Normal Phase Columns

MZ ANALYSENTECHNIK

AUTHORIZED DISTRIBUTOR

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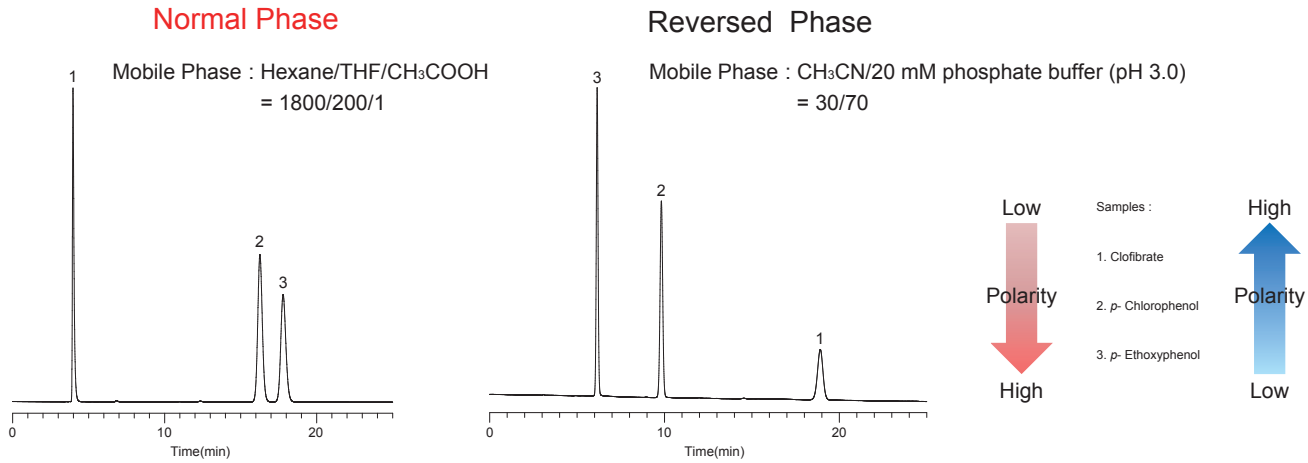
About Normal Phase Columns

Comparison of Reversed Phase and Normal Phase



Conditions

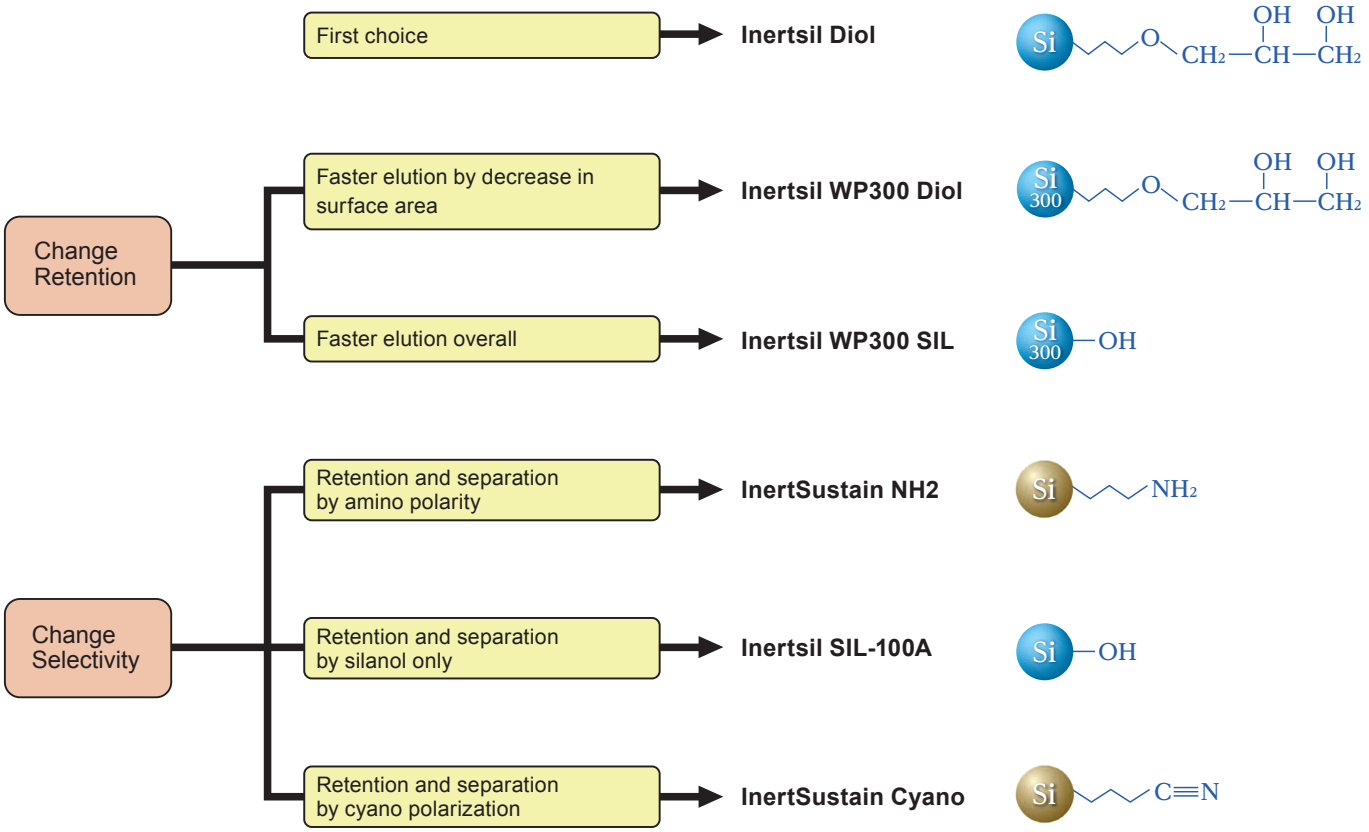
Column : Inertsil CN-3 (5 µm, 250 × 4.6 mm I.D.)
Flow Rate : 1.0 mL/min
Detection : UV 275 nm

GL Sciences has Variety Normal Phase Columns, You Can Choose a Proper One for Your Applications

Column	Feature	Particle size (µm)	Pore Size (nm)	Surface area (m^2/g)	Carbon Loading (%)	Recommended operating pH range
Inertsil Diol	First choice of normal phase column (also can use as SEC)	3, 5	10	450	20	2 - 7.5
Inertsil SIL-100A	High purity silica gel column with pore size 100 Å	3, 5	10	450	—	2 - 7.5
InertSustain NH2	Weak retentivity amino column	3, 5	10	350	7	2 - 7.5
Inertsil NH2	Strong retentivity amino column	3, 5	10	450	8	2 - 7.5
InertSustain Cyano	Super inertness and also can use as a reversed phase column	3, 5	10	350	8	2 - 7.5
Inertsil CN-3	Strong retentivity cyano column	3, 5	10	450	14	2 - 7.5
Inertsil SIL-150A	High purity silica gel column with pore size 150 Å	5	15	320	—	2 - 7.5
Inertsil WP300 SIL	High purity silica gel column with pore size 300 Å	5	30	150	—	2 - 7.5

Normal Phase Column Selection Guide

Molecular Weight < 5,000 Samples on Normal Phase Mode



Solvents used in Normal Phase mode

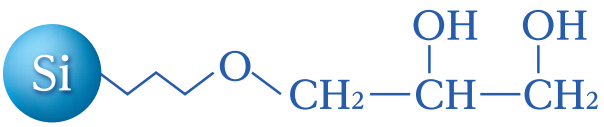
The solvents used in normal phase mode generally combine hexane and ethanol, although in some cases, less polar solvent such like propanol or ethyl acetate also used instead of ethanol. It is necessary to select the solvent according to the retention strength of the target components.

