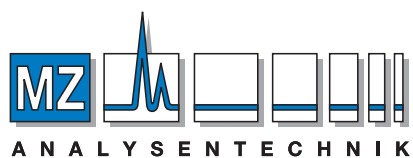


HILIC Columns

• About HILIC Columns	056
• InertSustain Amide	058
• Inertsil Amide	060
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About HILIC Columns

HILIC is, abbreviated name for Hydrophilic Interaction Chromatography, and it was developed as an alternative to reversed phase chromatography for highly polar compounds (Figure1). Inertsil HILIC is the column which chemically bonded with diol group, and it provides excellent peak shape for neutral and basic compounds. In HILIC mode, generally when organic concentration is raised, it shows a strong retention (Figure 2). Moreover, it can get more stable analysis by adding basic solvent to the eluate, such as ammonium acetate.

Figure 1 : Separation Mode from Reversed Phase to HILIC

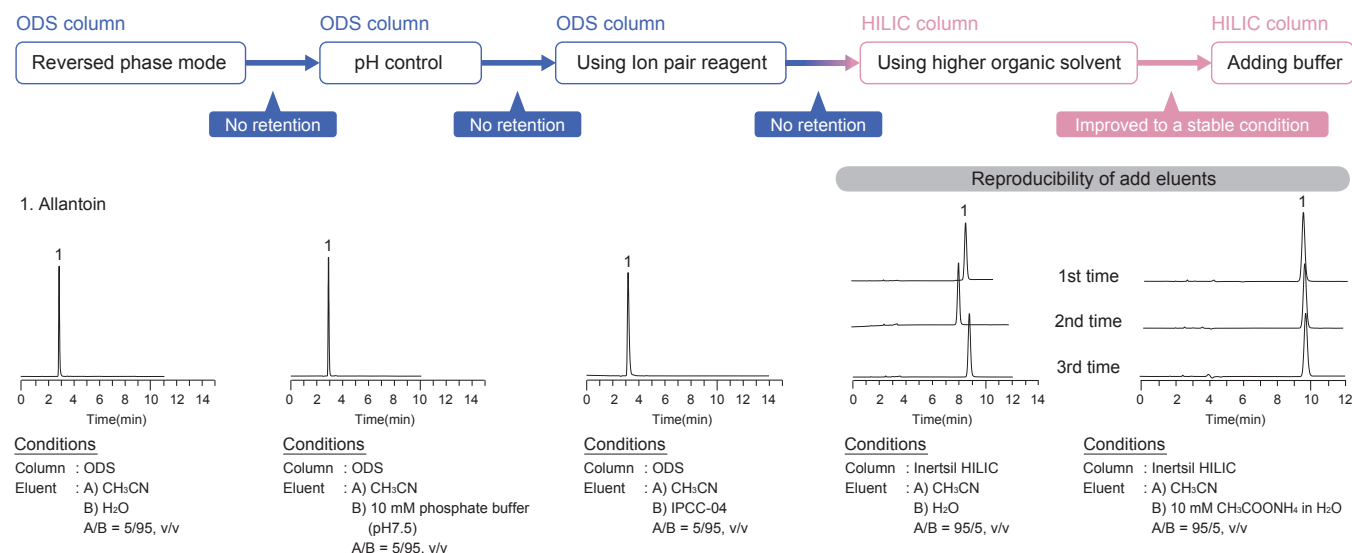
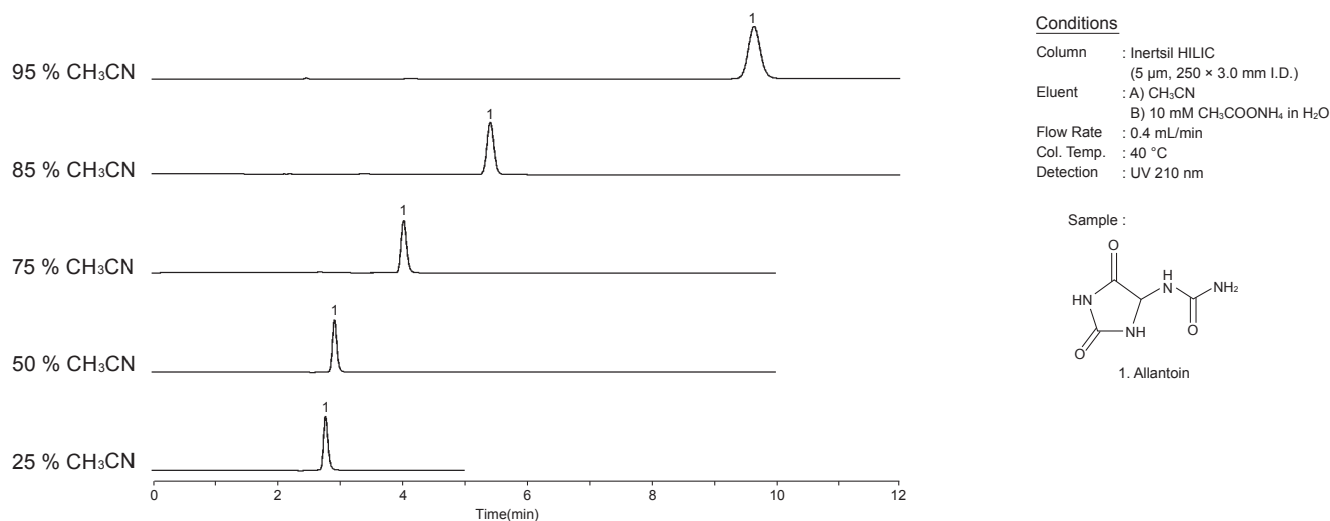


