

Buffer Recommendations for ACE® UltraCore™ UHPLC/HPLC Columns

Buffer Selection

ACE UltraCore SuperC18 and SuperPhenylHexyl phases have been designed for use with LC-MS compatible mobile phases across an extended pH range (pH 1.5 – pH 11.0). Manufactured using proprietary Encapsulated Bonding Technology (EBT™), this technology dramatically increases the ligand coverage of the silica surface and improves stability, inertness and chromatographic performance. The use of LC-MS compatible (volatile) buffers as detailed in Table 1 are recommended to maximise column lifetime. Working at the extremes of pH, temperature and/or pressure will result in shorter column lifetimes.

Table 1: Use of LC-MS Compatible Buffers for Maximum Column Lifetime

Buffer/Additive	pK _a	Buffer Range ¹	LC-MS Compatible	Comments
Trifluoroacetic acid (TFA)	0.2		Yes	Use in 0.02 – 0.2% range. Ion pair additive. May preferentially ionise and suppress MS signal.
Formic acid	3.8		Yes	Use with ammonium formate salt for maximum buffering capacity. Use in 0.05% - 0.5% range.
Ammonium formate	3.8	2.8 – 4.8	Yes	Typically use 10-25mM. Note: both sodium and potassium salts are non-volatile.
Acetic acid	4.8		Yes	Use with ammonium acetate salt for maximum buffering capacity. Use in 0.05% - 0.5% range.
Ammonium acetate	4.8	3.8 – 5.8	Yes	Typically use 10-25mM. Note: both sodium and potassium salts are non-volatile.
Ammonium formate	9.2	8.2 – 10.2	Yes	Typically use 10-25mM.
Ammonium acetate	9.2	8.2 – 10.2	Yes	Typically use 10-25mM.
Ammonia (NH ₄ OH)	9.3	8.3 – 10.3	Yes	Typically use 10-25mM. Adjust pH with ammonium hydroxide or acetic acid.

¹ A buffer is most effective when used within ± 1 pH unit of its pK_a, but may provide adequate buffering ± 2 pH units from the pK_a.

Use of non LC-MS Compatible Buffers:

Whilst the use of the above LC-MS compatible (volatile) buffers are recommended, ACE UltraCore columns may also be used with a variety of non LC-MS compatible, non-volatile buffers, commonly used within analytical methods. However, under alkaline conditions (>pH 7), such buffers are recognised to accelerate column degradation compared to LC-MS compatible buffers – the use of buffers detailed within Table 1 is consequently recommended to ensure maximum column lifetime at elevated pH. Further details are contained within the FREE ACE booklet 'A Guide to HPLC and LC-MS Buffer Selection' by leading chromatography expert John Dolan. Request your FREE copy via your local distributor or via info@ace-hplc.com.

Buffer Concentration:

Always use the highest quality buffer grade available and appropriately filter buffer solutions before use. In general, a buffer concentration of up to 25mM will be sufficient for most applications. LC-MS methods may use lower buffer concentrations – typically 10 mM. The exact recommended concentration is dependent upon the analysis goals – lower buffer concentrations will generally increase column lifetime. When performing gradient separations, the buffer concentration of each mobile phase should be matched to ensure adequate buffering capacity remains throughout the gradient profile.

Temperature:

ACE UltraCore columns may be used at temperatures up to 100°C. However, any temperature above ambient will reduce column lifetime. As a general rule, for acidic mobile phases (<pH 7), maintaining a temperature <60°C will help maximise column lifetime, whereas for alkaline mobile phases (>pH 7), maintaining a temperature <40°C is recommended.

Recommendations for Maximising Column Lifetime:

Optimising method conditions for maximum column lifetime can be a compromise with achieving maximum analyte resolution. However, selecting an LC-MS compatible buffer (as detailed within Table 1), using the lowest acceptable buffer concentration (typically ~10mM), reducing temperature, and reducing overall pressures will help prolong the lifetime of ACE UltraCore UHPLC/HPLC columns.

Further Information – FREE BUFFER GUIDE

Further information on buffer selection is provided in the FREE ACE booklet 'A Guide to HPLC and LC-MS Buffer Selection' by John Dolan. Request your FREE copy via your local distributor or via info@ace-hplc.com. For further guidance on maximising column lifetime or to assist with developing your evaluation conditions, please contact our Technical Support Department at info@ace-hplc.com.



ACE® UltraCore™
Solid-Core UHPLC / HPLC Columns

ACE® UltraCore™

Ultra-Inert Solid-Core Columns with Extended pH Stability

Product Availability and Specifications:

Phase	Functional Group	Particle Size (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	Maximum pH Range	USP Listing
ACE UltraCore 2.5 SuperC18	Octadecyl encapsulated	2.5	95	130	7.0	1.5-11.0 ^a	L1
ACE UltraCore 2.5 SuperPhenylHexyl	Phenyl-Hexyl encapsulated	2.5	95	130	4.6	1.5-11.0 ^a	L11
ACE UltraCore 5 SuperC18	Octadecyl encapsulated	5	95	100	5.4	1.5-11.0 ^a	L1
ACE UltraCore 5 SuperPhenylHexyl	Phenyl-Hexyl encapsulated	5	95	100	3.6	1.5-11.0 ^a	L11

^a ACE UltraCore columns are designed for use with LC/MS compatible buffers. For further details on the ACE UltraCore UHPLC/HPLC column range, please contact your distributor or visit www.ace-hplc.com.

