ChromaNik Technologies Inc.

HPLC column

Sunniest

BIOTECH

ChromaNik Technologies Inc.

ChromaNik Technologies Inc.

Sunniest C18, C18-HT, RP-AQUA, C8, PhE, PFP

A Novel Bonding Technique

The “State of Art” trifunctional silyl-reagent was developed as shown in Fig.1. This Unique silyl-bonded reagent (HMODTS)can bond with any silanol groups on Silica Sorbent surface as shown in Fig.2.It can expand and contract by itself in Caterpillar manner. This technique can substantially minimise the contribution of residual silanol groups on Reverses phase stationary phase.

Finally an end-capping was done with trimethylsilyl-reagent (TMS).

Fig. 1 Novel C18 reagent

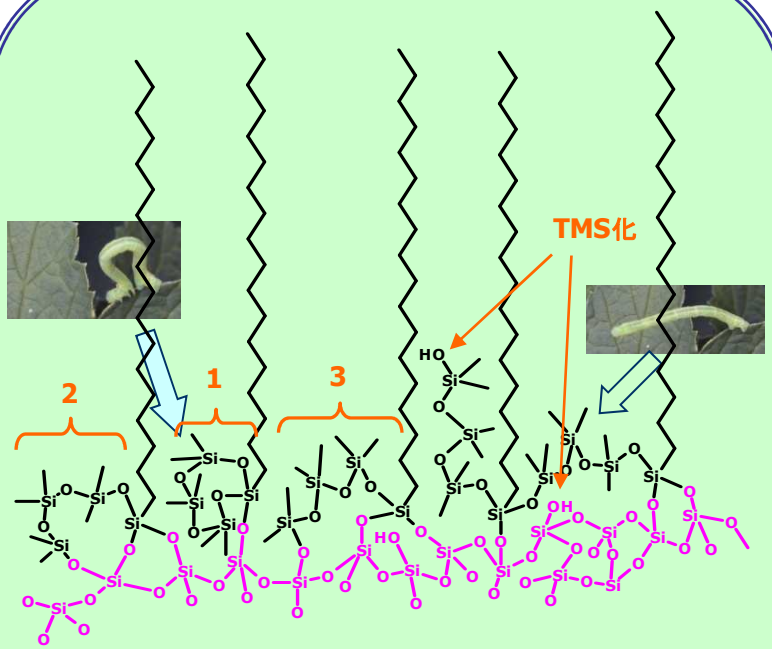


Fig. 2 Schematic diagram of bonding of novel silyl-reagent on silica surface

Features