Shipping Solvents of Normal Phase Columns

Columns	Shipping Solvents
Inertsil Diol	*n* - Hexane/Ethanol = 95/5, v/v
Inertsil SIL-100A	
Inertsil SIL-150A	
Inertsil WP300 SIL	
InertSustain NH2	*n* - Hexane/Ethanol = 98/2, v/v
Inertsil NH2	
Inertsil CN-3	
InertSustain Cyano	Acetonitrile/Water = 50/50, v/v

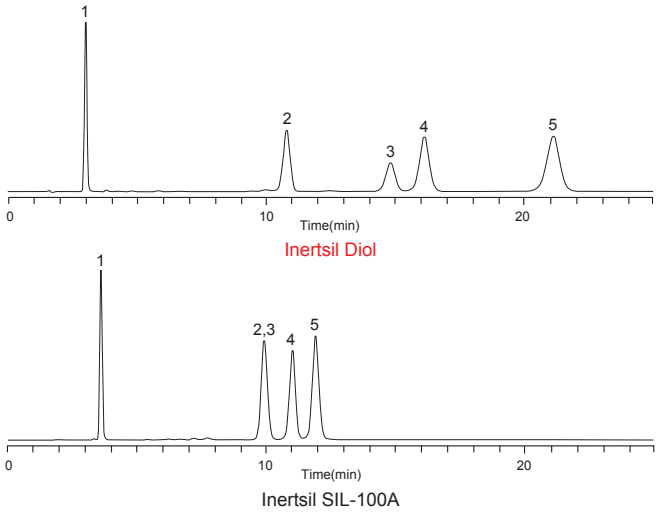
Inertsil Diol

- **Base Material** : 3 Series High Purity Silica Gel
- **Particle Size** : 3 µm, 5 µm
- **Surface Area** : 450 m^2/g
- **Pore Size** : 100 Å (10 nm)
- **Pore Volume** : 1.05 mL/g
- **Functional Group** : Diol (Dihydroxypropyl Groups)
- **End-capping** : No
- **Carbon Loading** : 20 %
- **USP Code** : L20
- **pH Range** : 2 - 7.5



Inertsil Diol has characteristics of dihydroxypropyl group bonded phase. It shows unique selectivity normal phase mode.
The separation mechanism of diol column is featured by hydrogen bonding interactions between diol groups and polar compounds. Diol columns provide an alternative selectivity to silica columns often with increased retentivity.
Figure 1, selectivities of Inertsil Diol and Inertsil SIL-100A(a pure Silica gel column) are compared. Inertsil Diol shows higher selectivity for those compounds.
Figure 2, 9 compounds are eluted by Inertsil Diol and other normal phase columns of “Inertsil series”. By comparing their retention times of each compound, it is noticeable that Inertsil Diol provides stable retention for all of the compounds, including basic and acidic compounds. As non-specific adsorption of water is reduced, Inertsil Diol can be washed by 100 % water eluent.

Figure 1 : Comparison of Selectivity between Diol Column and Silica Column



Conditions

Column Size : 5 µm, 150 × 4.6 mm I.D.
Eluent : A) *n*-Hexane
B) Ethanol
A/B = 85/15, v/v
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Detection : UV 254 nm

Sample :

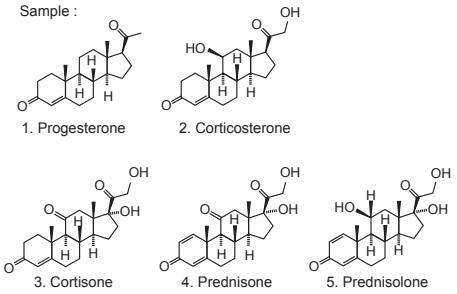
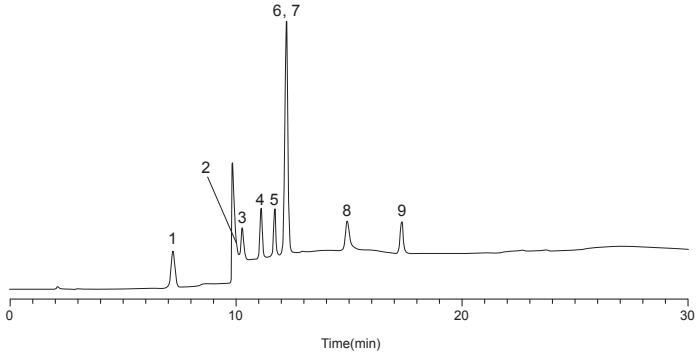
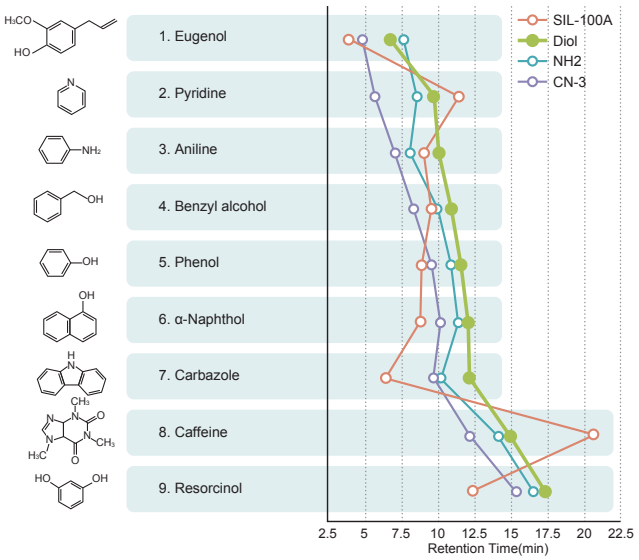


Figure 2 : Selectivity of Inertsil Diol

Conditions

Column : Inertsil Diol (5 µm, 150 × 3.0 mm I.D.)
Eluent : A) *n*-Hexane/Ethanol = 100/1, v/v
B) Ethanol
A/B = 100/0 – 30 min – 25/75, v/v
Flow Rate : 0.4 mL/min
Col. Temp. : 40 °C
Detection : UV 215 nm





Analytical Columns

Particle Size: 3 µm	Length \ I.D. (mm)	1.0	1.5		
	33	5020-86531	5020-86541		
	50	5020-86532	5020-86542		
	75	5020-86533	5020-86543		
	100	5020-86534	5020-86544		
	150	5020-86535	5020-86545		
	250	5020-86536	5020-86546		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-05411	5020-05421	5020-05431	5020-05441
	50	5020-05412	5020-05422	5020-05432	5020-05442
	75	5020-05413	5020-05423	5020-05433	5020-05443
	100	5020-05414	5020-05424	5020-05434	5020-05444
	150	5020-05415	5020-05425	5020-05435	5020-05445
	250	5020-05416	5020-05426	5020-05436	5020-05446
Particle Size: 5 µm	Length \ I.D. (mm)	1.0	1.5		
	33	5020-86511	5020-86521		
	50	5020-86512	5020-86522		
	75	5020-86513	5020-86523		
	100	5020-86514	5020-86524		
	150	5020-86515	5020-86525		
	250	5020-86516	5020-86526		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-05611	5020-05621	5020-05631	5020-05641
	50	5020-05612	5020-05622	5020-05632	5020-05642
	75	5020-05613	5020-05623	5020-05633	5020-05643
	100	5020-05614	5020-05624	5020-05634	5020-05644
	150	5020-05615	5020-05625	5020-05635	5020-05645
	250	5020-05616	5020-05626	5020-05636	5020-05646

Cartridge Guard Column E

I.D. of the Analytical Column Applicable (mm)	Length (mm)	I.D. (mm)	Replacement Cartridge E Guard Column (2 pcs)		Cartridge E Holder / Cartridge Set (2 Cartridge E Guard Columns & 1 Holder)	
			Particle Size		Particle Size	
			3 µm	5 µm	3 µm	5 µm
1.0	10	1.0	5020-19223	5020-19222	5020-19273	5020-19272
1.5, 2.1		1.5	5020-19323	5020-19322	5020-19373	5020-19372
2.1, 3.0		3.0	5020-19123	5020-19122	5020-19173	5020-19172
4.0, 4.6		4.0	5020-19023	5020-19022	5020-19073	5020-19072
2.1, 3.0	20	3.0	5020-19523	5020-19522	5020-19573	5020-19572
4.0, 4.6		4.0	5020-19423	5020-19422	5020-19473	5020-19472
Holder for Cartridge Guard Column E				For 10 mm Length		5020-08500
				For 20 mm Length		5020-08550

