Pinnacle® DB Columns: 1.9, 3, or 5 µm particles; 140 Å pore size

Restek® Pinnacle® DB columns are built for optimal UHPLC performance.

Pinnacle® DB columns are 100% manufactured by Restek in our Bellefonte, Pennsylvania, facility. Because performance begins with the support, our Pinnacle® DB UHPLC columns start with base-deactivated spherical silica that is optimized for UHPLC stability. From there, we bond them with a wide variety of phases to give chromatographers a stable and selective column. Get the most out of your UHPLC system. Combine selectivity and efficiency by using Restek® Pinnacle® DB UHPLC columns.

Pinnacle® DB Aqueous C18 Columns (USP L1)

Restek-manufactured silica

Chromatographic Properties

The Restek® Aqueous C18 is a rugged, reversed-phase column with a well-balanced retention profile. It can effectively retain more types of solutes than a conventional C18 and is ideal for multicomponent LC-MS analyses. The general-purpose Aqueous C18 boasts high reproducibility and compatibility with many mobile phase conditions—even 100% aqueous. And when used with a gradient, it eliminates the all-too-common issue of multiple compounds eluting near the column void time.

Length	2.1 mm ID cat.#	3.0 mm ID cat.#	4.6 mm ID cat.#
1.9 µm Columns			
30 mm	9418232	—	—
50 mm	9418252	—	—
100 mm	9418212	—	—
3 µm Columns			
30 mm	9418332	941833E	9418335
50 mm	9418352	941835E	9418355
100 mm	9418312	941831E	9418315
150 mm	9418362	941836E	9418365
5 µm Columns			
30 mm	9418532	941853E	9418535
50 mm	9418552	941855E	9418555
100 mm	9418512	941851E	9418515
150 mm	9418562	941856E	9418565
200 mm	9418522	941852E	9418525
250 mm	9418572	941857E	9418575

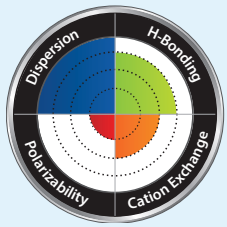
Column Characteristics:

particle size:	1.9 µm, 3 µm, or 5 µm, spherical
pore size:	140 Å
carbon load:	6%
pH range:	2.5 to 8
temperature limit:	80 °C
USP phase code:	L1
phase category:	modified C18
ligand type:	proprietary polar modified and functionally bonded C18

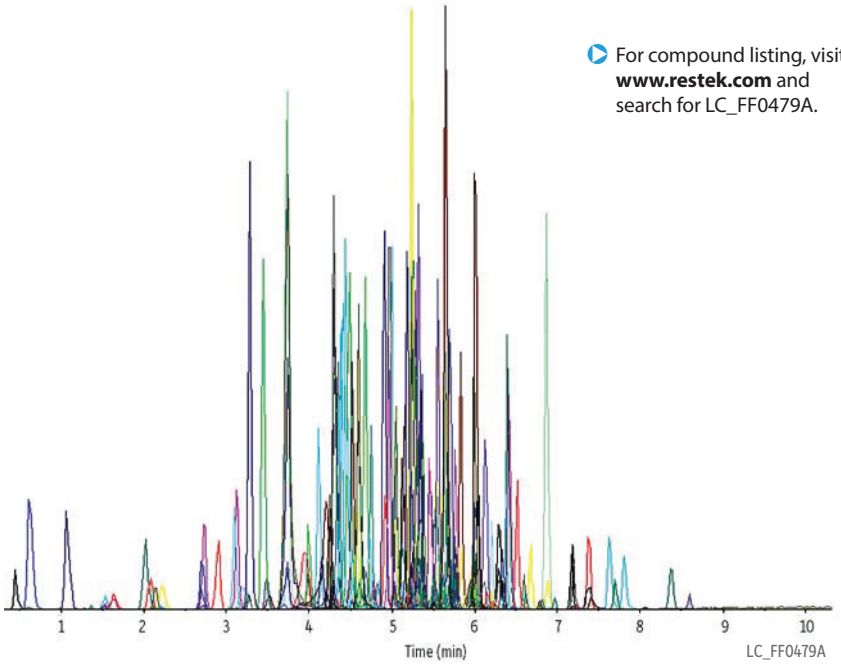
Aqueous C18

USLC® Column Interaction Profile

(See page 161 for more information.)