★ Little residual silanol groups by an unique bonding technique

★Excellent stability, especially under acidic pH conditions

★ Sharp peak shape for acidic, basic and chelating compounds

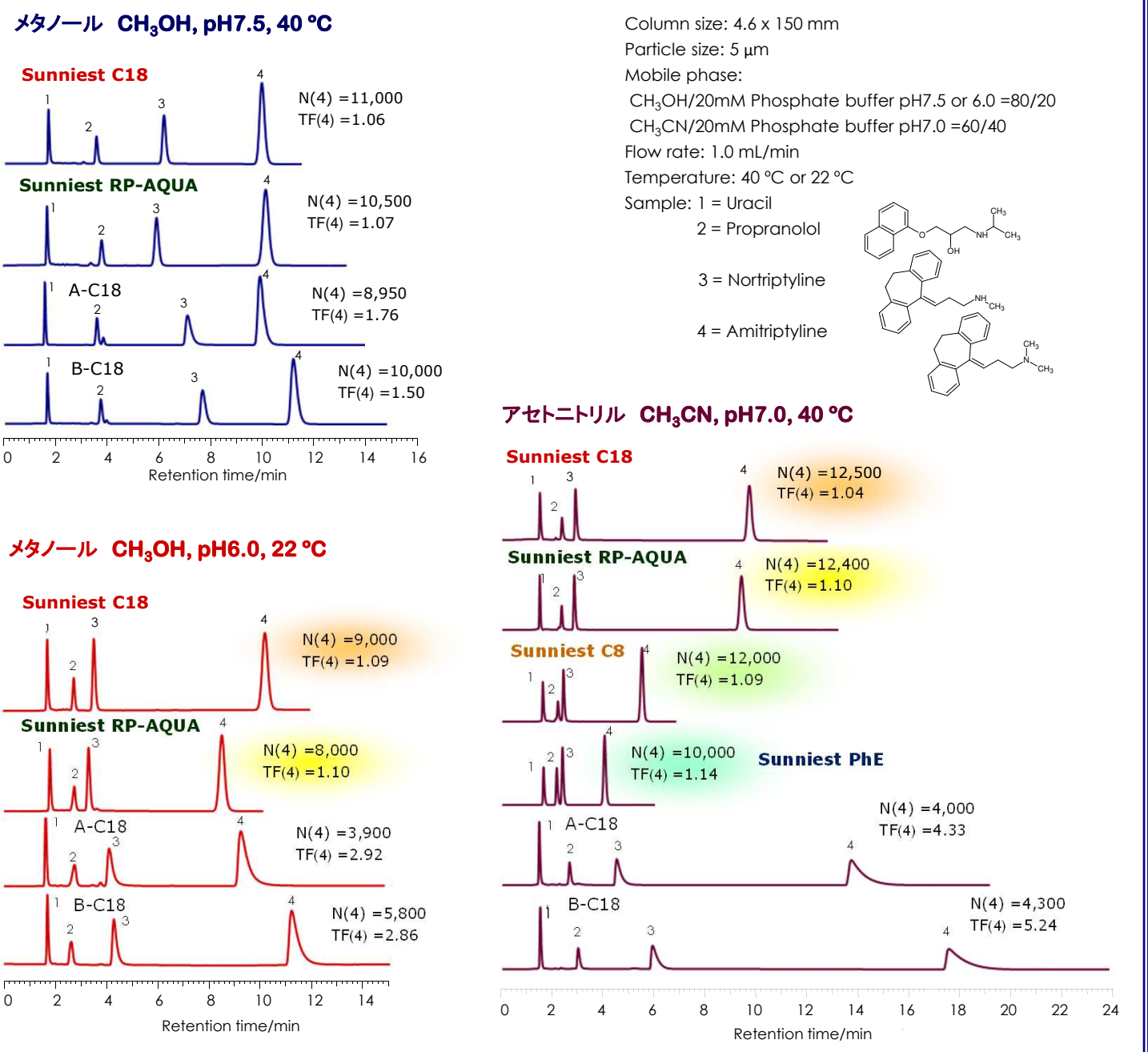
★RP-AQUA with C28 bonding offers Performance in 100% aqueous conditions, and shows enhanced retention of polar compounds.

Characteristics of Sunniest

	Particle size (μm)	Pore diameter (nm)	Specific surface area (m^2/g)	Carbon content (%)	Bonded point	USP L line	pH range
Sunniest C18	3 and 5	12	340	16	C18	L1	1.5 - 10
Sunniest C18-HT	2	10	340	16	C18	L1	1.5 - 10
Sunniest RP-AQUA	3 and 5	12	340	16	C28	L62	2 - 8
Sunniest C8	3 and 5	12	340	10	C8	L7	1.5 - 9
Sunniest PhE	3 and 5	12	340	10	Phenylethyl	L11	1.5 - 8
Sunniest PFP	5	12	340	10	Pentafluorophenyl	L43	2 - 8

