XSelect Columns · Atlantis Columns · CORTECS Columns · Acquity UPLC · XBridge Columns

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

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

MAXPEAK PREMIER

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

MAXPEAK PREMIER

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 C_{18} AX

MAXPEAK PREMIER

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 C_{18} 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 C_{18}/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

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

Bonding
Intermediate coverage trifunctional C_{18} bonding, fully endcapped, bonded to silica solid-core particles.

HSS T3

MAXPEAK PREMIER

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 C_{18} 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 is compatible with 100% aqueous mobile phases. Directly scalable to preparative scale. pH stability from 2–8.

Bonding
Intermediate coverage trifunctional C_{18} 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
- Superior chemical stability

HSS Technology
- High retentive UPLC/UHPLC/HPLC silica particle
- High strength silica for mechanical stability at elevated operating pressures

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 scalabilty 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_3COOH	0.571 mL	—	✓	✓
Ammonium Acetate pK_a 1	4.8	3.8–5.8	CH_3COONH_4	0.770 g	CH_3COOH or NH_4OH	✓	✓
Ammonium Acetate pK_a 2	9.2	8.2–10.2	CH_3COONH_4	0.770 g	CH_3COOH or NH_4OH	✓	✓
Ammonium Bicarbonate	9.2, 10.3	8.2–11.3	NH_4HCO_3	0.790 g	HCOOH or NH_4OH	✓	✓
Ammonium Formate pK_a 1	3.8	2.8–4.8	$HCOONH_4$	0.640 g	HCOOH or NH_4OH	✓	✓
Ammonium Formate pK_a 2	9.2	8.2–10.2	$HCOONH_4$	0.640 g	HCOOH or NH_4OH	✓	✓
Ammonium Hydroxide (28%)	9.2	—	NH_4OH	0.675 mL	—	✓	✓
Ammonium Phosphate, Dibasic	7.2, 9.2	6.2–10.2	$(NH_4)_2HPO_4$	1.32 g	H_3PO_4 or NH_4OH	×	✓
Formic Acid	3.8	—	HCOOH	0.420 mL	—	✓	✓
N-Methylpyrrolidine	10.3	—	$C_5H_{11}N$	1.04 mL	—	✓	✓
Phosphoric Acid	2.1	—	H_3PO_4	0.580 mL	—	×	✓
Potassium Phosphate, Monobasic	2.1	1.1–3.1	KH_2PO_4	1.36 g	H_3PO_4 or KOH	×	×
Potassium Phosphate, Dibasic	7.2	6.2–8.2	K_2HPO_4	1.74 g	H_3PO_4 or KOH	×	×
Potassium Phosphate, Tribasic	12.7	11.7–13.7	K_3PO_4	2.12 g	H_3PO_4 or KOH	×	×
Pyrrolidine	11.3	—	C_4H_9N	0.833 mL	—	✓	✓
Sodium Borate	9.1, 12.7, 13.8	8.2–14	$Na_2B_4O_7$	2.01 g	H_3BO_4 or NaOH	×	×
Sodium Citrate, Tribasic	3.1, 4.8, 6.4	2.1–7.4	$HOC(COONa)(CH_2COONa)_2$	2.58 g	Citric Acid or NaOH	×	×
Triethylamine (TEA)	11.01	—	$(CH_3CH_2)_3N$	1.39 mL	—	✓	✓
Triethylammonium Acetate (TEAA) pK_a 1	4.76	3.8–5.8	$(CH_3CH_2)_3NH{:}CH_3COO$	0.695 mL TEA/0.571 mL Acetic Acid	TEA or CH_3COOH	✓	✓
Triethylammonium Acetate (TEAA) pK_a 2	11.01	10.0–12.0	$(CH_3CH_2)_3NH{:}CH_3COO$	1.39 mL TEA/0.285 mL Acetic Acid	TEA or HCOOH	✓	✓
Triethylammonium Formate (TEAF) pK_a 1	3.75	2.8–4.8	$(CH_3CH_2)_3NH{:}HCOO$	0.695 mL TEA/0.420 mL Formic Acid	TEA or HCOOH	✓	✓
Triethylammonium Formate (TEAF) pK_a 2	11.01	10.0–12.0	$(CH_3CH_2)_3NH{:}HCOO$	1.39 mL TEA/0.210 mL Formic Acid	TEA or HCOOH	✓	✓
Trifluoroacetic Acid (TFA)	0.3	—	CF_3COOH	0.743 mL	—	✓	✓

MAXPEAK PREMIER

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.

Waters

THE SCIENCE OF WHAT'S POSSIBLE.™

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