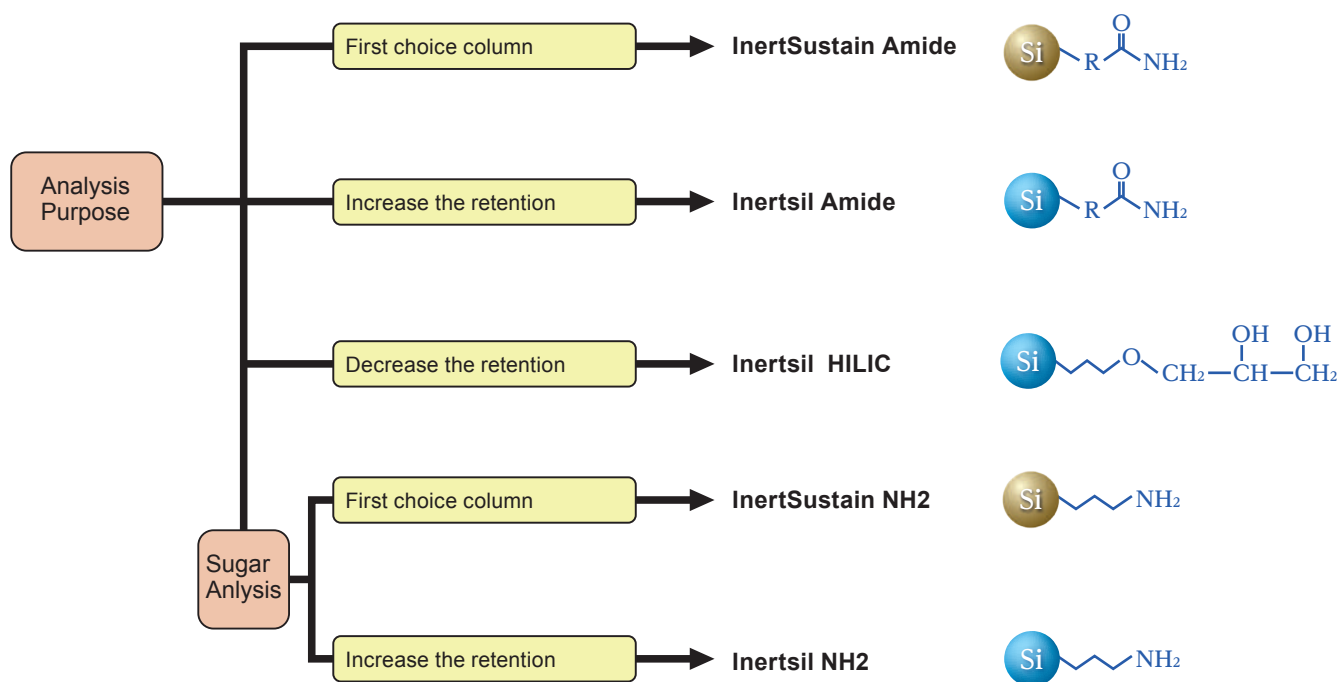
Figure 2 : Correlation between Retention Time and the Concentration of CH₃CN in Mobile Phase



HILIC Column Specification

Columns	Features	Particle Size (µm)	Pore Size (nm)	Surface Area (m ² /g)	Carbon Loading (%)	Recommended pH range
InertSustain Amide	First choice column for HILIC mode.	3, 5	10	350	15	2 - 8.5
Inertsil Amide	Effective when the retention of high polar components is further strengthened.	3, 5	10	450	18	2 - 7.5
Inertsil HILIC	Effective when the overall retention is to be reduced or when the separation pattern is to be changed.	3, 5	10	450	20	2 - 7.5
InertSustain NH2	First choice column for sugar analysis.	3, 5	10	350	7	2 - 7.5
Inertsil NH2	Effective for intensifying retention in sugar analysis.	3, 5	10	450	8	2 - 7.5