◆Evaluation of End-capping

Comparison of plates number (N) and USP tailing factor (TF) of amitriptyline

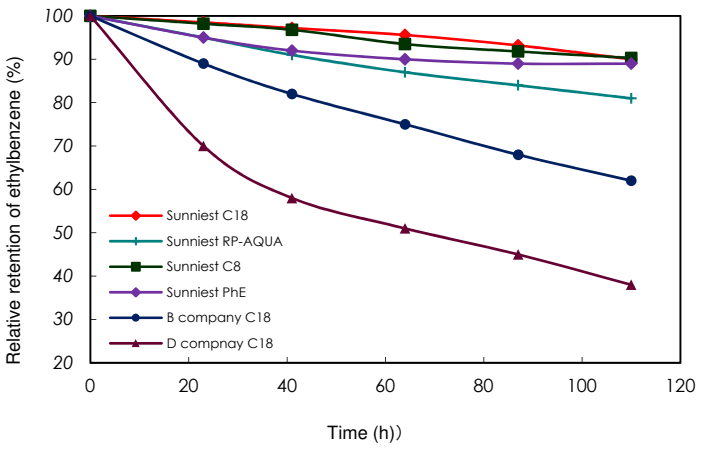


Amitriptyline is widely used to evaluate residual silanol groups on the C18 stationary phase. Peak shape of Amitriptyline was compared under 3 kinds of conditions such as methanol/phosphate buffer/40 ℃, methanol/phosphate buffer/22 ℃ and acetonitrile/phosphate buffer/40 ℃. Majority of the HPLC columns offered good peak shapes under methanol/phosphate buffer/40 ℃ conditions. However using Mobile phase of acetonitrile/phosphate buffer/40 ℃, most of the columns(Refer column A and B) offered high extent of Tailing unlike Sunniest columns offering a symmetrical peak.

Sunniest C18, RP-AQUA and C8 columns allow to use a wide range of mobile phase without peak tailing because of extremely low content of residual silanol groups on the stationary phase.

Sunniest C18,C18-HT,
Sunniest RP-AQUA
SunniestC8,PhE,PFP

◆Stability under acidic and basic pH conditions

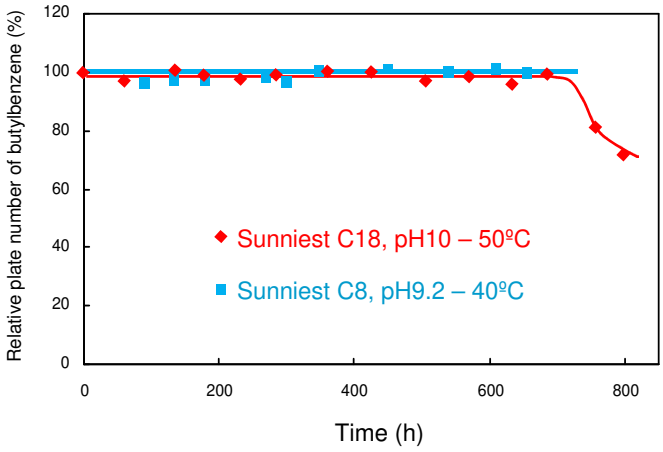


Durable test condition

Column size: 150 x 4.6 mm
Mobile phase: CH_3CN/1.0% TFA (pH1) = 10/90
Flow rate: 1.0 mL/min
Temperature: 80 °C

Measurement condition

Column size: 150 x 4.6 mm
Mobile phase: CH_3CN/H_2O=60/40
Flow rate: 1.0 mL/min
Temperature: 40 °C
Sample: 1 = Uracil
2 = Ethylbenzene



Durable test condition

Column: Sunniest C18, C8, 5 µm 150 x 4.6 mm
Mobile phase:
C18: CH_3OH/20mM Sodium borate/10mM NaOH=30/21/49 (pH10)
C8: CH_3OH/20mM Sodium borate (pH9.2) =30/70
Flow rate: 1.0 mL/min
Temperature: C18 - 50 °C, C8 - 40 °C

Measurement condition

Column: Sunniest C18, C8, 5µm 150 x 4.6 mm
Mobile phase: CH_3OH/H_2O=75/25
Flow rate: 1.0 mL/min
Temperature: 40 °C
Sample: 1 = Butylbenzene

Stability under acidic pH conditions was evaluated at 80 °C using acetonitrile/1% trifluoroacetic acid solution (10:90) as mobile phase. 100% aqueous mobile phase expels from the pore of packing materials by capillarity and packing materials doesn't deteriorate. 10% acetonitrile in a mobile phase allows an accurate evaluation.[1-3)]

★Sunniest C18 has kept 90% retention for 100 hours under severe conditions of acetonitrile /1% trifluoroacetic acid solution (pH 1)at 80 deg C.

Our Unique HMODTS bonding technique offers significant enhancement of column life,

Considering the Sunniest RP-AQUA C28 ligand length the Sunniest RP-AQUA is less stable than Sunniest C18. However, Sunniest RP-AQUA C28 column with HMODTS bonding along with end capping offers longer column life in comparison to other RP Aqua columns.

