HYPERCARB® NO LIMITS FOR HPLC

Hypercarb is unique.
It is 100% porous graphitic carbon optimised for HPLC and SPE with superior chromatographic power.

No restriction for polar compounds.
Get retention and separation where silica and resin stationary phases fail.

No restriction for isomers.
Achieve unique separations with diastereo, geometric and positional isomers.

No restriction on pH.
Stability from pH 0 to 14 for complete flexibility in analysis.

No restriction on temperature.
Use outside the range of bonded silica for novel method development.

No restriction on eluents.
Use 100% organic or 100% aqueous and anything in between.

Thermo Hypersil-Keystone

What is Hypercarb?

Hypercarb is a unique material for HPLC and SPE, comprised of spherical particles of 100% porous graphitic carbon (PGC). It is composed of flat sheets of hexagonally arranged carbon atoms with a fully satisfied valence. The surface of Hypercarb is crystalline and highly reproducible with no micropores. Hypercarb is available in 5µm and 7µm particle sizes for HPLC and 30µm particle size for Solid Phase Extraction.

The selectivity of Hypercarb is completely different to silica or polymeric phases because its retention mechanism is unique. Retention is determined by the strength of interaction with analytes and the surface of Hypercarb, specifically:

- the molecular area of the analyte in contact with the Hypercarb surface;
- the strength of interaction of analyte functional groups with Hypercarb.

The physical characteristics of Hypercarb are superior to silica and resins, resulting in HPLC columns with extremely high pressure and temperature capabilities. Hypercarb is robust to extremes of pH and solvents, so novel eluents can be used to achieve superior chromatography.

Physical specifications	
Particle sizes (µm)	5, 7, 30
Pore Size (Å)	250
Pore Volume (cc/g)	0.7
Surface Area (m^2/g)	120
Mechanical Strength	> 400 bar
% Carbon	100

These analytical and physical differences enable Hypercarb to excel at analysis where silica or resin based phases fail. Hypercarb can be used in both reversed and normal phase LC with fast switching between eluents.

Hypercarb offers improved chromatography or a new solution in analysis of:

- Geometric isomers and closely related compounds
- Enantiomeric separations
- Sugars, carbohydrates and glucuronides
- Residue analysis
- Highly polar and ionised solutes
- Solid phase extraction

Applications from pH 0 to 14

Silica based columns typically have a pH range of 2 to 9 whereas Hypercarb is completely stable from pH 0 to 14. The performance of Hypercarb does not reduce with long term exposure to extremes of pH, giving flexibility in method development as pH is a powerful tool to influence analyte retention.

Long term high pH stability is proven by a 93-day pH 12 stability trial using a 70:30 methanol: 0.1M sodium hydroxide mobile phase. *Figure 1* demonstrates that both retention time and selectivity remain constant over the duration of the study.

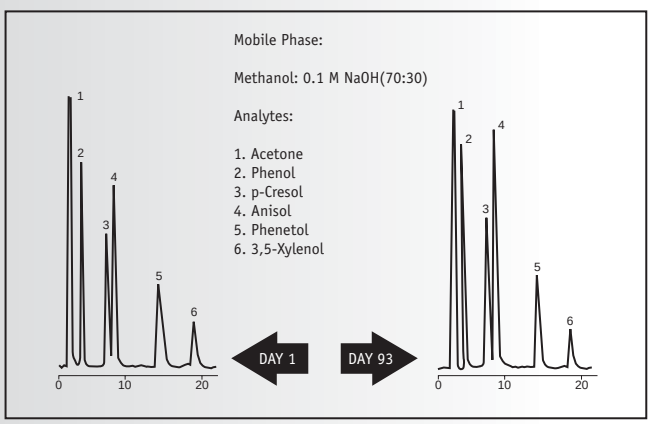


Figure 1: Hypercarb pH 12 Stability trial.

An example of extreme pH analysis is given in *Figure 2*, where analysis of oxygen heterocycles in confectionery products is analysed at pH 1.