HILIC Column Selection



Reversed Phase Columns

HILIC Columns

Normal Phase Columns

SEC Columns

Ion Exchange Columns

Application Special Columns

Guard Columns

Preparative Columns

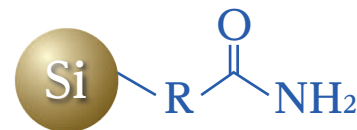
Capillary Columns

Applications

Cat. No. Index

InertSustain Amide

- **Base Material** : High Purity ES Silica Gel
- **Particle Size** : 3 μm , 5 μm
- **Surface Area** : 350 m^2/g
- **Pore Size** : 100 \AA (10 nm)
- **Pore Volume** : 0.85 mL/g
- **Functional Group** : Carbamoyl
- **End-capping** : No
- **Carbon Loading** : 15 %
- **USP Code** : L68
- **pH Range** : 2 - 8.5

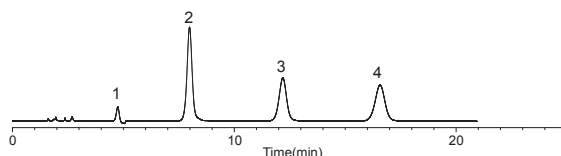


InertSustain Amide column is a HILIC (Hydrophilic Interaction Chromatography) column for enhanced retention of extremely polar compounds. It offers the strongest retentivity among the Amide columns available in the market due to the usage and bonding of carbamoyl groups. Superior stability and durability even under water rich mobile phases.

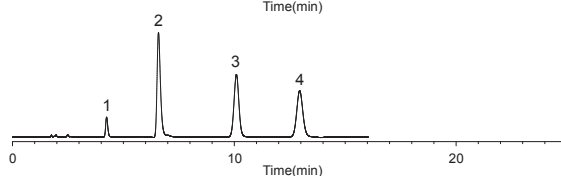
Comparison with Other Brands

HILIC phases are particularly useful for compounds that are weakly retained by reversed phase columns such as Melamine and Cyanuric Acid. As shown below, InertSustain Amide provides stronger retention for such analytes compared to other HILIC columns available in the market.

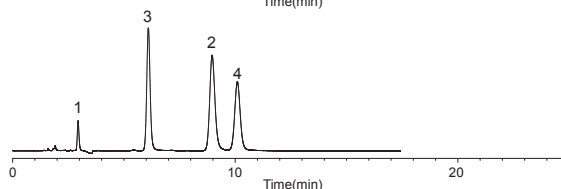
InertSustain Amide (Amide)



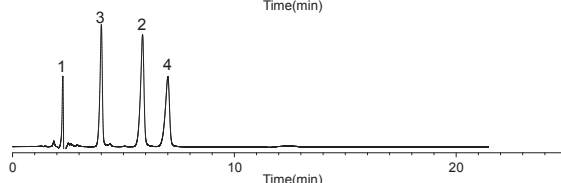
TSKgel Amide-80 (Amide)



XBridge BEH Amide (Amide)



Atlantis Silica HILIC (Unbonded Silica)



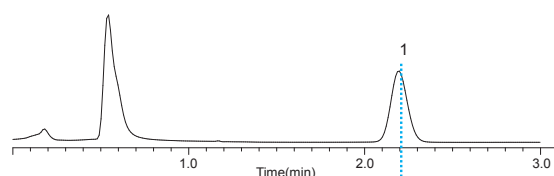
Conditions

Column : 5 μm , 150 \times 2.1 mm I.D.
 Eluent : A) CH_3CN
 B) 10 mM HCOONH_4 in H_2O
 A/B = 90/10, v/v
 Flow Rate : 0.2 mL/min
 Col. Temp. : 40 $^\circ\text{C}$
 Detection : UV 215 nm
 Sample : 1. Cyanuric Acid
 2. Melamine
 3. Ammelide
 4. Ammeline

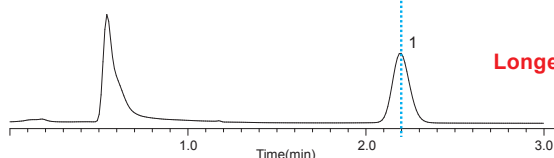
Extreme Durability

The use of metaphosphoric acid aqueous solution as a diluent solvent is a common technique to prevent the decomposition of sample in Vitamin C (ascorbic acid) analysis. A silica-base amide type columns often show short column lifetime due to the usage of strongly acidic diluent solvent in the analysis. As proven below, InertSustain Amide offer longer column lifetime even under such harsh analytical condition.

