

Waters Column Selection Guide for Polar Compounds

Waters HILIC and reversed-phase LC columns specifically developed to tackle polar analyte separations.

Compound Polarity

-4

-3

-2

-1

0

1

2

3

4

log P

More Polar Analytes

HILIC Recommended

Less Polar Analytes

Reversed-Phase Recommended

Is the polar compound acidic, basic, or neutral?

Basic and Neutral Compounds



CORTECS™ HILIC

Particle Size

1.6 µm

2.7 µm

5 µm

Performance Benefits

High efficiency column designed for retention of very polar, basic, water-soluble analytes, pH stability 1–5.

Bonding

Unbonded, high-purity, solid-core silica particles.



BEH HILIC



Particle Size

1.7 µm

2.5 µm

3.5 µm

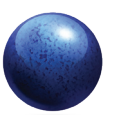
5 µm

Performance Benefits

Excellent for retention of very polar, basic, water-soluble analytes. Improved high-pH stability vs unbonded silica; recommended for use from pH 1–9.

Bonding

Unbonded Ethylene Bridged Hybrid (BEH) particles.



Atlantis™ HILIC

Particle Size

3.0 µm

5 µm

Performance Benefits

Excellent for retention of very polar, basic, water soluble analytes. pH stability from 1–5.

Bonding

Unbonded high purity Atlantis silica particles.

Acidic, Basic, and Neutral Compounds



Atlantis BEH Z-HILIC



Particle Size

1.7 µm

2.5 µm

5 µm

Performance Benefits

Excellent retention and complementary selectivity for a wide range of polar compounds using HILIC. Ideal for wide panel metabolite methods. Excellent low- and high-pH stability 2–10.

Bonding

Zwitterionic sulfobetaine groups attached to highly retentive 95 Å Ethylene Bridged Hybrid (BEH) particles.



BEH Amide



Particle Size

1.7 µm

2.5 µm

3.5 µm

5 µm

Performance Benefits

Rugged HILIC stationary phase designed to separate a wide range of polar compounds. Especially useful for separating carbohydrates (saccharides) using high concentrations of organic modifier, elevated temperature, and high pH. Compatible with all modern detectors including MS, ELSD, UV, and fluorescence. pH stability from 2–11.

Bonding

Amide groups attached to Ethylene Bridged Hybrid (BEH) particles.

Acidic and Neutral Compounds



Atlantis BEH C₁₈ AX



Particle Size

1.7 µm

2.5 µm

5 µm

Performance Benefits

Excellent retention of polar acidic analytes, and an alternative selectivity when compared to traditional C₁₈ phases, especially for ionizable analytes. Excellent low- and high-pH stability, low MS bleed, and compatible with 100% aqueous mobile phases. pH stability from 2–10.

Bonding

Mixed-mode C₁₈/anion-exchange bonding, fully endcapped, bonded to highly retentive 95 Å Ethylene Bridged Hybrid (BEH) particles.

Acidic, Basic, and Neutral Compounds



CORTECS T3



Particle Size

1.6 µm

2.7 µm

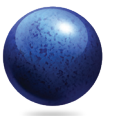
5 µm

Performance Benefits

Aqueous mobile phase compatible column designed to maximize efficiency. Provides balanced retention for both polar and non-polar compounds. pH stability from 2–8.

Bonding

Intermediate coverage trifunctional C₁₈ bonding, fully endcapped, bonded to silica solid-core particles.



HSS T3



Particle Size

1.8 µm

2.5 µm

3.5 µm

5 µm

Performance Benefits

Aqueous mobile-phase compatible column designed for exceptional polar compound retention. pH stability from 2–8.

Bonding

Intermediate coverage trifunctional C₁₈ bonding, fully endcapped, bonded to High Strength Silica (HSS) particles.



Atlantis T3

Particle Size

3 µm

5 µm

10 µm

Performance Benefits

Designed for enhanced polar compound retention, offering superior stability under low pH conditions and compatible with 100% aqueous mobile phases. Directly scalable to preparative scale. pH stability from 2–8.

Bonding

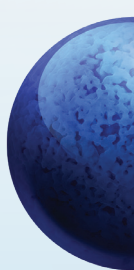
Intermediate coverage trifunctional C₁₈ bonding, fully endcapped, bonded to high purity Atlantis silica particles.