Stability under basic pH conditions was evaluated at 50 °C using methanol/Sodium borate buffer pH 10 (30:70) as mobile phase. Sodium borate is used as a alkaline standard solution for pH meter, so that its buffer capacity is high.

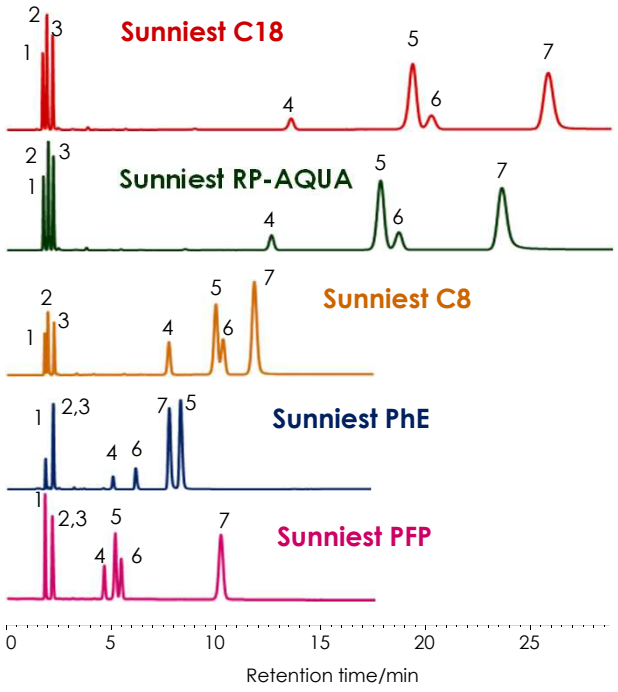
Elevated temperature of 10 °C makes column life be one third. When Sunniest C18 column is used at 40 °C, column life becomes 2,000 hours. Most of the HPLC columns stability data is offered at ambient room temperature alternate 25 °C at pH 1-10 units..At temperature of 25°C,the column life is sixteen times longer than that at 50 °C.

★ Sunniest C18 offers performance at elevated pH and temperature. Regarding stability under basic pH condition, there are very few C18 column like Sunniest C18 & Hybrid type C18 which can sustain and offer performance under such challenging conditions of high temperature and pH.It is considered that our double end-capping & base deactivation technique leads higher stability.

★ Sunniest C18 has operational pH Range from 1.5 to 10. Sunniest C8,Phenyl has operational pH Range 1.5 to 9 and Sunniest RP-Aqua and Pentaflorophenyl (PFP) at pH 2-8..

1) N. Nagae, T. Enami and S. Doshi, LC/GC North America October 2002.
2) T. Enami and N. Nagae, American Laboratory October 2004.
3) T. Enami and N. Nagae, BUNSEKI KAGAKU, 53 (2004) 1309.

◆Separation of standard samples



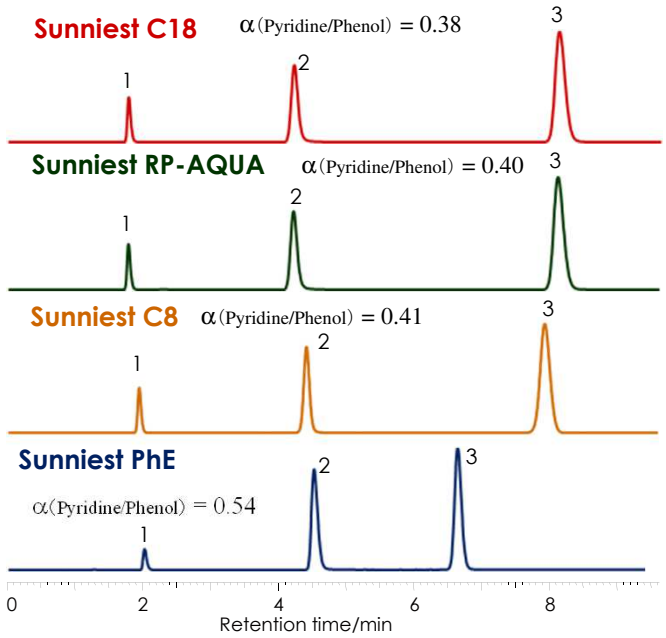
Column: Sunniest C18, 5 µm 4.6x150 mm
Sunniest RP-AQUA, 5 µm 4.6x150mm
Sunniest C8, 5 µm 4.6x150 mm
Sunniest PhE, 3 µm 4.6x150 mm
Sunniest PFP, 5 µm 4.6x150 mm
Mobile phase: CH_3OH/H_2O=75/25
Flow rate: 1.0 mL/min
Temperature: 40 °C
Pressure: 5.4 MPa
Sample: 1 = Uracil,
2 = Caffeine,
3 = Phenol,
4 = Butylbenzene, (N=15,700)
5 = o-Terphenyl, (N=15,000)
6 = Amylbenzene, (N=15,300)
7 = Triphenylene, (N=14,500)