Inertsil SIL-100A

- **Base Material** : 3 Series High Purity Silica Gel
- **Particle Size** : 3 µm, 5 µm
- **Surface Area** : 450 m^2/g
- **Pore Size** : 100 Å (10 nm)
- **Pore Volume** : 1.05 mL/g
- **Functional Group** : None
- **End-capping** : No
- **Carbon Loading** : - %
- **USP Code** : L3
- **pH Range** : 2 - 7.5

Inertsil SIL-100A is a pure silica gel column available in normal phase mode. Because of the high quality of its silica gel, Inertsil SIL-100A achievs separation with sharp peaks and provides high column-to-column reproducibility. This excellent silica gel ideally designed for HPLC is the basis for “Inertsil 3-series” of GL Scineces. GL Sciences is the first company which emphasized the importance of silica-gel purity and determined the nature of the silanol impurities in the Silica gel.
GL Sciences has established a successful manufacturing process for ultra pure silica gel with smooth and rigid surface. The SEM photos of Inertsil SIL-100A and other brands’ silica gel are shown as Figure 1. Particles of Inertsil SIL-100A stand out by the smooth surface, uniformity in size and spherical shape. From Figure 2, we can know as silanols on the sllica surface interact with basic compounds, Inertsil SIL-100A retains basic compounds strongly and acidic compounds weakly.

Figure 1 : SEM Photos of Inertsil SIL-100A and Other Brand Available Silica Gels

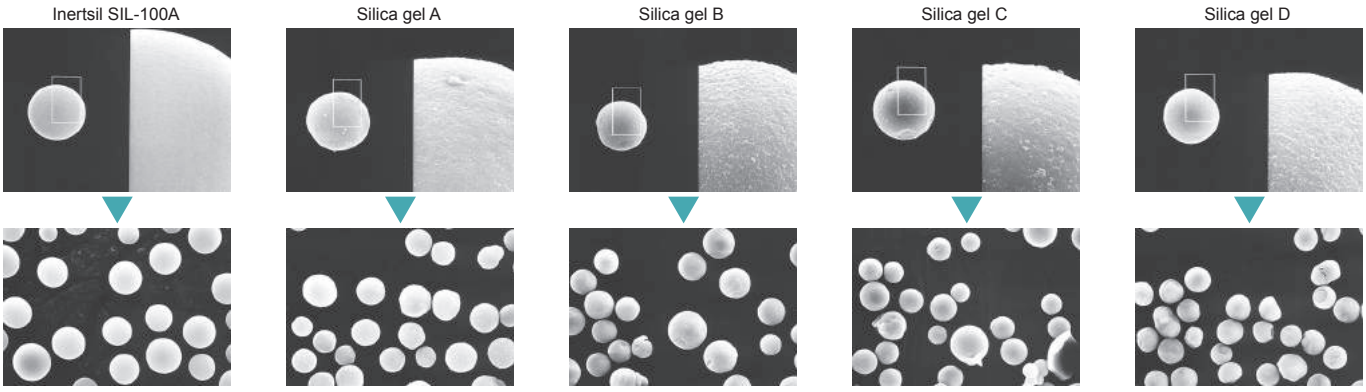
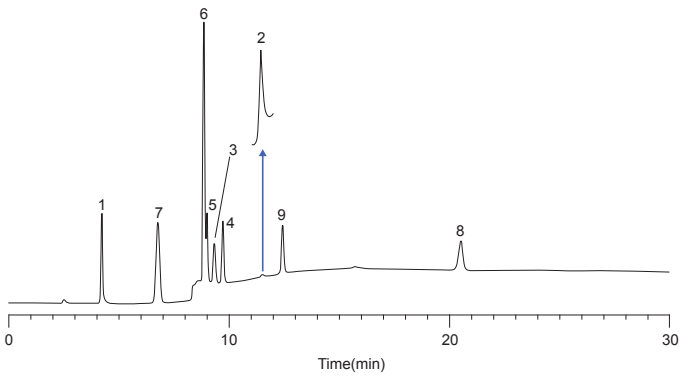
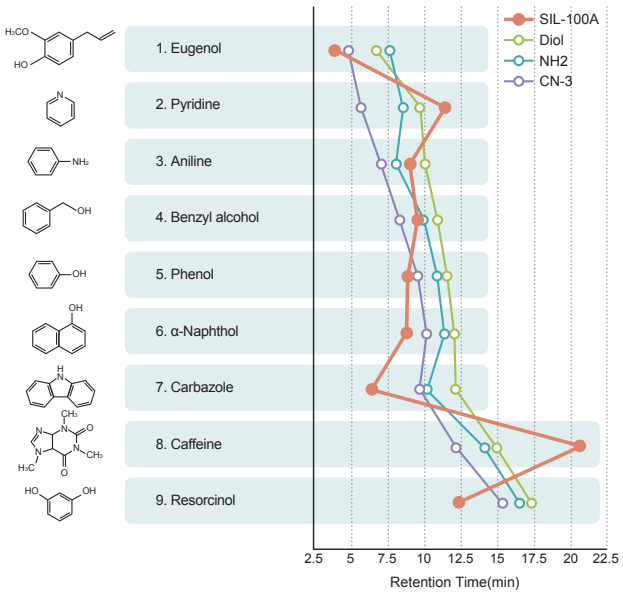


Figure 2 : Selectivity of Inertsil SIL-100A

Conditions
Column : Inertsil SIL-100A (5 µm, 150 × 3.0 mm I.D.)
Eluent : A) *n*-Hexane/Ethanol = 100/1, v/v
B) Ethanol
A/B = 100/0 – 30 min – 25/75, v/v
Flow Rate : 0.4 mL/min
Col. Temp. : 40 °C
Detection : UV 215 nm





Analytical Columns

	Length \ I.D. (mm)	1.0	1.5		
Particle Size: 3 µm	33	5020-84211	5020-84221		
	50	5020-84212	5020-84222		
	75	5020-84213	5020-84223		
	100	5020-84214	5020-84224		
	150	5020-13422	5020-13420		
	250	5020-	5020-		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-04211	5020-04221	5020-04231	5020-04241
	50	5020-04212	5020-04222	5020-04232	5020-04242
	75	5020-04213	5020-04223	5020-04233	5020-01700
	100	5020-04214	5020-04224	5020-01703	5020-04244
	150	5020-04215	5020-04225	5020-04235	5020-01701
	250	5020-04216	5020-04226	5020-04236	5020-01702
Particle Size: 5 µm	Length \ I.D. (mm)	1.0	1.5		
	33	5020-84311	5020-84321		
	50	5020-84312	5020-84322		
	75	5020-84313	5020-84323		
	100	5020-84314	5020-84324		
	150	5020-13412	5020-13410		
	250	5020-84316	5020-84326		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-04311	5020-04321	5020-04331	5020-04341
	50	5020-04312	5020-04322	5020-04332	5020-04342
	75	5020-04313	5020-04323	5020-04333	5020-04343
	100	5020-04314	5020-04324	5020-04334	5020-04344
	150	5020-04315	5020-04325	5020-04335	5020-01711
	250	5020-04316	5020-04326	5020-04336	5020-01712