Pesticides on Pinnacle® DB Aqueous C18 (LC-MS/MS, ESI+)



For compound listing, visit **www.restek.com** and search for LC_FF0479A.

Column	Pinnacle® DB Aqueous C18 (cat.# 9418252)
Dimensions:	50 mm x 2.1 mm ID
Particle Size:	1.9 µm
Pore Size:	140 Å
Temp.:	35 °C
Sample	multicomponent pesticide standard
Diluent:	water
Conc.:	33.3 ppb each pesticide
Inj. Vol.:	5 µL
Mobile Phase	
A:	10 mM NH_4OAc in water
B:	10 mM NH_4OAc in methanol

Time (min)	%B
0	10
1	10
8	90
10	90
11	10

Flow:	0.60 mL/min
Max Pressure:	~517 bar
Detector	Applied Biosystems/MDS Sciex LC-MS/MS
Model #:	4000 QTRAP® LC-MS/MS system
Ion Source:	TurboIonSpray®
Ion Spray Voltage:	5 kV
Gas 1:	40 psi (275.8 kPa)
Gas 2:	60 psi (413.7 kPa)
Source Temp.:	500 °C
Instrument	Shimadzu UFLCXR

Pinnacle® DB IBD UHPLC Columns (USP L68)

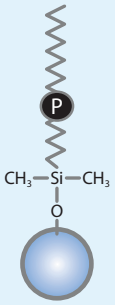
Restek-manufactured silica

Chromatographic Properties

The Restek® IBD is a polar-embedded column that acts as a strong hydrogen bonder and may be the most versatile column available today. With a unique polar group, this column is very retentive and selective for acids. It also provides symmetrical peak shape for strong bases. Restek's IBD is compatible with 100% aqueous mobile phases and can be used under reversed-phase or HILIC conditions to retain very polar, ionic compounds in highly organic mobile phases.

Column Characteristics:

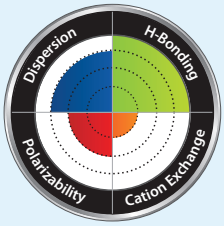
particle size:	1.9 µm, spherical
pore size:	140 Å
end-cap:	no
pH range:	2.5 to 8
temperature limit:	80 °C
USP phase code:	L68
phase category:	polar-embedded alkyl
ligand type:	proprietary polar functional embedded alkyl



IBD

USLC® Column Interaction Profile

(See page 161 for more information.)



Length	2.1 mm ID cat.#
1.9 µm Columns	
30 mm	9425232
50 mm	9425252
100 mm	9425212

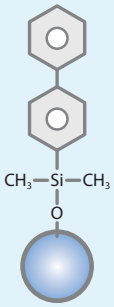
Pinnacle® DB Biphenyl Columns (USP L11)

Restek-manufactured silica

Chromatographic Properties

Since 2005, the Restek® Biphenyl has offered a greater degree of dispersion than conventional phenyls and a greater degree of polarizability than phenyl hexyls, creating higher selectivity and a greater range of usability. Because of these heightened interactions, this column shows substantial increases in retention—especially for dipolar, unsaturated, or conjugated solutes—and enhanced orthogonal selectivity when using methanol mobile phases. It is ideal for increasing sensitivity and selectivity in LC-MS analyses.

Length	2.1 mm ID cat.#	3.0 mm ID cat.#	4.6 mm ID cat.#
1.9 µm Columns			
30 mm	9409232	—	—
50 mm	9409252	—	—
100 mm	9409212	—	—
3 µm Columns			
30 mm	9409332	940933E	9409335
50 mm	9409352	940935E	9409355
100 mm	9409312	940931E	9409315
150 mm	9409362	940936E	9409365
5 µm Columns			
30 mm	9409532	940953E	9409535
50 mm	9409552	940955E	9409555
100 mm	9409512	940951E	9409515
150 mm	9409562	940956E	9409565
200 mm	9409522	940952E	9409525
250 mm	9409572	940957E	9409575



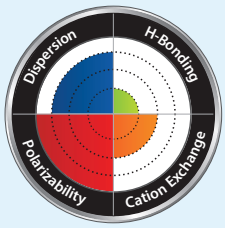
Biphenyl

Column Characteristics:

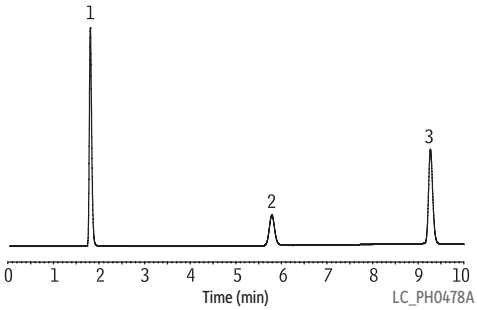
particle size:	1.9 µm, 3 µm, or 5 µm, spherical
pore size:	140 Å
carbon load:	8%
end-cap:	yes
pH range:	2.5 to 8
temperature limit:	80 °C
USP phase:	L11
phase category:	phenyl
ligand type:	unique Biphenyl

USLC® Column Interaction Profile

(See page 161 for more information.)



NSAIDs on Pinnacle® DB Biphenyl



Peaks
1. Uracil (void marker)
2. Tenoxicam
3. Sulfinpyrazone

Column	Pinnacle® DB Biphenyl (cat.# 9409565)
Dimensions:	150 mm x 4.6 mm ID
Particle Size:	5 µm
Pore Size:	140 Å
Temp.:	30 °C
Sample	
Diluent:	0.1% formic acid in water:methanol (40:60)
Conc.:	100 µg/mL each component (see peak list)
Inj. Vol.:	10 µL
Mobile Phase	
A:	0.1% formic acid in water
B:	methanol

Time (min)	%B
0.00	60
2.0	60
8.0	90
20.0	90
20.1	60

Flow:	1.0 mL/min
Detector	UV/Vis @ 254 nm
Instrument	Shimadzu Prominence

Pinnacle® DB PFP Propyl Columns (USP L43)

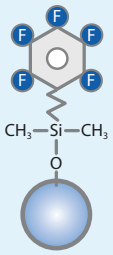
Restek-manufactured silica

Chromatographic Properties

The Restek® PFP Propyl is a great choice for the retention and selectivity of charged bases, electronegative compounds, and amine-containing compounds. Unlike a conventional cyano column, the Restek® PFP Propyl is much more amenable to LC-MS because it is more reliable and efficient with acidic mobile phases. This versatile column is also compatible with highly aqueous mobile phases and HILIC separations.

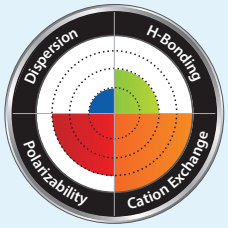
Column Characteristics:

particle size:	1.9 µm, 3 µm, or 5 µm, spherical
pore size:	140 Å
carbon load:	6%
end-cap:	yes
pH range:	2.5 to 8
temperature limit:	80 °C
USP phase code:	L43
phase category:	fluorophenyl propyl
ligand type:	pentafluorophenyl propyl



PFP Propyl

USLC® Column Interaction Profile
(See page 161 for more information.)



Length	2.1 mm ID cat.#	3.0 mm ID cat.#	4.6 mm ID cat.#
1.9 µm Columns			
30 mm	9419232	—	—
50 mm	9419252	—	—
100 mm	9419212	—	—
3 µm Columns			
30 mm	9419332	941933E	9419335
50 mm	9419352	941935E	9419355
100 mm	9419312	941931E	9419315
150 mm	9419362	941936E	9419365
5 µm Columns			
30 mm	9419532	941953E	9419535
50 mm	9419552	941955E	9419555
100 mm	9419512	941951E	9419515
150 mm	9419562	941956E	9419565
200 mm	9419522	941952E	9419525
250 mm	9419572	941957E	9419575

Pinnacle® DB C18 Columns (USP L1)

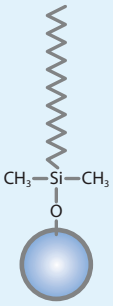
Restek-manufactured silica

Chromatographic Properties

The general-purpose Restek® C18 is a conventional monomeric octadecylsilane column suitable for analyses of a wide range of compounds from acidic through slightly basic.