N is plate number of the above Sunniest C18.

	C18	RP-AQUA	C8	PhE	PFP
Hydrophobicity					
α(Amylbenzene/Butylbenzene)	1.56	1.56	1.43	1.34	1.29
Hydrogen bonding capacity					
α(Caffeine/Phenol)	0.43	0.49	0.33	1.00	1.00
Steric selectivity					
α(Triphenylene/o-Terphenyl)	1.37	1.36	1.23	0.92	2.51
Residual silanol activity					
α(Pyridine/Phenol)	0.38	0.40	0.41	0.54	-----

Sunniest C18 shows not only high efficiency but also low column pressure.

◆Separation of pyridine and phenol



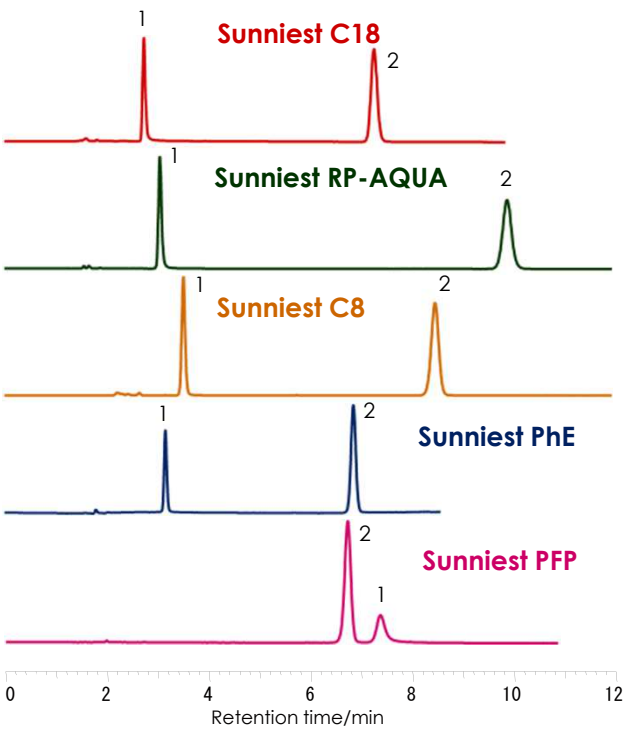
Column: Sunniest C18, 5 µm 4.6x150 mm
Sunniest RP-AQUA, 5 µm 4.6x150mm
Sunniest C8, 5 µm 4.6x150 mm
Sunniest PhE, 3 µm 4.6x150 mm
Mobile phase: CH_3OH/H_2O=30/70
Flow rate: 1.0 mL/min
Temperature: 40 °C
Detection: UV@250nm
Sample: 1 = Uracil
2 = Pyridine
3 = Phenol

Separation factor of pyridine and phenol is said to show the amount of residual silanol groups. The lower a value of separation factor, the less an effect of residual silanol groups.

All Sunniest columns show one of the lowest value.