1st Injection



After 1,000 Injections



Longer Column Lifetime

Conditions

Column : InertSustain Amide
 (5 μm , 150 \times 3.0 mm I.D.)
 Eluent : A) CH_3CN
 B) 0.1% H_3PO_4 in H_2O
 A/B = 87/13, v/v
 Flow Rate : 0.8 mL/min
 Col. Temp. : 40 $^\circ\text{C}$
 Detection : UV 243 nm
 Injection Vol. : 2 μL
 Sample : 1. Ascorbic acid
 Diluent : 2 % metaphosphoric acid aqueous solution

Analytical Columns

Particle Size: 3 µm	Length\I.D. (mm)	1.0	1.5		
	30	5020-88766	5020-88772		
	50	5020-88767	5020-88773		
	75	5020-88768	5020-88774		
	100	5020-88769	5020-88775		
	150	5020-88770	5020-88776		
	250	5020-88771	5020-88777		
	Length\I.D. (mm)	2.1	3.0	4.0	4.6
	30	5020-88726	5020-88734	5020-88742	5020-88750
	50	5020-88727	5020-88735	5020-88743	5020-88751
	75	5020-88728	5020-88736	5020-88744	5020-88752
	100	5020-88729	5020-88737	5020-88745	5020-88753
	125	5020-88730	5020-88738	5020-88746	5020-88754
	150	5020-88731	5020-88739	5020-88747	5020-88755
	250	5020-88732	5020-88740	5020-88748	5020-88756
Particle Size: 5 µm	Length\I.D. (mm)	1.0	1.5		
	30	5020-88642	5020-88648		
	50	5020-88643	5020-88649		
	75	5020-88644	5020-88650		
	100	5020-88645	5020-88651		
	150	5020-88646	5020-88652		
	250	5020-88647	5020-88653		
	Length\I.D. (mm)	2.1	3.0	4.0	4.6
	30	5020-88602	5020-88610	5020-88618	5020-88626
	50	5020-88603	5020-88611	5020-88619	5020-88627
	75	5020-88604	5020-88612	5020-88620	5020-88628
	100	5020-88605	5020-88613	5020-88621	5020-88629
	125	5020-88606	5020-88614	5020-88622	5020-88630
	150	5020-88607	5020-88615	5020-88623	5020-88631
	250	5020-88608	5020-88616	5020-88624	5020-88632

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	5020-88805	5020-88709	5020-88806	5020-88710
1.5, 2.1		1.5	5020-88807	5020-88711	5020-88808	5020-88712
2.1, 3.0		3.0	5020-88803	5020-88707	5020-88804	5020-88708
4.0, 4.6		4.0	5020-88801	5020-88705	5020-88802	5020-88706
2.1, 3.0	20	3.0	5020-88811	5020-88715	5020-88812	5020-88716
4.0, 4.6		4.0	5020-88809	5020-88713	5020-88810	5020-88714
Holder for Cartridge Guard Column E				For 10 mm Length		5020-08500
				For 20 mm Length		5020-08550

Reversed Phase Columns

HILIC Columns

Normal Phase Columns

SEC Columns

Ion Exchange Columns

Application Special Columns

Guard Columns

Preparative Columns

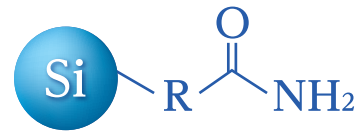
Capillary Columns

Applications

Cat. No. Index

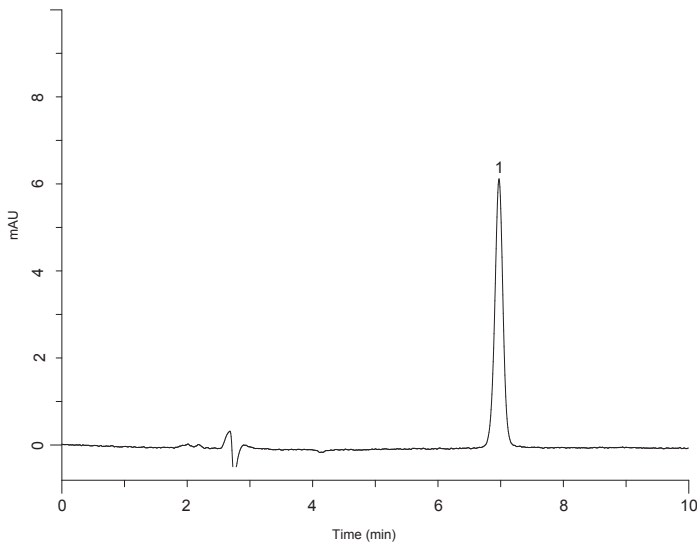
Inertsil Amide

- Base Material : 3 Series High Purity Silica Gel
- Particle Size : 3 μm , 5 μm
- Surface Area : 450 m^2/g
- Pore Size : 100 \AA (10 nm)
- Pore Volume : 1.05 mL/g
- Functional Group : Carbamoyl
- End-capping : No
- Carbon Loading : 18 %
- USP Code : L68
- pH Range : 2 - 7.5
- Usable organic solvents concentration: 50 % or more.



