0		For all 2 mm ID cartridges			
19018	Guard cartridge holder	3.2	1.5		For 4.6 mm ID Octadecyl 4-PW and Phenyl-5PW RP columns			

*needs cartridge holder

RPC

TRADITIONAL RP COLUMNS TSKgel ODS-80Ts / ODS-80TM / OCTYL-80Ts / CN-80Ts

HIGHLIGHTS

- ODS-80 is prepared from spherical silica with 80 Å pores
- Monomeric-bonded phase chemistry for optimal lot-to-lot reproducibility
- 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

APPLICATIONS

TSKgel 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

TSKgel 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

TSKgel Octyl-80Ts

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

TSKgel 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

TRADITIONAL RP COLUMNS TSKgel ODS-120A - TSKgel 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

TSKgel 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

TSKgel ODS-120T

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

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 (MPa)
TSKgel Stainless Steel Columns								
18150	ODS-80Ts, 80 Å	2.0	15.0	5	≥ 11,000	0.15 - 0.18	0.22	20.0
18151	ODS-80Ts, 80 Å	2.0	25.0	5	≥ 18,000	0.15 - 0.18	0.22	30.0
17200	ODS-80Ts, 80 Å	4.6	7.5	5	≥ 4,500	0.8 - 1.0	1.2	10.0
17201	ODS-80Ts, 80 Å	4.6	15.0	5	≥ 11,000	0.8 - 1.0	1.2	20.0
17202	ODS-80Ts, 80 Å	4.6	25.0	5	≥ 18,000	0.8 - 1.0	1.2	30.0
17380	ODS-80Ts, 80 Å	21.5	30.0	10	≥ 6,000	4.0 - 6.0	12.0	6.0
16651	ODS-80TM, 80 Å	4.6	7.5	5	≥ 4,500	0.8 - 1.0	1.2	10.0
08148	ODS-80TM, 80 Å	4.6	15.0	5	≥ 11,000	0.8 - 1.0	1.2	20.0
08149	ODS-80TM, 80 Å	4.6	25.0	5	≥ 18,000	0.8 - 1.0	1.2	30.0
14002	ODS-80TM, 80 Å	21.5	30.0	10	≥ 6,000	4.0 - 6.0	12.0	6.0
17344	Octyl-80Ts, 80 Å	4.6	15.0	5	≥ 11,000	0.8 - 1.0	1.2	20.0
17345	Octyl-80Ts, 80 Å	4.6	25.0	5	≥ 18,000	0.8 - 1.0	1.2	30.0
17348	CN-80Ts, 80 Å	4.6	15.0	5	≥ 11,000	0.8 - 1.0	1.2	20.0
17349	CN-80Ts, 80 Å	4.6	25.0	5	≥ 18,000	0.8 - 1.0	1.2	30.0
Guard column products								
19325	ODS-80Ts Guard cartridge, pk 3 *	2.0	1.0	5	For all 2 mm ID ODS-80Ts / ODS-120T columns			
19011	ODS-80Ts Guard cartridge, pk 3 *	3.2	1.5	5	For all 4.6 mm ID ODS-80Ts columns			
19012	Octyl-80Ts Guard cartridge, pk 3 *	3.2	1.5	5	For all 4.6 mm ID ODS-80Ts columns			
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 *	3.2	1.5	5	For 4.6 mm ID ODS-80TM columns			
19013	CN-80Ts Guard cartridge, pk 3 *	3.2	1.5	5	For 4.6 mm ID CN-80Ts columns			
TSKgel Stainless steel columns								
07636	ODS-120A, 120 Å	4.6	15.0	5	≥ 7,000	0.8 - 1.0	1.2	15.0
07124	ODS-120A, 120 Å	4.6	25.0	5	≥ 10,000	0.8 - 1.0	1.2	20.0
07129	ODS-120A, 120 Å	7.8	30.0	10	≥ 6,000	1.0 - 2.0	3.0	7.5
06172	ODS-120A, 120 Å	21.5	30.0	10	≥ 6,000	4.0 - 6.0	12.0	6.0
18152	ODS-120T, 120 Å	2.0	15.0	5	≥ 6,500	0.15 - 0.18	0.22	15.0
18153	ODS-120T, 120 Å	2.0	25.0	5	≥ 10,000	0.15 - 0.18	0.22	20.0
07637	ODS-120T, 120 Å	4.6	15.0	5	≥ 7,000	0.8 - 1.0	1.2	15.0
07125	ODS-120T, 120 Å	4.6	25.0	5	≥ 10,000	0.8 - 1.0	1.2	20.0
07130	ODS-120T, 120 Å	7.8	30.0	10	≥ 6,000	1.0 - 2.0	3.0	7.5
07134	ODS-120T, 120 Å	21.5	30.0	10	≥ 6,000	3.0 - 6.0	12.0	6.0
Guard column products								
19006	ODS-120T Guard cartridge, pk 3 *	3.2	1.5	5	For all 4.6 mm ID ODS-120T columns			
19005	ODS-120A Guard cartridge, pk 3*	3.2	1.5	5	For 4.6 mm ID ODS-120T columns			
19018	Guard cartridge holder	3.2	1.5		For 3.2 mm ID cartridges			
19308	Guard cartridge holder	2.0	1.5		For all 2 mm ID Guard columns			

*needs cartridge holder

RPC

TOSOH

TSK-GEL REVERSED PHASE COLUMNS

TOSOH BIOSCIENCE

For more information about our RPC columns, please request our RPC brochure

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