To further extend UHPLC and HPLC column lifetimes, ACE pre-column filters are recommended – for further details please contact your distributor or visit www.ace-hplc.com.

For HPLC column connections up to 5000psi, PEEK™ fingertight fittings (p/n# ACE-CC10) are recommended – for further details please contact your distributor or visit www.ace-hplc.com.

For UHPLC column connections up to 25000psi, re-useable fittings (p/n# EXL-CC10) are recommended – for further details please contact your distributor or visit www.ace-hplc.com.

ACE UltraCore 2.5µm SuperC18 UHPLC/HPLC Columns (UHPLC/HPLC hardware format with 1000bar/15000psi pressure limit)

Column Diameter	Column Length							
	20mm	30mm	35mm	50mm	75mm	100mm	125mm	150mm
2.1mm	CORE-25A-0202U	CORE-25A-0302U	CORE-25A-3502U	CORE-25A-0502U	CORE-25A-7502U	CORE-25A-1002U	CORE-25A-1202U	CORE-25A-1502U
3.0mm	CORE-25A-0203U	CORE-25A-0303U	CORE-25A-3503U	CORE-25A-0503U	CORE-25A-7503U	CORE-25A-1003U	CORE-25A-1203U	CORE-25A-1503U
4.6mm	CORE-25A-0246U	CORE-25A-0346U	CORE-25A-3546U	CORE-25A-0546U	CORE-25A-7546U	CORE-25A-1046U	CORE-25A-1246U	CORE-25A-1546U

ACE UltraCore 2.5µm SuperPhenylHexyl UHPLC/HPLC Columns (UHPLC/HPLC hardware format with 1000bar/15000psi pressure limit)

Column Diameter	Column Length							
	20mm	30mm	35mm	50mm	75mm	100mm	125mm	150mm
2.1mm	CORE-25B-0202U	CORE-25B-0302U	CORE-25B-3502U	CORE-25B-0502U	CORE-25B-7502U	CORE-25B-1002U	CORE-25B-1202U	CORE-25B-1502U
3.0mm	CORE-25B-0203U	CORE-25B-0303U	CORE-25B-3503U	CORE-25B-0503U	CORE-25B-7503U	CORE-25B-1003U	CORE-25B-1203U	CORE-25B-1503U
4.6mm	CORE-25B-0246U	CORE-25B-0346U	CORE-25B-3546U	CORE-25B-0546U	CORE-25B-7546U	CORE-25B-1046U	CORE-25B-1246U	CORE-25B-1546U

ACE UltraCore 5µm SuperC18 UHPLC/HPLC Columns (UHPLC/HPLC hardware format with 1000bar/15000psi pressure limit)

Column Diameter	Column Length								
	20mm	30mm	35mm	50mm	75mm	100mm	125mm	150mm	250mm
2.1mm	CORE-5A-0202U	CORE-5A-0302U	CORE-5A-3502U	CORE-5A-0502U	CORE-5A-7502U	CORE-5A-1002U	CORE-5A-1202U	CORE-5A-1502U	CORE-5A-2502U
3.0mm	CORE-5A-0203U	CORE-5A-0303U	CORE-5A-3503U	CORE-5A-0503U	CORE-5A-7503U	CORE-5A-1003U	CORE-5A-1203U	CORE-5A-1503U	CORE-5A-2503U
4.6mm	CORE-5A-0246U	CORE-5A-0346U	CORE-5A-3546U	CORE-5A-0546U	CORE-5A-7546U	CORE-5A-1046U	CORE-5A-1246U	CORE-5A-1546U	CORE-5A-2546U

ACE UltraCore 5µm SuperPhenylHexyl UHPLC/HPLC Columns (UHPLC/HPLC hardware format with 1000bar/15000psi pressure limit)

Column Diameter	Column Length								
	20mm	30mm	35mm	50mm	75mm	100mm	125mm	150mm	250mm
2.1mm	CORE-5B-0202U	CORE-5B-0302U	CORE-5B-3502U	CORE-5B-0502U	CORE-5B-7502U	CORE-5B-1002U	CORE-5B-1202U	CORE-5B-1502U	CORE-5B-2502U
3.0mm	CORE-5B-0203U	CORE-5B-0303U	CORE-5B-3503U	CORE-5B-0503U	CORE-5B-7503U	CORE-5B-1003U	CORE-5B-1203U	CORE-5B-1503U	CORE-5B-2503U
4.6mm	CORE-5B-0246U	CORE-5B-0346U	CORE-5B-3546U	CORE-5B-0546U	CORE-5B-7546U	CORE-5B-1046U	CORE-5B-1246U	CORE-5B-1546U	CORE-5B-2546U

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