Particle Technologies



BEH Technology™

- Stable across a wide pH range
- Seamless scalability from UPLC to HPLC and preparative LC
- Superior chemical stability



HSS Technology

- High retentive UPLC/UHPLC/HPLC silica particle
- High strength silica for mechanical stability at elevated operating pressures
- Seamless scalability from UPLC to HPLC and preparative LC



Solid-Core Technology

- Maximum separation efficiency
- Sharper peaks for increased sensitivity
- Seamless scalability from UPLC to UHPLC to HPLC



Atlantis Silica

- High retentive HPLC silica particle
- Seamless scalability from HPLC to preparative LC

Common LC Buffers

Mobile-Phase Chemical	pK _a	Buffer Range	Formula	Volume or Mass Required for 10 mM Mobile-Phase Concentration (per 1 L)	pH Adjustment Acid/Base	MS Compatible?	HILIC Compatible?
Acetic Acid (glacial)	4.8	—	CH ₃ COOH	0.571 mL	—	✓	✓
Ammonium Acetate pK _a 1	4.8	3.8–5.8	CH ₃ COONH ₄	0.770 g	CH ₃ COOH or NH ₄ OH	✓	✓
Ammonium Acetate pK _a 2	9.2	8.2–10.2	CH ₃ COONH ₄	0.770 g	CH ₃ COOH or NH ₄ OH	✓	✓
Ammonium Bicarbonate	9.2, 10.3	8.2–11.3	NH ₄ HCO ₃	0.790 g	HCOOH or NH ₄ OH	✓	✓
Ammonium Formate pK _a 1	3.8	2.8–4.8	HCOONH ₄	0.640 g	HCOOH or NH ₄ OH	✓	✓
Ammonium Formate pK _a 2	9.2	8.2–10.2	HCOONH ₄	0.640 g	HCOOH or NH ₄ OH	✓	✓
Ammonium Hydroxide (28%)	9.2	—	NH ₄ OH	0.675 mL	—	✓	✓
Ammonium Phosphate, Dibasic	7.2, 9.2	6.2–10.2	(NH ₄) ₂ HPO ₄	1.32 g	H ₃ PO ₄ or NH ₄ OH	✗	✓
Formic Acid	3.8	—	HCOOH	0.420 mL	—	✓	✓
N-Methylpyrrolidine	10.3	—	C ₅ H ₁₁ N	1.04 mL	—	✓	✓
Phosphoric Acid	2.1	—	H ₃ PO ₄	0.580 mL	—	✗	✓
Potassium Phosphate, Monobasic	2.1	1.1–3.1	KH ₂ PO ₄	1.36 g	H ₃ PO ₄ or KOH	✗	✗
Potassium Phosphate, Dibasic	7.2	6.2–8.2	K ₂ HPO ₄	1.74 g	H ₃ PO ₄ or KOH	✗	✗
Potassium Phosphate, Tribasic	12.7	11.7–13.7	K ₃ PO ₄	2.12 g	H ₃ PO ₄ or KOH	✗	✗
Pyrrolidine	11.3	—	C ₄ H ₉ N	0.833 mL	—	✓	✓
Sodium Borate	9.1, 12.7, 13.8	8.2–14	Na ₂ B ₄ O ₇	2.01 g	H ₃ BO ₄ or NaOH	✗	✗
Sodium Citrate, Tribasic	3.1, 4.8, 6.4	2.1–7.4	HOC(COONa)(CH ₂ COONa) ₂	2.58 g	Citric Acid or NaOH	✗	✗
Triethylamine (TEA)	11.01	—	(CH ₃ CH ₂) ₃ N	1.39 mL	—	✓	✓
Triethylammonium Acetate (TEAA) pK _a 1	4.76	3.8–5.8	(CH ₃ CH ₂) ₃ NH:CH ₃ COO	0.695 mL TEA/0.571 mL Acetic Acid	TEA or CH ₃ COOH	✓	✓
Triethylammonium Acetate (TEAA) pK _a 2	11.01	10.0–12.0	(CH ₃ CH ₂) ₃ NH:CH ₃ COO	1.39 mL TEA/0.285 mL Acetic Acid	TEA or HCOOH	✓	✓
Triethylammonium Formate (TEAF) pK _a 1	3.75	2.8–4.8	(CH ₃ CH ₂) ₃ NH:HCOO	0.695 mL TEA/0.420 mL Formic Acid	TEA or HCOOH	✓	✓
Triethylammonium Formate (TEAF) pK _a 2	11.01	10.0–12.0	(CH ₃ CH ₂) ₃ NH:HCOO	1.39 mL TEA/0.210 mL Formic Acid	TEA or HCOOH	✓	✓
Trifluoroacetic Acid (TFA)	0.3	—	CF ₃ COOH	0.743 mL	—	✓	✓



Select column configurations that show the MaxPeak Premier symbol are available in the MaxPeak Premier Column format. The MaxPeak Premier Columns utilize MaxPeak High Performance Surfaces (HPS) Technology which increases reproducibility, improves peak shape, and enables more accurate recovery by minimizing unwanted analyte/surface interactions.