Sunniest C18
Sunniest RP-AQUA
Sunniest C8

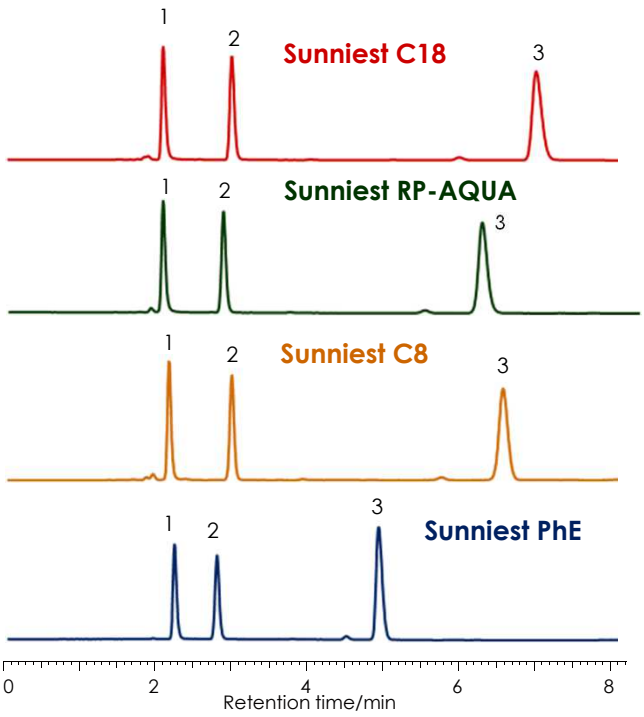
◆Separation of a chelating compound



Column: Sunniest C18, 5 μm 4.6x150 mm
Sunniest RP-AQUA, 5 μm 4.6x150mm
Sunniest C8, 5 μm 4.6x150 mm
Sunniest PhE, 3 μm 4.6x150 mm
Sunniest PFP, 5 μm 4.6x150 mm
Mobile phase: CH_3CN/20mM H_3PO_4=10/90
Flow rate: 1.0 mL/min
Temperature: 40 °C
Detection: UV@250nm
Sample: 1 = 8-Quinolinol
2 = Caffeine

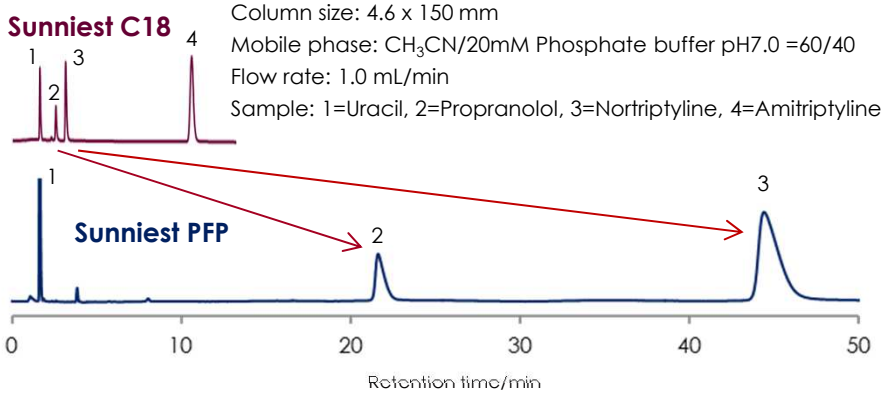
★Sunniest C18, RP-AQUA, C8 ,PhE and PFP are inert for a metal chelating compound and acidic and basic compounds, so that they show symmetrical peaks of each compound.

◆Separation of acidic compounds



Column: Sunniest C18, 5 μm 4.6x150 mm
Sunniest RP-AQUA, 5 μm 4.6x150mm
Sunniest C8, 5 μm 4.6x150 mm
Sunniest PhE, 3 μm 4.6x150 mm
Mobile phase: CH_3CN/0.1% H_3PO_4=2/98
Flow rate: 1.0 mL/min
Temperature: 40 °C
Detection: UV@210nm
Sample: 1 = Formic acid
2 = Acetic acid
3 = Propionic Acid

◆Retention comparison between C18 and PFP



Column size: 4.6 x 150 mm
Mobile phase: CH_3CN/20mM Phosphate buffer pH7.0 =60/40
Flow rate: 1.0 mL/min
Sample: 1=Uracil, 2=Propranolol, 3=Nortriptyline, 4=Amitriptyline

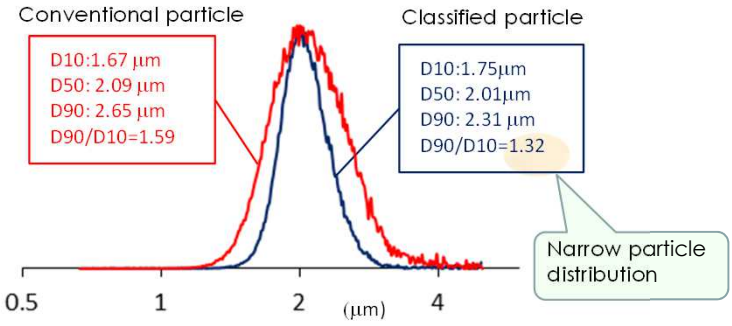
★PFP retains a cation such a nortriptyline much longer than a C18.