Inertsil Amide column is bonded of carbamoyl group, and it shows strong retention of highly polar compounds. As shown below, compared to other commercial columns, Inertsil Amide showed high retentivity. Inertsil Amide provides excellent performance for those hard to retain compounds using an ODS column with a long lifetime.

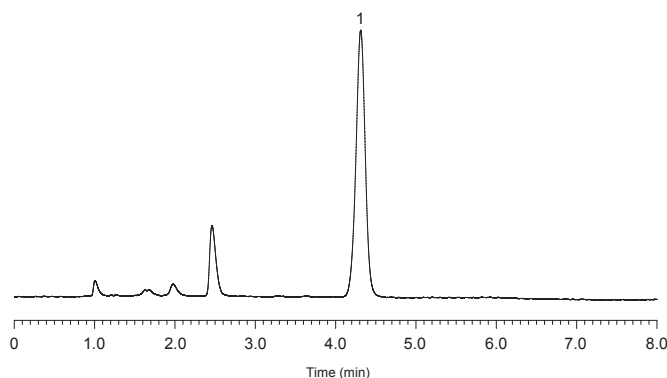
Figure 1 : Oxalic Acid



Conditions

Column Size : 5 μm , 250 \times 4.6 mm I.D.
Eluent : A) CH₃CN
 B) 30 mM Na₂HPO₄ in H₂O (pH 6.8)
 A/B = 65/35, v/v
Flow Rate : 1 mL/min
Col. Temp. : 50 °C
Detection : UV 220 nm (GL-7450 UV Detector)
Injection Vol. : 5 μL
Sample : Oxalic acid (100 mg/L)

Figure 2 : Urea



Conditions

Column Size : 5 μm , 150 \times 3.0 mm I.D.
Eluent : A) CH₃CN
 B) H₂O
 A/B = 85/15, v/v
Flow Rate : 0.4 mL/min
Col. Temp. : 40 °C
Detection : UV 200 nm
Injection Vol. : 5.0 mL
Sample : Urea (200 mg/L)

Analytical Columns

Particle Size: 3 µm	Length \ I.D. (mm)	1.0	1.5		
	33	5020-86831	5020-86841		
	50	5020-86832	5020-86842		
	75	5020-86833	5020-86843		
	100	5020-86834	5020-86844		
	150	5020-86835	5020-86845		
	250	5020-86836	5020-86846		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-07861	5020-07871	5020-07881	5020-07891
	50	5020-07862	5020-07872	5020-07882	5020-07892
	75	5020-07863	5020-07873	5020-07883	5020-07893
	100	5020-07864	5020-07874	5020-07884	5020-07894
	150	5020-07865	5020-07875	5020-07885	5020-07895
	250	5020-07866	5020-07876	5020-07886	5020-07896
	Particle Size: 5 µm	Length \ I.D. (mm)	1.0	1.5	
33		5020-86811	5020-86821		
50		5020-86812	5020-86822		
75		5020-86813	5020-86823		
100		5020-86814	5020-86824		
150		5020-86815	5020-86825		
250		5020-86816	5020-86826		
Length \ I.D. (mm)		2.1	3.0	4.0	4.6
33		5020-07801	5020-07811	5020-07821	5020-07831
50		5020-07802	5020-07812	5020-07822	5020-07832
75		5020-07803	5020-07813	5020-07823	5020-07833
100		5020-07804	5020-07814	5020-07824	5020-07834
150		5020-07805	5020-07815	5020-07825	5020-07835
250		5020-07806	5020-07816	5020-07826	5020-07836

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	5020-20156	5020-20155	5020-20158	5020-20157
1.5, 2.1		1.5	5020-20160	5020-20159	5020-20162	5020-20161
2.1, 3.0		3.0	5020-20152	5020-20151	5020-20154	5020-20153
4.0, 4.6		4.0	5020-20148	5020-20147	5020-20150	5020-20149
2.1, 3.0	20	3.0	5020-20168	5020-20167	5020-20170	5020-20169
4.0, 4.6		4.0	5020-20164	5020-20163	5020-20166	5020-20165
Holder for Cartridge Guard Column E				For 10 mm Length		5020-08500
				For 20 mm Length		5020-08550