Column Characteristics:

particle size:	1.9 µm, 3 µm, or 5 µm, spherical
pore size:	140 Å
carbon load:	11%
end-cap:	yes
pH range:	2.5 to 8
temperature limit:	80 °C
USP phase code:	L1
phase category:	C18, octadecylsilane
ligand type:	monomeric C18



C18

Length	2.1 mm ID cat.#	3.0 mm ID cat.#	4.6 mm ID cat.#
1.9 µm Columns			
30 mm	9414232	—	—
50 mm	9414252	—	—
100 mm	9414212	—	—
3 µm Columns			
30 mm	9414332	941433E	9414335
50 mm	9414352	941435E	9414355
100 mm	9414312	941431E	9414315
5 µm Columns			
30 mm	9414532	941453E	9414535
50 mm	9414552	941455E	9414555
100 mm	9414512	941451E	9414515
150 mm	9414562	941456E	9414565
200 mm	9414522	941452E	9414525
250 mm	9414572	941457E	9414575

also available

Trident Direct Guard Column System

See page 189.

Looking for an equivalent column?

Restek has extensively studied column selectivity and can provide you with an accurate recommendation. Please contact Restek® Technical Support or your local Restek® representative.

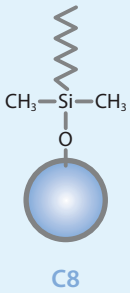
Pinnacle® DB C8 Columns (USP L7)

Restek-manufactured silica

Chromatographic Properties

Our C8 is a conventional monomeric octylsilane column offering a shorter alkyl chain to provide less hydrophobic retention and improved basic peak shape over a traditional C18 phase. Like our C18, this general-purpose Restek® C8 is suitable for a wide range of compounds from acidic through slightly basic.

Length	2.1 mm ID cat.#	3.0 mm ID cat.#	4.6 mm ID cat.#
1.9 µm Columns			
30 mm	9413232	—	—
50 mm	9413252	—	—
100 mm	9413212	—	—
3 µm Columns			
30 mm	9413332	941333E	9413335
50 mm	9413352	941335E	9413355
100 mm	9413312	941331E	9413315
5 µm Columns			
30 mm	9413532	941353E	9413535
50 mm	9413552	941355E	9413555
100 mm	9413512	941351E	9413515
150 mm	9413562	941356E	9413565
200 mm	9413522	941352E	9413525
250 mm	9413572	941357E	9413575



C8

Column Characteristics:

particle size:	1.9 µm, 3 µm, or 5 µm, spherical
pore size:	140 Å
carbon load:	6%
end-cap:	yes
pH range:	2.5 to 8
temperature limit:	80 °C
USP phase code:	L7
phase category:	C8, octylsilane
ligand type:	monomeric C8

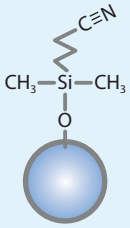
Pinnacle® DB Cyano Columns (USP L10)

Restek-manufactured silica

Chromatographic Properties

The Restek® Cyano is a traditional monomeric cyanopropylsilane that is recommended for assays where alternate selectivity, or confirmation, to a C18 or C8 column is desired. It can be used in normal-phase, reversed-phase (best with mobile phase pH between 5 and 7), and HILIC modes. It is an excellent choice for the analysis of protonated bases.

Length	2.1 mm ID cat.#	3.0 mm ID cat.#	4.6 mm ID cat.#
1.9 µm Columns			
30 mm	9416232	—	—
50 mm	9416252	—	—
100 mm	9416212	—	—
5 µm Columns			
30 mm	9416532	941653E	9416535
50 mm	9416552	941655E	9416555
100 mm	9416512	941651E	9416515
150 mm	9416562	941656E	9416565
200 mm	9416522	941652E	9416525
250 mm	9416572	941657E	9416575



Cyano

Column Characteristics:

particle size:	1.9 µm or 5 µm, spherical
pore size:	140 Å
carbon load:	4%
end-cap:	yes
pH range:	2.5 to 8
temperature limit:	80 °C
USP phase code:	L10
phase category:	cyano
ligand type:	cyanopropylsilane

Whether it's on our new Raptor™ SPP or the proven Pinnacle® DB and Ultra supports, Restek's LC Manufacturing group bonds our silica with stationary phases that offer maximum selectivity and reliability.

Pinnacle® DB Silica Columns (USP L3)

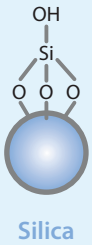
Restek-manufactured silica

Chromatographic Properties

Base-deactivated spherical silica is useful for normal-phase or HILIC separations.