Sunniest C18-HT, 2 μm

Features
- Low back pressure and high efficiency by precisely classified particle
- High pressure packing (10,000 psi) using hard silica gels with high pressure resistant
- leads long column life without any void.
- Unique bonding technique for Sunniest
- The most suitable inner surface of column by special grinding

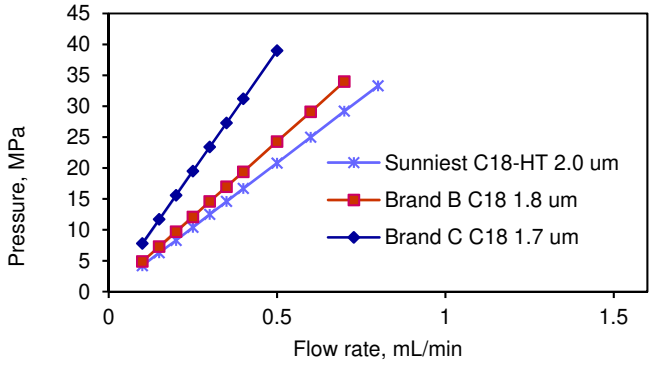
• Narrow Particle Distribution and Low Back Pressure

Measured by Coulter Counter method



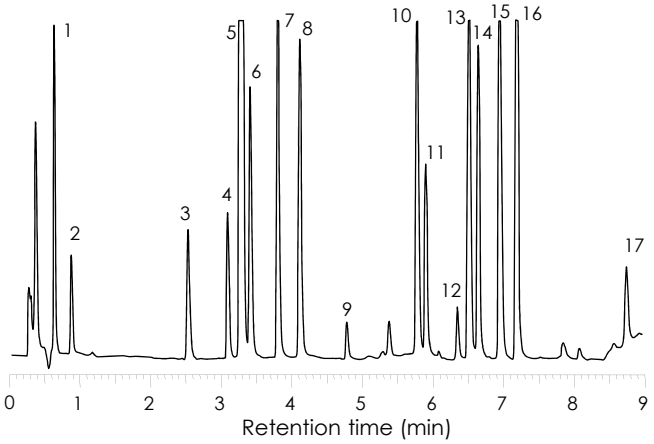
Conventional 2 μm silica gel particle was classified again. 20% volume was cut off from both sides respectively. Consequently column back pressure reduced more than 15%. Our 2 μm silica gel particle shows a half pressure to compare with the other sub-2 μm silica gel particle.

Comparison of back pressure



Column: Sunniest, Acquity and Zorbax
Column dimension: 50 x 2.1 mm
Mobile phase: Acetonitrile/water=(70/30)
Temperature: 25 °C

• Separation of Amino Acids derivatized with OPA and FMOC



Column: Sunniest C18-HT 2 μm, 100 x 2.1 mm
Mobile phase: A) 10mM Na2PO4 + 10mM Na2B4O7 + 0.5mM NaN3
B) Acetonitrile/Methanol/Water (45/45/10 %V)

Time(min)	0	0.2	7.2	7.8
%B	5	5	50	100

Flow rate: 0.72 mL/min
Temperature: 40 °C
Detection: UV@338 nm
Sample: 1=Aspartic acid, 2=Glutaminc acid, 3=Serine, 4=Histidine, 5=Glycine, 6=Threonine, 7=Arginine, 8=Alanine, 9=Tyrosine, 10=Valine, 11=Methionine, 12=Tryptophan, 13=Pnehylalanine, 14=Isoleucine, 15=Leucine, 16=Lysine, 17=Proline