Reversed Phase Columns

HILIC Columns

Normal Phase Columns

SEC Columns

Ion Exchange Columns

Application Specific Columns

Guard Columns

Preparative Columns

Capillary Columns

Applications

Cat. No. Index

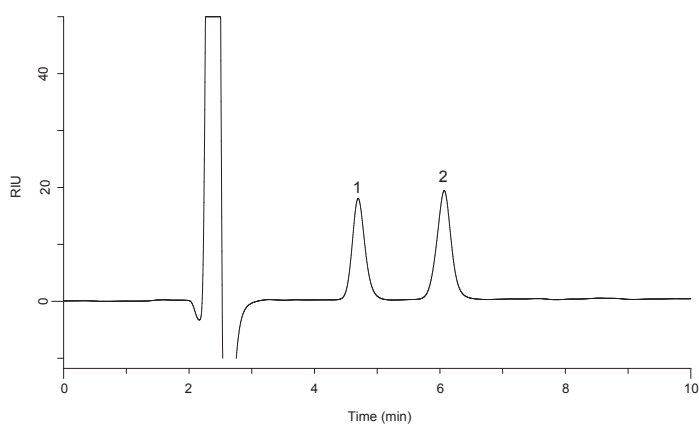
Inertsil HILIC

- Base Material : 3 Series High Purity Silica Gel
- Particle Size : 3 μm , 5 μm
- Surface Area : 450 m^2/g
- Pore Size : 100 \AA (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



HILIC is, abbreviated name for Hydrophilic Interaction Chromatography, and it was developed as an alternative to reversed phase chromatography for highly polar compounds (Figure 1). Inertsil HILIC is the column which chemically bonded with diol group, and it provides excellent peak shape for neutral and basic compounds. In HILIC mode, generally when organic solvent concentration is raised, it shows a strong retention (Figure 2). Moreover, it can get more stable analysis by adding basic solvent to the eluate, such as ammonium acetate.

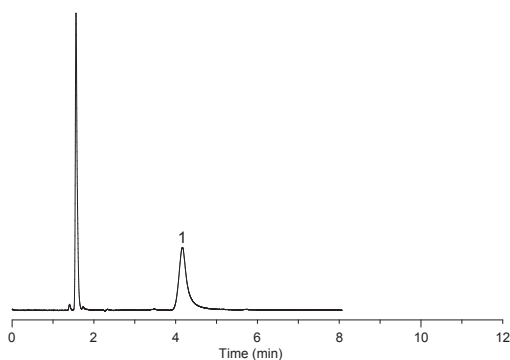
Figure 1 : Analysis of Taurine and Inositol



Conditions

Column : 5 μm , 150 \times 3.0 mm I.D.
Eluent : A) CH_3CN
 B) H_2O
 A/B = 80/20, v/v
Flow Rate : 0.4 mL/min
Col. Temp. : 40 $^\circ\text{C}$
Detection : RI (35 $^\circ\text{C}$, positive)
Injection Vol. : 20 μL
Sample : 1. Taurine
 2. Inositol
 (500 mg/L each)

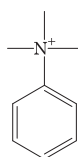
Figure 2 : Analysis of Basic Compound



Conditions

Column : 5 μm , 150 \times 2.1 mm I.D.
Eluent : A) CH_3CN B) 10 mM HCOONH_4 in H_2O
 A/B = 90/10, v/v
Flow Rate : 0.2 mL/min
Col. Temp. : 40 $^\circ\text{C}$
Detection : UV 254 nm

Sample:



1. Trimethylphenylammonium

Analytical Columns

Particle Size: 3 µm	Length \ I.D. (mm)	1.0	1.5		
	33	5020-86731	5020-86741		
	50	5020-86732	5020-86742		
	75	5020-86733	5020-86743		
	100	5020-86734	5020-86744		
	150	5020-86735	5020-86745		
	250	5020-86736	5020-86746		
	Length \ I.D. (mm)	2.1	3.0	4.0	4.6
	33	5020-07761	5020-07771	5020-07781	5020-07791
	50	5020-07762	5020-07772	5020-07782	5020-07792
	75	5020-07763	5020-07773	5020-07783	5020-07793
	100	5020-07764	5020-07774	5020-07784	5020-07794
	150	5020-07765	5020-07775	5020-07785	5020-07795
	250	5020-07766	5020-07776	5020-07786	5020-07796
	Particle Size: 5 µm	Length \ I.D. (mm)	1.0	1.5	
33		5020-86711	5020-86721		
50		5020-86712	5020-86722		
75		5020-86713	5020-86723		
100		5020-86714	5020-86724		
150		5020-86715	5020-86725		
250		5020-86716	5020-86726		
Length \ I.D. (mm)		2.1	3.0	4.0	4.6
33		5020-07701	5020-07711	5020-07721	5020-07731
50		5020-07702	5020-07712	5020-07722	5020-07732
75		5020-07703	5020-07713	5020-07723	5020-07733
100		5020-07704	5020-07714	5020-07724	5020-07734
150		5020-07705	5020-07715	5020-07725	5020-07735
250		5020-07706	5020-07716	5020-07726	5020-07736