Cartridge Guard Column E

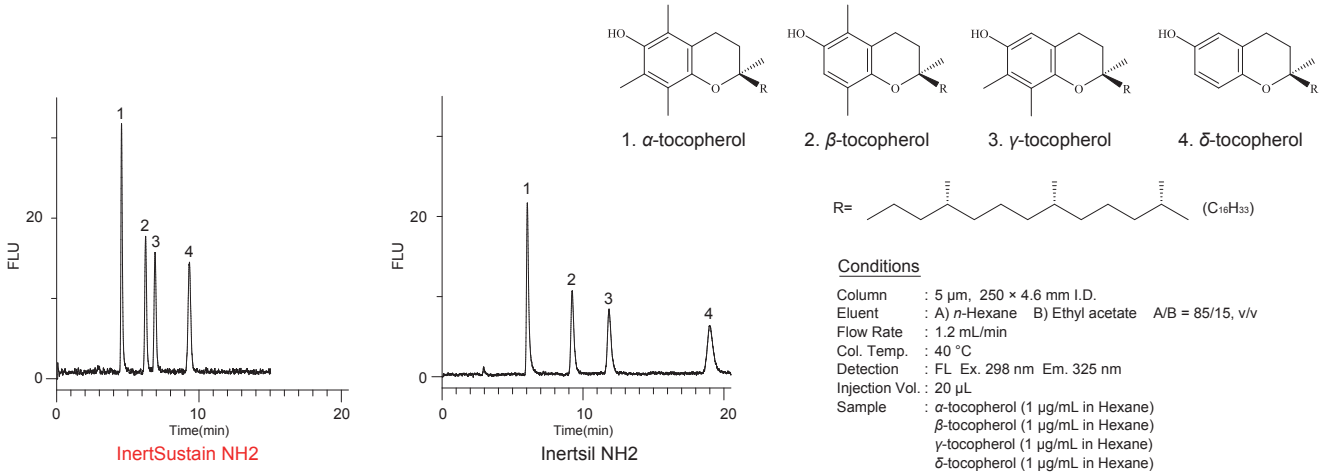
I.D. of the Analytical Column Applicable (mm)	Length (mm)	I.D. (mm)	Replacement Cartridge E Guard Column (2 pcs)		Cartridge E Holder / Cartridge Set (2 Cartridge E Guard Columns & 1 Holder)	
			Particle Size		Particle Size	
			3 µm	5 µm	3 µm	5 µm
1.0	10	1.0	5020-19227	5020-19226	5020-19277	5020-19276
1.5, 2.1		1.5	5020-19327	5020-19326	5020-19377	5020-19376
2.1, 3.0		3.0	5020-19127	5020-19126	5020-19177	5020-19176
4.0, 4.6		4.0	5020-19027	5020-19026	5020-19077	5020-19076
2.1, 3.0	20	3.0	5020-19527	5020-19526	5020-19577	5020-19576
4.0, 4.6		4.0	5020-19427	5020-19426	5020-19477	5020-19476
Holder for Cartridge Guard Column E				For 10 mm Length		5020-08500
				For 20 mm Length		5020-08550

InertSustain NH2

- **Base Material** : **High Purity ES Silica Gel**
- **Particle Size** : **3 µm, 5 µm**
- **Surface Area** : **350 m^2/g**
- **Pore Size** : **100 Å (10 nm)**
- **Pore Volume** : **0.85 mL/g**
- **Functional Group** : **Aminopropyl**
- **End-capping** : **No**
- **Carbon Loading** : **7 %**
- **USP Code** : **L8**
- **pH Range** : **2 - 7.5**

InertSustain NH2 is a newly developed ES silica column, compare to the other normal silica columns, InertSustain NH2 performs a sharp peaks, and high reproducible results with exceptional stability and durability that will maintain performance over the lifetime of the method. Also, InertSustain NH2 is an easily equilibrate column. Figure 2 is an analysis sample to show the equilibrate time of InertSustain NH2 column. Using a column was replaced with isopropanol, phthalic acid ester as the sample and measured the time until stabilized the analysis conditions. From the chromatogram we can know at the total flow time of 21 minutes of 4th injection, the column was stabled to be analyze.

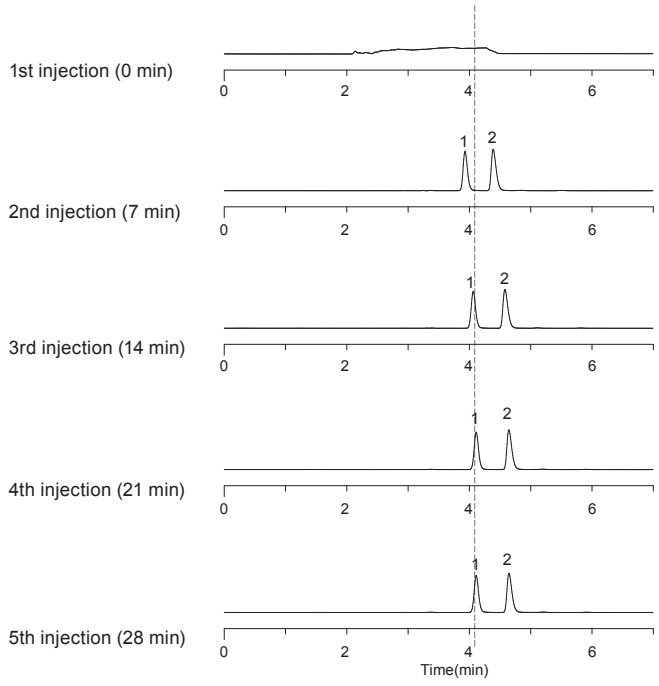
Figure 1 : Analysis of Vitamin E with InertSustain NH2 & Inertsil NH2 Column

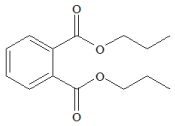


Conditions

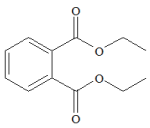
Column	: 5 µm, 250 × 4.6 mm I.D.
Eluent	: A) *n*-Hexane B) Ethyl acetate A/B = 85/15, v/v
Flow Rate	: 1.2 mL/min
Col. Temp.	: 40 °C
Detection	: FL Ex. 298 nm Em. 325 nm
Injection Vol.	: 20 µL
Sample	: α-tocopherol (1 µg/mL in Hexane) β-tocopherol (1 µg/mL in Hexane) γ-tocopherol (1 µg/mL in Hexane) δ-tocopherol (1 µg/mL in Hexane)

Figure 2 : Evaluation of Equilibration Time





Di-*n*-propylphthlate



Diethy phthalate

Conditions

Column	: InertSustain NH2 (5 µm, 250 × 4.6 mm I.D.)
Eluent	: A) *n*-Hexane/Isopropanol = 100/1, v/v B) Isopropanol A/B = 95/5, v/v (gradient mixer)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: UV 300 nm

Analytical Columns

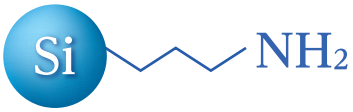
	Length \ I.D. (mm)	1.0	1.5		
Particle Size: 3 µm	30	5020-16768	5020-16774		
	50	5020-16769	5020-16775		
	75	5020-16770	5020-16776		
	100	5020-16771	5020-16777		
	150	5020-16772	5020-16778		
	250	5020-16773	5020-16779		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	30	5020-16732	5020-16739	5020-16746	5020-16753
	50	5020-16733	5020-16740	5020-16747	5020-16754
	75	5020-16734	5020-16741	5020-16748	5020-16755
	100	5020-16735	5020-16742	5020-16749	5020-16756
	150	5020-16736	5020-16743	5020-16750	5020-16757
	250	5020-16737	5020-16744	5020-16751	5020-16758
Particle Size: 5 µm	Length \ I.D. (mm)	1.0	1.5		
	30	5020-16639	5020-16645		
	50	5020-16640	5020-16646		
	75	5020-16641	5020-16647		
	100	5020-16642	5020-16648		
	150	5020-16643	5020-16649		
	250	5020-16644	5020-16650		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	30	5020-16602	5020-16609	5020-16616	5020-16623
	50	5020-16603	5020-16610	5020-16617	5020-16624
	75	5020-16604	5020-16611	5020-16618	5020-16625
	100	5020-16605	5020-16612	5020-16619	5020-16626
	150	5020-16606	5020-16613	5020-16620	5020-16627
	250	5020-16607	5020-16614	5020-16621	5020-16628