Column Characteristics:

particle size:	1.9 µm, 3 µm, or 5 µm, spherical
pore size:	140 Å
end-cap:	no
pH range:	2.5 to 8
temperature limit:	80 °C
USP phase code:	L3
phase category:	bare silica
ligand type:	none



Length	2.1 mm ID cat.#	3.0 mm ID cat.#	4.6 mm ID cat.#
1.9 µm Columns			
30 mm	9410232	—	—
50 mm	9410252	—	—
100 mm	9410212	—	—
3 µm Columns			
30 mm	9410332	941033E	9410335
50 mm	9410352	941035E	9410355
100 mm	9410312	941031E	9410315
150 mm	9410362	941036E	9410365
5 µm Columns			
30 mm	9410532	941053E	9410535
50 mm	9410552	941055E	9410555
100 mm	9410512	941051E	9410515
150 mm	9410562	941056E	9410565
200 mm	9410522	941052E	9410525
250 mm	9410572	941057E	9410575

Pinnacle® DB PAH UHPLC Columns

Restek-manufactured silica

Chromatographic Properties

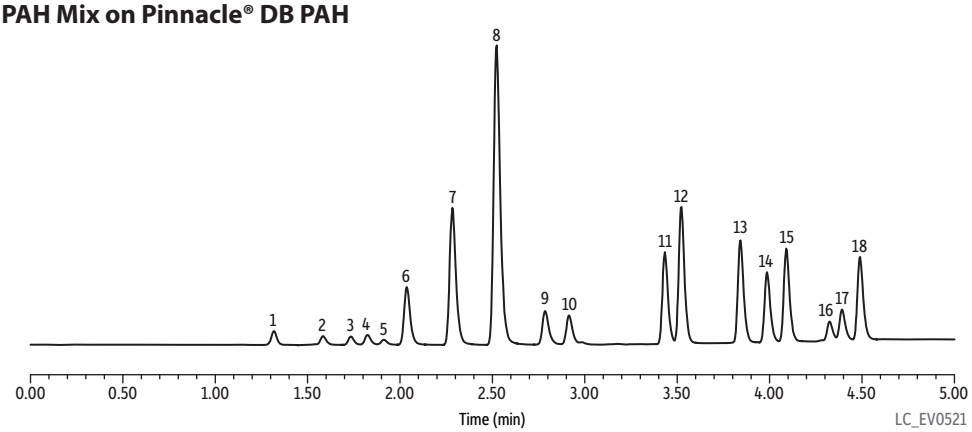
Specifically designed to resolve complex mixtures of polycyclic aromatic hydrocarbons (PAHs). Get complete resolution of all 16 EPA 610 PAHs, plus two other routinely analyzed PAH compounds, in less than five minutes to greatly reduce run times and increase sample throughput.

Column Characteristics:

particle size:	1.9 µm, spherical
pore size:	140 Å
end-cap:	no
pH range:	2.5 to 8
temperature limit:	80 °C

Length	2.1 mm ID cat.#
1.9 µm Columns	
30 mm	9470232
50 mm	9470252
100 mm	9470212

PAH Mix on Pinnacle® DB PAH



Peaks
1. Naphthalene
2. Acenaphthylene
3. 1-Methylnaphthalene
4. 2-Methylnaphthalene
5. Acenaphthene
6. Fluorene
7. Phenanthrene
8. Anthracene
9. Fluoranthene
10. Pyrene
11. Benzo[a]anthracene
12. Chrysene
13. Benzo[b]fluoranthene
14. Benzo[k]fluoranthene
15. Benzo[a]pyrene
16. Dibenzo[a,h]anthracene
17. Benzo[ghi]perylene
18. Indeno[1,2,3-cd]pyrene

Column	Pinnacle® DB PAH (cat.# 9470252)
Dimensions:	50 mm x 2.1 mm ID
Particle Size:	1.9 µm
Pore Size:	140 Å
Temp.:	30 °C
Sample	EPA Method 8310 PAH Mixture (cat.# 31841)
Diluent:	acetonitrile
Conc.:	10 µg/mL
Inj. Vol.:	1 µL

Mobile Phase
A: water
B: acetonitrile

Time (min)	Flow (mL/min)	%A	%B
0	0.8	60	40
2	0.8	40	60
4	0.8	0	100
4.5	0.8	0	100
4.51	0.8	60	40
5	0.8	60	40

Max Pressure: 724 bar
Detector Photo diode array @ 254, 4.8 nm
Instrument Waters