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	5020-19225	5020-19224	5020-19275	5020-19274
1.5, 2.1		1.5	5020-19325	5020-19324	5020-19375	5020-19374
2.1, 3.0		3.0	5020-19125	5020-19124	5020-19175	5020-19174
4.0, 4.6		4.0	5020-19025	5020-19024	5020-19075	5020-19074
2.1, 3.0	20	3.0	5020-19525	5020-19524	5020-19575	5020-19574
4.0, 4.6		4.0	5020-19425	5020-19424	5020-19475	5020-19474
Holder for Cartridge Guard Column E				For 10 mm Length		5020-08500
				For 20 mm Length		5020-08550

Reversed Phase Columns

HILIC Columns

Normal Phase Columns

SEC Columns

Ion Exchange Columns

Application Specific Columns

Guard Columns

Preparative Columns

Capillary Columns

Applications

Cat. No. Index

InertSustain NH2

- Base Material : High Purity ES Silica Gel
- Particle Size : 3 μm , 5 μm
- Surface Area : 350 m^2/g
- Pore Size : 100 \AA (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 shows far superior stability compared to other brand available aminopropyl columns, as our newly developed “Evolved Surface Silica” is chemically bonded with aminopropyl group. Generally, aminopropyl columns are used for applications that are hard to be separated in a reversed phase mode, such as simultaneous analysis of sugars or vitamin E. However, the shift in retention time has been an issue for a long time. InertSustain NH2 delivers highly reliable reproducibility and stability with accurate qualitative and quantitative results. Furthermore, aminopropyl columns generally can not be washed by weakly acidic eluent, however InertSustain NH2 was improved and it can be washed by weakly acidic eluent.