Cartridge Guard Column E

I.D. of the Analytical Column Applicable (mm)	Length (mm)	I.D. (mm)	Replacement Cartridge E Guard Column (2 pcs)		Cartridge E Holder / Cartridge Set (2 Cartridge E Guard Columns & 1 Holder)	
			Particle Size		Particle Size	
			3 µm	5 µm	3 µm	5 µm
1.0	10	1.0	5020-16807	5020-16706	5020-16808	5020-16707
1.5, 2.1		1.5	5020-16809	5020-16708	5020-16810	5020-16709
2.1, 3.0		3.0	5020-16805	5020-16704	5020-16806	5020-16705
4.0, 4.6		4.0	5020-16803	5020-16702	5020-16804	5020-16703
2.1, 3.0	20	3.0	5020-16813	5020-16712	5020-16814	5020-16713
4.0, 4.6		4.0	5020-16811	5020-16710	5020-16812	5020-16711
Holder for Cartridge Guard Column E				For 10 mm Length		5020-08500
				For 20 mm Length		5020-08550

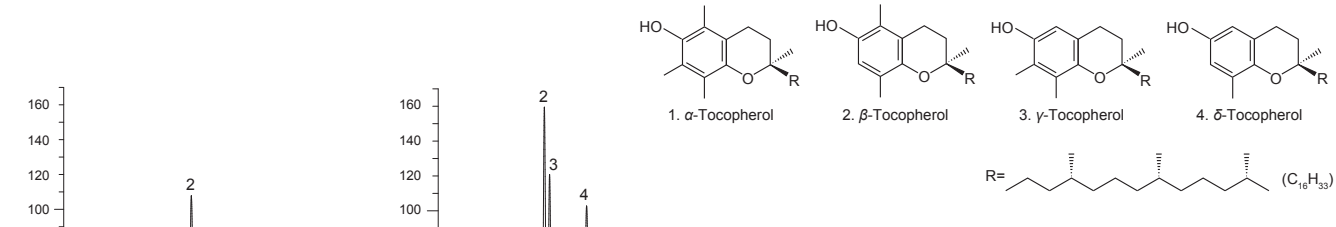
Inertsil NH2

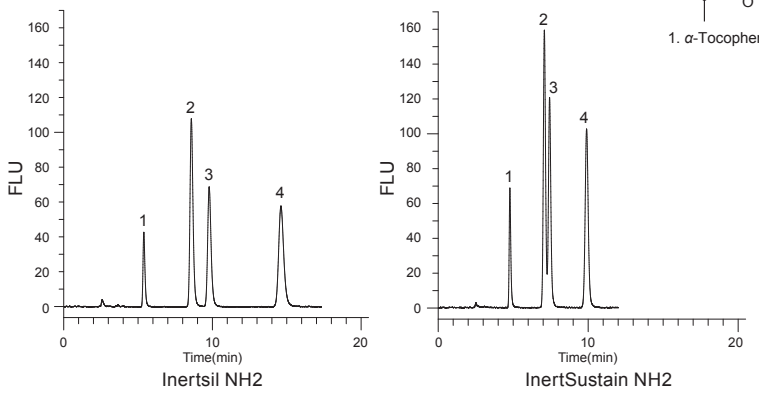
- **Base Material** : 3 Series High Purity Silica Gel
- **Particle Size** : 3 µm, 5 µm
- **Surface Area** : 450 m^2/g
- **Pore Size** : 100 Å (10 nm)
- **Pore Volume** : 1.05 mL/g
- **Functional Group** : Aminopropyl
- **End-capping** : No
- **Carbon Loading** : 8 %
- **USP Code** : L8
- **pH Range** : 2 - 7.5



Inertsil NH2 has a wide surface area, and bonded with aminopropyl groups, an amino column performs high retention time. Inertsil NH2 achieves better separation than other commercially available amino columns as it is modified with primary amines. Figure 1 shows that Inertsil NH2 is able to separate isomers of tocopherol with good peak shape in short time compared to other commercially amino columns.
Primary Amines on the surface provides Inertsil NH2 unique selectivity as a normal phase column. Inertsil NH2 retains acidic compounds strongly and basic compound weakly (Figure 2).

Figure 1 : Analysis of Vitamin E





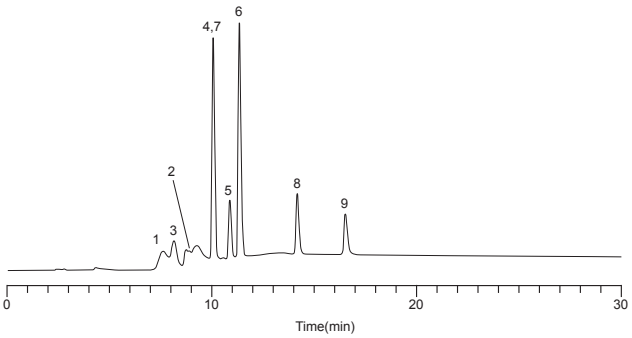
Conditions

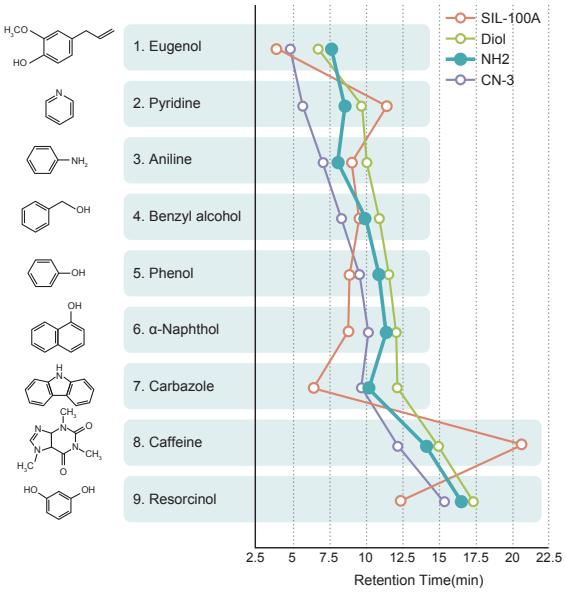
Column	: 5 µm, 250 × 4.6 mm I.D.
Eluent	: A) *n*-Hexane B) Isopropanol A/B = 98/2, v/v
Flow Rate	: 1.2 mL/min
Col. Temp.	: 40 °C
Detection	: FL Ex. 298 nm Em. 325 nm
Injection. Vol.	: 20 µL
Sample	: α-tocopherol (1 µg/mL in Hexane) β-tocopherol (1 µg/mL in Hexane) γ-tocopherol (1 µg/mL in Hexane) δ-tocopherol (1 µg/mL in Hexane)

Figure 2 : Selectivity of Inertsil NH2

Conditions

Column	: 5 µm, 150 × 3.0 mm I.D.
Eluent	: A) Hexane/Ethanol = 100/1, v/v B) Ethanol A/B = 100/0 – 30 min – 25/75, v/v
Flow Rate	: 0.4 mL/min
Col. Temp.	: 40 °C
Detection	: UV 215 nm





Analytical Columns

Particle Size: 3 µm	Length \ I.D. (mm)	1.0	1.5		
	33	5020-85531	5020-85541		
	50	5020-85532	5020-85542		
	75	5020-85533	5020-85543		
	100	5020-85534	5020-85544		
	150	5020-85535	5020-85545		
	250	5020-85536	5020-85546		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-05461	5020-05471	5020-05481	5020-05491
	50	5020-05462	5020-05472	5020-05482	5020-05492
	75	5020-05463	5020-05473	5020-05483	5020-05493
	100	5020-05464	5020-05474	5020-05484	5020-05494
	150	5020-05465	5020-05475	5020-05485	5020-05495
	250	5020-05466	5020-05476	5020-05486	5020-05496
Particle Size: 5 µm	Length \ I.D. (mm)	1.0	1.5		
	33	5020-85511	5020-85521		
	50	5020-85512	5020-85522		
	75	5020-85513	5020-85523		
	100	5020-85514	5020-85524		
	150	5020-85515	5020-85525		
	250	5020-85516	5020-85526		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-05511	5020-05521	5020-05531	5020-05541
	50	5020-05512	5020-05522	5020-05532	5020-05542
	75	5020-05513	5020-05523	5020-05533	5020-05543
	100	5020-05514	5020-05524	5020-05534	5020-05544
	150	5020-05515	5020-05525	5020-05535	5020-05545
	250	5020-05516	5020-05526	5020-05536	5020-05546