• Characteristics of Sunniest C18-HT, 2 μm

Packings	Silica gel support			C18			
	Particle size (μm)	Pore diameter nm)	Specific surface area (m^2/g)	Carbon content (%)	Bonded phase	Maximum operating pressure	Available pH range
Sunniest C18-HT	2.0 (Coulter counter)	10	340	16	C18	70 MPa or 10,000 psi	1.5 - 10

It is very important for 2 mm particle to have a capacity to resist pressure because of high column back pressure. The larger a pore volume of silica gel, the weaker a capacity to resist pressure. The silica gel with 0.85 ml/g of pore volume is used for Sunniest C18-HT, 2 μm, so that it have a high capacity to resist pressure and a high operating pressure.

✻ Sunniest Ordering information

Inner diameter [mm]	Length [mm]	Sunniest C18, 3µm Catalog No.	Sunniest C18, 5µm Catalog No.	Sunniest RP-AQUA, 3µm Catalog No.	Sunniest RP-AQUA, 5µm Catalog No.	Sunniest C8, 3µm Catalog No.	Sunniest C8, 5µm Catalog No.
2	50	EB2241	EB3241	ER2241	ER3241	EC2241	EC3241
	75	EB2251	—	ER2251	—	EC2251	—
	100	EB2261	EB3261	ER2261	ER3261	EC2261	EC3261
	150	EB2271	EB3271	ER2271	ER3271	EC2271	EC3271
	250	EB2281	EB3281	ER2281	ER3281	EC2281	EC3281
3	50	EB2341	EB3341	ER2341	ER3341	EC2341	EC3341
	100	EB2361	EB3361	ER2361	ER3361	EC2361	EC3361
	150	EB2371	EB3371	ER2371	ER3371	EC2371	EC3371
	250	EB2381	EB3381	ER2381	ER3381	EC2381	EC3381
4.6	10	EB2411	EB3411	ER2411	ER3411	EC2411	EC3411
	50	EB2441	EB3441	ER2441	ER3441	EC2441	EC3441
	75	EB2451	—	ER2451	—	EC2451	—
	100	EB2461	EB3461	ER2461	ER3461	EC2461	EC3461
	150	EB2471	EB3471	ER2471	ER3471	EC2471	EC3471
	250	EB2481	EB3481	ER2481	ER3481	EC2481	EC3481
10	250	—	EB3781	—	ER3781	—	EC3781
20	50	—	EB3841	—	ER3841	—	EC3841
	150	—	EB3871	—	ER3871	—	EC3871
	250	—	EB3881	—	ER3881	—	EC3881

Inner diameter [mm]	Length [mm]	Sunniest PhE, 3 µm Catalog No.	Sunniest PhE, 5 µm Catalog No.	Sunniest PFP, 5 µm Catalog No.
2.0	50	EP2241	EP3241	—
	75	EP2251	—	—
	100	EP2261	EP3261	—
	150	EP2271	EP3271	—
	250	EP2281	EP3281	—
3.0	50	EP2341	EP3341	—
	100	EP2361	EP3361	—
	150	EP2371	EP3371	—
	250	EP2381	EP3381	—
4.6	10	—	EP3411	—
	50	EP2441	EP3441	EF3441
	75	EP2451	—	—
	100	EP2461	EP3461	EF3461
	150	EP2471	EP3471	EF3471
	250	EP2481	EP3481	EF3481
10.0	250	—	EP3781	—
20.0	50	—	EP3841	—
	150	—	EP3871	—
	250	—	EP3881	—

Inner diameter [mm]	Length [mm]	Sunniest C18-HT, 2 µm Catalog No.
2.1	30	EB1931
	50	EB1941
	75	EB1951
	100	EB1961
3.0	30	EB1331
	50	EB1341
	75	EB1351
	100	EB1361

Global Distributor
Biotech AB
Råövägen 300, SE-439 92 Onsala, Sweden
Tel +46 (0)300-56 91 80
E-mail: info@biotech.se
www.biotech.se

Manufacturer
ChromaNik Technologies Inc.
6-3-1 Namiyoke, Minato-ku, Osaka, 552-0001 Japan
TEL: +81-6-6581-0885 FAX: +81-6-6581-0890
E-mail: info@chromanik.co.jp
URL: http://chromanik.co.jp

1809