Figure 1 : Comparison of Preventing Anomer Resolution of Sugar Analysis

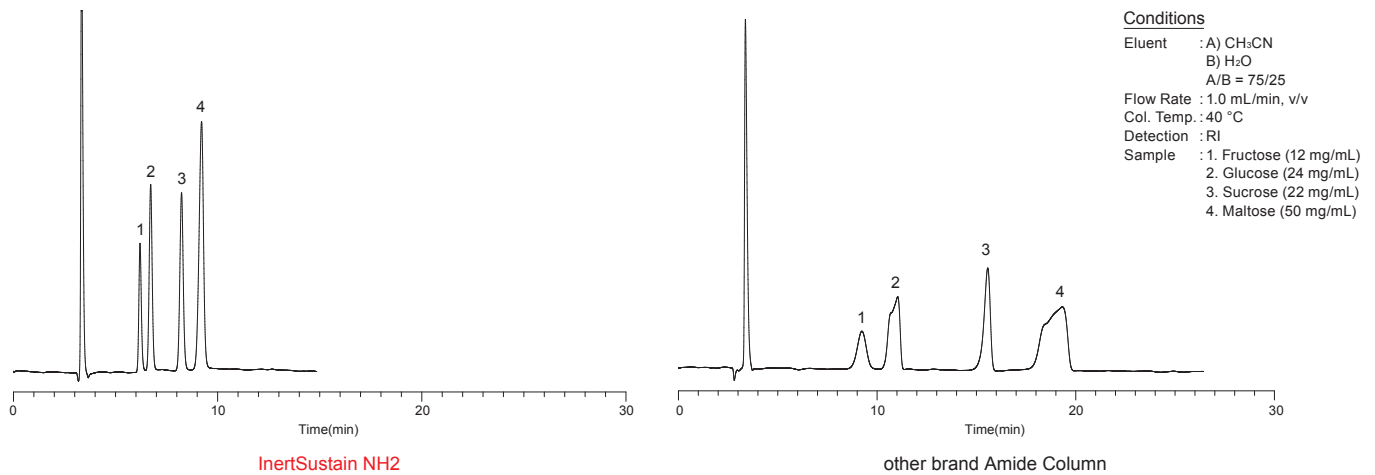


Figure 2 : Retention Change after Purged Acidic Solution

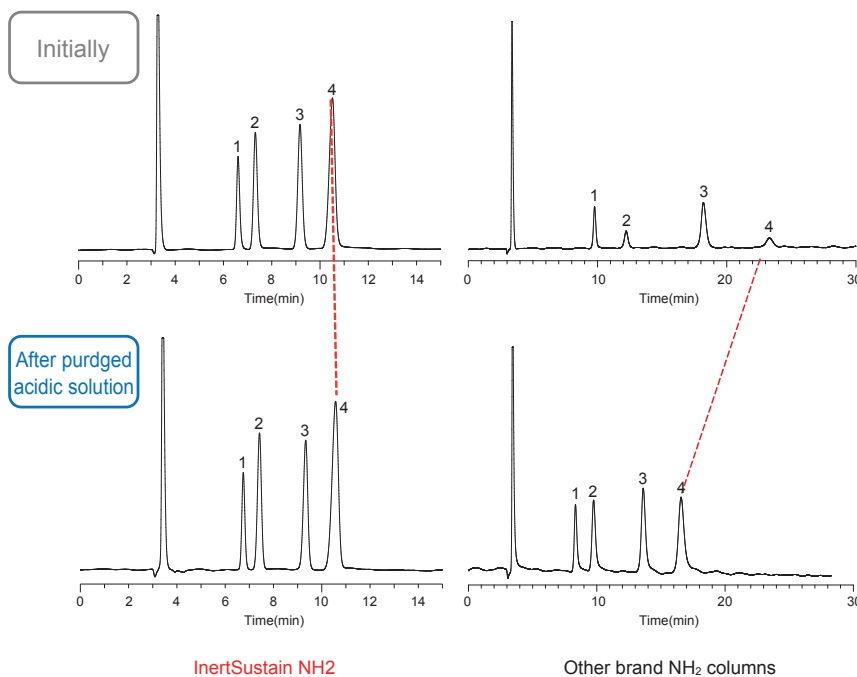
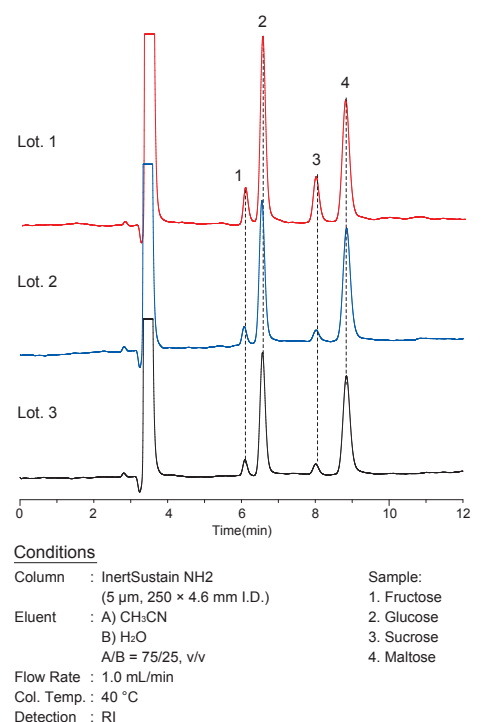


Figure 3 : Reliable Reproducibility



Analytical Columns

Particle Size: 3 µm	Length \ I.D. (mm)	1.0	1.5		
	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

Reversed Phase Columns

HILIC Columns

Normal Phase Columns

SEC Columns

Ion Exchange Columns

Application Specific Columns

Guard Columns

Preparative Columns

Capillary Columns

Applications

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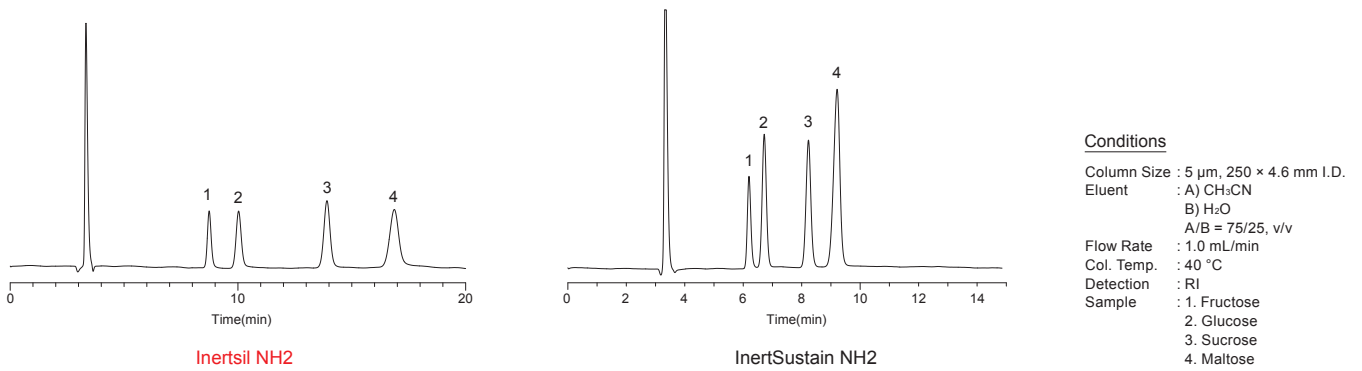
Inertsil NH2

- Base Material : 3 Series High Purity Silica Gel
- Particle Size : 3 μm , 5 μm
- Surface Area : 450 m^2/g
- Pore Size : 100 \AA (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 column is chemically bonded with Aminopropyl group. It is widely used for analyzing sugar in reversed phase mode. Compared to InertSustain NH2, InertSustain NH2 provides a better performance on durability. However, compare to other brand aminopropyl columns, Inertsil NH2 still shows excellent and strong retentivity.

Figure 1 : Comparison of Aminopropyl Columns



Analytical Columns

Particle Size: 3 μ m	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 μ m	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 μ m	5 μ m	3 μ m	5 μ m
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

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