Cartridge Guard Column E

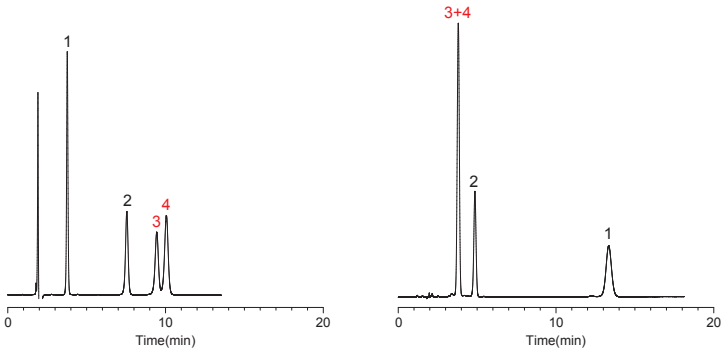
I.D. of the Analytical Column Applicable (mm)	Length (mm)	I.D. (mm)	Replacement Cartridge E Guard Column (2 pcs)		Cartridge E Holder / Cartridge Set (2 Cartridge E Guard Columns & 1 Holder)	
			Particle Size		Particle Size	
			3 µm	5 µm	3 µm	5 µm
1.0	10	1.0	5020-19221	5020-19220	5020-19271	5020-19270
1.5, 2.1		1.5	5020-19321	5020-19320	5020-19371	5020-19370
2.1, 3.0		3.0	5020-19121	5020-19120	5020-19171	5020-19170
4.0, 4.6		4.0	5020-19021	5020-19020	5020-19071	5020-19070
2.1, 3.0	20	3.0	5020-19521	5020-19520	5020-19571	5020-19570
4.0, 4.6		4.0	5020-19421	5020-19420	5020-19471	5020-19470
Holder for Cartridge Guard Column E				For 10 mm Length		5020-08500
				For 20 mm Length		5020-08550

InertSustain Cyano

- **Base Material** : **High Purity ES Silica Gel**
- **Particle Size** :**3 µm, 5 µm**
- **Surface Area** :**350 m^2/g**
- **Pore Size** :**100 Å (10 nm)**
- **Pore Volume** :**0.85mL/g**
- **Functional Group** :**Cyanopropyl**
- **End-capping** :**Yes**
- **Carbon Loading** :**8 %**
- **USP Code** :**L10**
- **pH Range** : **2 - 7.5**

InertSustain Cyano column is endcapped and bonded with cyanopropyl groups, it can be used in both normal and reversed phase modes. Compounds are difficult to separate in reversed phase mode may be able to separate in normal phase mode (Figure 1). Also since it is end-capped, it can be flushed with highly polar solvents such as 100% water eluent.
InertSustain Cyano column can be also used as reversed phase mode, the delivery solvent is mixture of water and acetonitrile, by replacing the solvent it can use as normal phase column (Figure 2).

Figure 1 : Comparison of Normal Phase Mode and Reversed Phase Mode Analysis

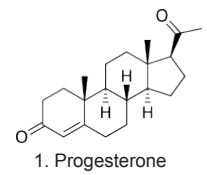


Conditions

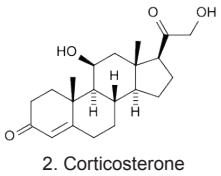
Eluent : A) Hexane B) Ethanol
A/B = 90/10, v/v
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Detection : UV 220 nm

Conditions

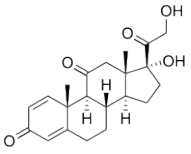
Eluent : A) CH_3OH B) H_2O
A/B = 40/60, v/v
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Detection : UV 220 nm



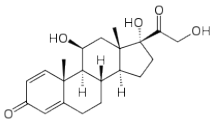
1. Progesterone



2. Corticosterone

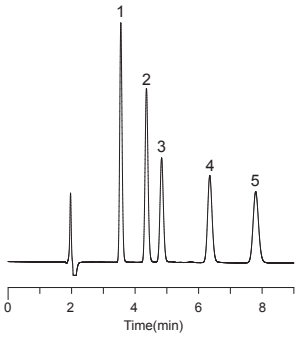


3. Prednisone

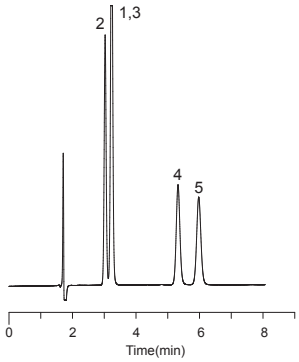


4. Prednisolone

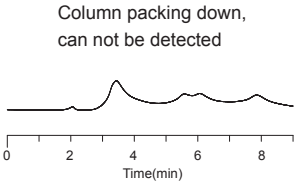
Figure 2: Comparison with Other Brands Column



InertSustain Cyano



ZORBAX SB-CN



XSelect HSS CN

Conditions

Column Size : 5 µm,150 × 4.6 mm I.D.
Eluent : A) *n*-Hexane B) Ethanol
A/B = 90/10, v/v
Flow Rate : 1.0 mL/min
Col. Temp. : 40℃
Detection : UV 220 nm
Sample 1. Progesterone
2. Estrone
3. β-Estradiol
4. Corticosterone
5. Hydrocortisone

Analytical Columns

	Length\I.D. (mm)	2.1	3.0	4.6	
HP Series Particle Size : 3 µm 50 MPa (500 bar)	30	5020-89459	5020-89465	5020-89471	
	50	5020-89460	5020-89466	5020-89472	
	75	5020-89461	5020-89467	5020-89473	
	100	5020-89462	5020-89468	5020-89474	
	150	5020-89463	5020-89469	5020-89475	
	250	5020-89464	5020-89470	5020-89476	
	Length\I.D. (mm)	1.0	1.5		
	30	5020-89410	5020-89416		
	50	5020-89411	5020-89417		
	75	5020-89412	5020-89418		
	100	5020-89413	5020-89419		
	150	5020-89414	5020-89420		
	250	5020-89415	5020-89421		
Particle Size: 3 µm	Length\I.D. (mm)	2.1	3.0	4.0	4.6
	30	5020-89374	5020-89381	5020-89388	5020-89395
	50	5020-89375	5020-89382	5020-89389	5020-89396
	75	5020-89376	5020-89383	5020-89390	5020-89397
	100	5020-89377	5020-89384	5020-89391	5020-89398
	150	5020-89378	5020-89385	5020-89392	5020-89399
	250	5020-89379	5020-89386	5020-89393	5020-89400
	Length\I.D. (mm)	1.0	1.5		
	30	5020-89288	5020-89294		
	50	5020-89289	5020-89295		
	75	5020-89290	5020-89296		
	100	5020-89291	5020-89297		
	150	5020-89292	5020-89298		
	250	5020-89293	5020-89299		
Particle Size: 5 µm	Length\I.D. (mm)	2.1	3.0	4.0	4.6
	30	5020-89251	5020-89258	5020-89265	5020-89272
	50	5020-89252	5020-89259	5020-89266	5020-89273
	75	5020-89253	5020-89260	5020-89267	5020-89274
	100	5020-89254	5020-89261	5020-89268	5020-89275
	150	5020-89255	5020-89262	5020-89269	5020-89276
	250	5020-89256	5020-89263	5020-89270	5020-89277

Cartridge Guard Column E

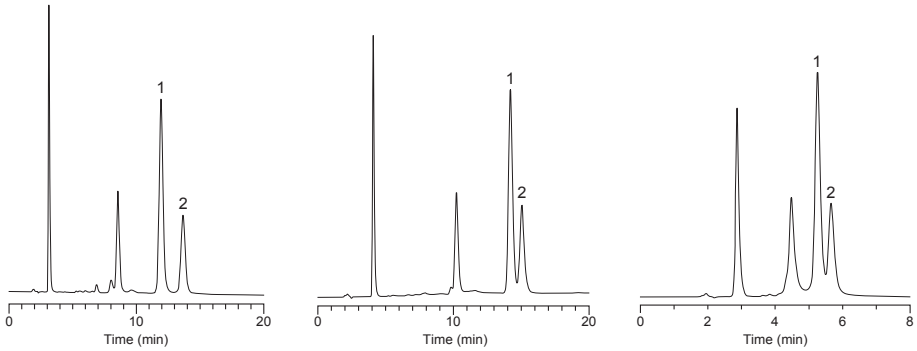
I.D. of the Analytical Column Applicable (mm)	Length (mm)	I.D. (mm)	Replacement Cartridge E Guard Column (2 pcs)		Cartridge E Holder / Cartridge Set (2 Cartridge E Guard Columns & 1 Holder)	
			Particle Size		Particle Size	
			3 µm	5 µm	3 µm	5 µm
1.0	10	1.0	5020-89449	5020-89355	5020-89450	5020-89356
1.5, 2.1		1.5	5020-89451	5020-89357	5020-89452	5020-89358
2.1, 3.0		3.0	5020-89447	5020-89353	5020-89448	5020-89354
4.0, 4.6		4.0	5020-89445	5020-89351	5020-89446	5020-89352
2.1, 3.0	20	3.0	5020-89455	5020-89361	5020-89456	5020-89362
4.0, 4.6		4.0	5020-89453	5020-89359	5020-89454	5020-89360
Holder for Cartridge Guard Column E				For 10 mm Length		5020-08500
				For 20 mm Length		5020-08550

Inertsil CN-3

- **Base Material** : 3 Series High Purity Silica Gel
- **Particle Size** : 3 µm, 5 µm
- **Surface Area** : 450 m^2/g
- **Pore Size** : 100 Å (10 nm)
- **Pore Volume** : 1.05 mL/g
- **Functional Group** : Cyanopropryl
- **End-capping** : No
- **Carbon Loading** : 14 %
- **USP Code** : L10
- **pH Range** : 2 - 7.5

Inertsil CN-3, Cyanopropryl groups bonded to Silica gel with high density. And it is not only increase difference recognition of hydrophilicity, but also increase the durability. It is difficult to increase the both performance with other previous cyanopropryl columns. Inertsil CN-3 can be cleaned with 100 % aqueous solvent because non-specific adsorption of water effected with silanol base is prevented.
Figure 2 shows 9 compounds analysis with Inertsil CN-3. And also it shows different selectivity of the other Inertsil series columns. Each compounds are detected adequate retentivity. And then they are easy to use as same as Inertsil Diol on normal phase mode.

Figure1 : Comparison of Selectivity



Conditions

Column	: Cyano Column (5 µm, 150 × 4.6 mm I.D.)
Eluent	: A) Hexane B) Ethanol A/B = 90/10, v/v
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: UV 254 nm

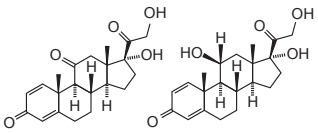
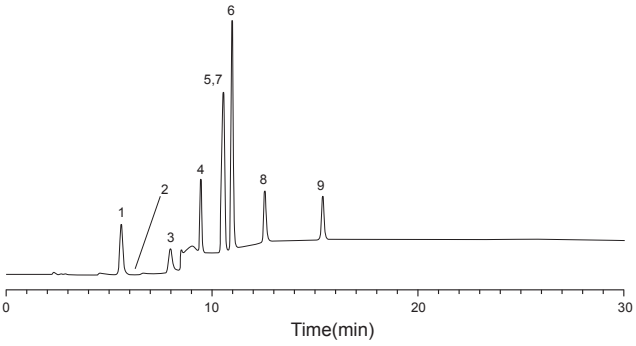
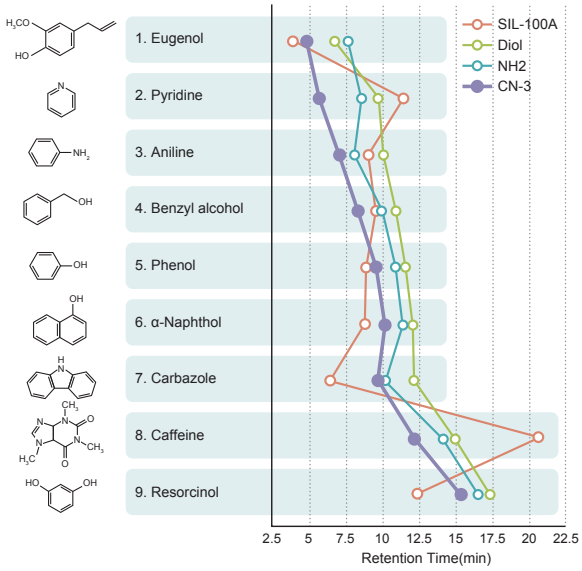


Figure2 : Selectivity of Inertsil® CN-3

Conditions

Column	: Inertsil CN-3 (5 µm, 150 × 3.0 mm I.D.)
Eluent	: A) Hexane/Ethanol = 100/1, v/v B) Ethanol A/B = 100/0 – 30 min – 25/75, v/v
Flow Rate	: 0.4 mL/min
Col. Temp.	: 40 °C
Detection	: UV 215 nm





Analytical Columns

Particle Size: 3 µm	Length \ I.D. (mm)	1.0	1.5		
	33	5020-85331	5020-85341		
	50	5020-85332	5020-85342		
	75	5020-85333	5020-85343		
	100	5020-85334	5020-85344		
	150	5020-85335	5020-85345		
	250	5020-85336	5020-85346		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-05261	5020-05271	5020-05281	5020-05291
	50	5020-05262	5020-05272	5020-05282	5020-05292
	75	5020-05263	5020-05273	5020-05283	5020-05293
	100	5020-05264	5020-05274	5020-05284	5020-05294
	150	5020-05265	5020-05275	5020-05285	5020-05295
	250	5020-05266	5020-05276	5020-05286	5020-05296
Particle Size: 5 µm	Length \ I.D. (mm)	1.0	1.5		
	33	5020-85311	5020-85321		
	50	5020-85312	5020-85322		
	75	5020-85313	5020-85323		
	100	5020-85314	5020-85324		
	150	5020-13712	5020-13710		
	250	5020-85316	5020-85326		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-05311	5020-05321	5020-05331	5020-05341
	50	5020-05312	5020-05322	5020-05332	5020-05342
	75	5020-05313	5020-05323	5020-05333	5020-05343
	100	5020-05314	5020-05324	5020-05334	5020-05344
	150	5020-05315	5020-05325	5020-01942	5020-01940
	250	5020-05316	5020-05326	5020-01943	5020-01941

Cartridge Guard Column E

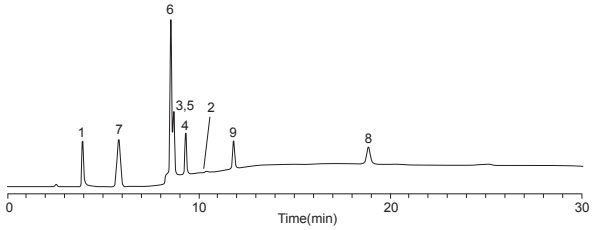
I.D. of the Analytical Column Applicable (mm)	Length (mm)	I.D. (mm)	Replacement Cartridge E Guard Column (2 pcs)		Cartridge E Holder / Cartridge Set (2 Cartridge E Guard Columns & 1 Holder)	
			Particle Size		Particle Size	
			3 µm	5 µm	3 µm	5 µm
1.0	10	1.0	5020-19219	5020-19218	5020-19269	5020-19268
1.5, 2.1		1.5	5020-19319	5020-19318	5020-19369	5020-19368
2.1, 3.0		3.0	5020-19119	5020-19118	5020-19169	5020-19168
4.0, 4.6		4.0	5020-19019	5020-19018	5020-19069	5020-19068
2.1, 3.0	20	3.0	5020-19519	5020-19518	5020-19569	5020-19568
4.0, 4.6		4.0	5020-19419	5020-19418	5020-19469	5020-19468
Holder for Cartridge Guard Column E				For 10 mm Length		5020-08500
				For 20 mm Length		5020-08550

Inertsil SIL-150A

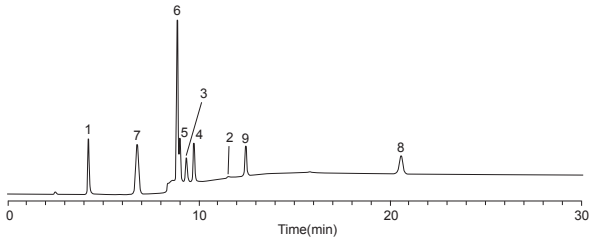
- **Base Material** : **2 Series High Purity Silica Gel**
- **Particle Size** : **5 µm**
- **Surface Area** : **320 m^2/g**
- **Pore Size** : **150 Å (15 nm)**
- **Pore Volume** : **1.20 mL/g**
- **Functional Group** : **None**
- **End-capping** : **No**
- **Carbon Loading** : **- %**
- **USP Code** : **L3**
- **pH Range** : **2 - 7.5**

Inertsil SIL-150A is ultra pure silica gel column, and this ultra pure silica gel contains very low level of metal impurities and is durable and free from dents and cracks which can cause premature column failure. Compared to Inertsil SIL-100A, the silica's surface area is smaller (320 m²/g). Retentivity of Inertsil SIL-150A is weaker than that of Inertsil SIL-100A (Figure 1).

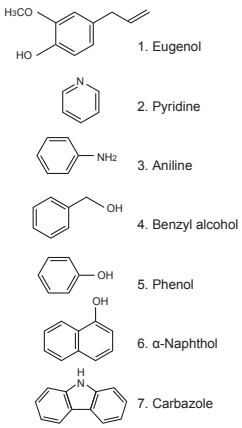
Figure 1 : Comparison of Retentivity and Selectivity with Different Pore Size



Inertsil SIL-150A (150 Å)

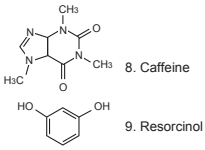


Inertsil SIL-100A (100 Å)



Conditions

Column Size : 5 µm, 150 × 3.0 mm I.D.
Eluent : A) *n*-Hexane/Ethanol = 100/1, v/v
B) Ethanol
A/B = 100/0 – 30 min – 25/75, v/v
Flow Rate : 0.4 mL/min
Col. Temp. : 40 °C
Detection : UV 215 nm



Analytical Columns

Particle Size: 5 µm	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	150	5020-01021	5020-01022	5020-01023	5020-01024
	250	5020-01025	5020-01026	5020-01027	5020-01028

Cartridge Guard Column E

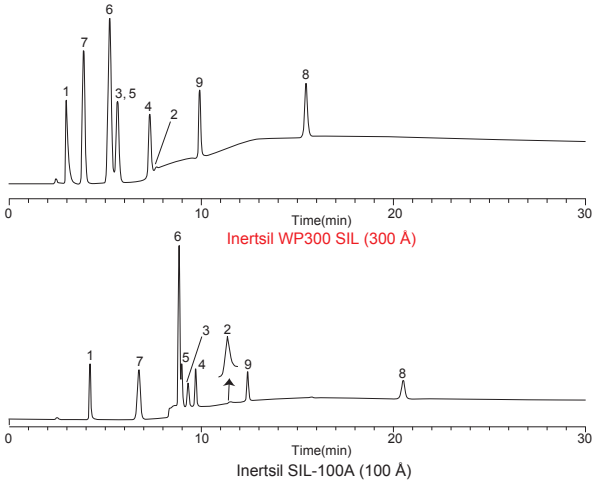
I.D. of the Analytical Column Applicable (mm)	Length (mm)	I.D. (mm)	Replacement Cartridge E Guard Column (2 pcs)	Cartridge E Holder / Cartridge Set (2 Cartridge E Guard Columns & 1 Holder)
			Particle Size	Particle Size
			5 µm	5 µm
2.1, 3.0	10	3.0	5020-19139	5020-19189
4.0, 4.6		4.0	5020-19039	5020-19089
2.1, 3.0	20	3.0	5020-19539	5020-19589
4.0, 4.6		4.0	5020-19439	5020-19489
Holder for Cartridge Guard Column E			For 10 mm Length	5020-08500
			For 20 mm Length	5020-08550

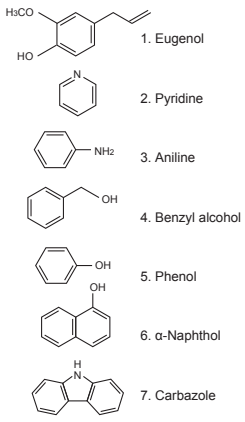
Inertsil WP300 SIL

- **Base Material** : **High Purity Silica Gel**
- **Particle Size** : **5 µm**
- **Surface Area** : **150 m^2/g**
- **Pore Size** : **300 Å (30 nm)**
- **Pore Volume** : **1.05 mL/g**
- **Functional Group** : **None**
- **End-capping** : **No**
- **Carbon Loading** : **- %**
- **USP Code** : **L3**
- **pH Range** : **2 - 7.5**

Inertsil WP300 SIL is pure silica gel phase with wide pores(300 Å). It is available for analysing compounds including large molecules. As the pore becomes wider, the surface area of silica gel is smaller. Since the interactions between the analyte and silica gel occur on the sIlica surface, smaller surface area means less interactions and faster elution. In the figure below, Inertsil WP300 SIL and Inertsil SIL-100A are compared to see their separation and eluting speed. The pore size of Inertsil SIL-100A is 100 Å and the surface area is 450 m²/g. As shown, Inertsil WP300 SIL elutes faster than Inertsil SIL-100A though their separating patterns are similar.

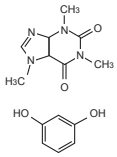
Figure 1 : Comparison of Selectivity and Retentivity with Different Pore Size





Conditions

Column Size : 5 µm, 150 × 3.0 mm I.D.
Eluent : A) *n*-Hexane/Ethanol = 100/1, v/v
B) Ethanol
A/B = 100/0 – 30 min – 25/75. v/v
Flow Rate : 0.4 mL/min
Col. Temp. : 40 °C
Detection : UV 215 nm



Analytical Columns

	Length \ I.D. (mm)	1.0	1.5		
Particle Size: 5 µm	33	5020-86011	5020-86021		
	50	5020-86012	5020-86022		
	75	5020-86013	5020-86023		
	100	5020-86014	5020-86024		
	150	5020-86015	5020-86025		
	250	5020-86016	5020-86026		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-06011	5020-06021	5020-06031	5020-06041
	50	5020-06012	5020-06022	5020-06032	5020-06042
	75	5020-06013	5020-06023	5020-06033	5020-06043
	100	5020-06014	5020-06024	5020-06034	5020-06044
	150	5020-06015	5020-06025	5020-06035	5020-06045
	250	5020-06016	5020-06026	5020-06036	5020-06046

Cartridge Guard Column E

I.D. of the Analytical Column Applicable (mm)	Length (mm)	I.D. (mm)	Replacement Cartridge E Guard Column (2 pcs)	Cartridge E Holder / Cartridge Set (2 Cartridge E Guard Columns & 1 Holder)
			Particle Size	Particle Size
			5 µm	5 µm
1.0	10	1.0	5020-19232	5020-19282
1.5, 2.1		1.5	5020-19332	5020-19382
2.1, 3.0		3.0	5020-19132	5020-19182
4.0, 4.6		4.0	5020-19032	5020-19082
2.1, 3.0	20	3.0	5020-19532	5020-19582
4.0, 4.6		4.0	5020-19432	5020-19482
Holder for Cartridge Guard Column E			For 10 mm Length	5020-08500
			For 20 mm Length	5020-08550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