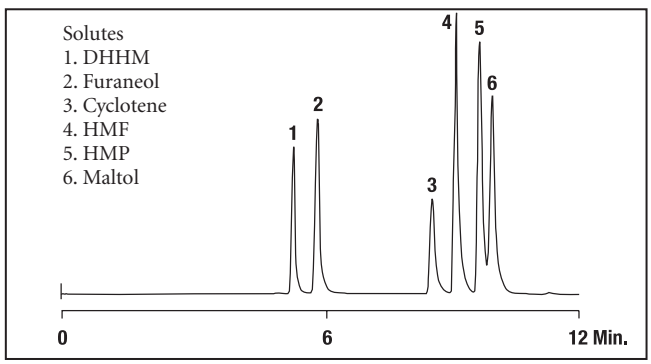
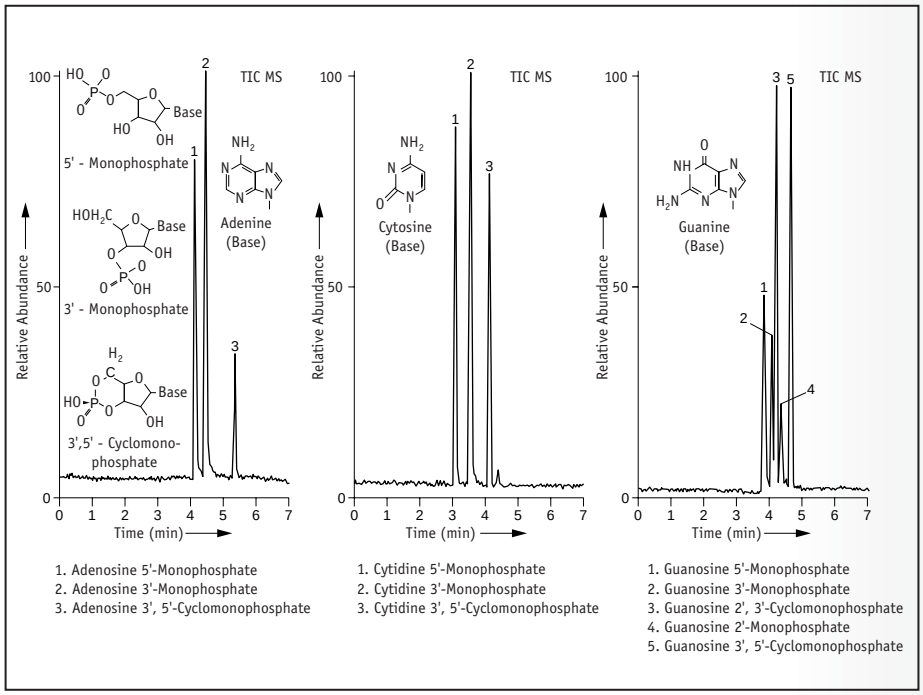


Figure 2: Oxygen heterocycles at pH 1

Column Hypercarb 7µm 100 x 4.6mm

Eluent A:	Aqueous perchloric acid pH 1.0	
Eluent B:	Acetonitrile	
Gradient:	Time(min)	%B
	0	1
	10	35

Ref.: Dr A. Lea & Dr G. Ford, Reading Scientific Services Ltd, UK.



Column:	Hypercarb 30 x 3 mm, 5µm
Eluent:	A: Ammonium acetate 50 mM, pH 6.0
	B: Acetonitrile
Gradient:	5% to 70% B in 7 min
Flow rate:	0.5ml/min
Detection:	ESI-MS

Separation of structurally related compounds

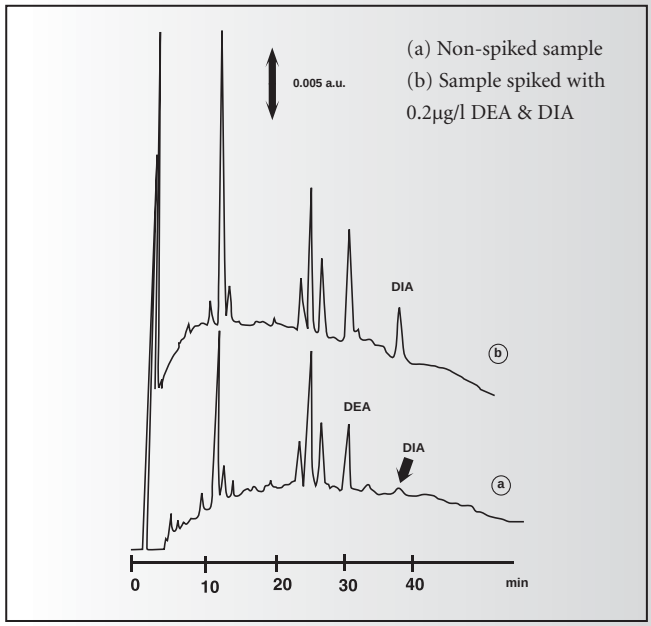
Ribonucleotides are usually separated by ion exchange chromatography or reversed phase chromatography with an ion pairing reagent. A high nitrogen and phosphate content gives these compounds a high degree of polarity, causing difficulties with retention and selectivity on silica based columns.

The ribonucleotide isomers have different orientations of the phosphate group, which affects the interaction with the Hypercarb surface. This application shows how the polar retention effect of Hypercarb can separate polar analytes such as cyclic nucleotides and their respective isomeric mononucleotides using a simple MS compatible mobile phase on a short column.

Analysis of polar compounds

The ability of Hypercarb to retain polar compounds where silica and resin columns fail can be used in trace enrichment applications. A common problem in environmental analysis is recovery of polar pesticides. Hypercarb can be used to 'trap' the polar pesticides prior to analysis. This can be performed off-line with a Hypercarb SPE column, or on-line using a Hypercarb guard column.

Hypercarb offers a key advantage over resin or silica columns as des-isopropylatrazine (DIA) is eluted after des-ethylatrazine (DEA) and is separated from interference compounds. Silica or resin based columns also exhibit low recoveries for polar metabolites due to low breakthrough volumes, whereas Hypercarb has a very high breakthrough volume allowing lower detection limits to be achieved.



Ref.: Marie-Claire Hennion, J. Chromatography A, 856 (1999) 3 – 54.

Column:	Hypercarb 7µm 100 x 4.6mm
Eluent A:	Acetonitrile
Eluent B:	0.005M Phosphate buffer (pH 7.0)
Gradient:	15 to 35% B from 0 to 40 min.
Flow rate:	1ml/min
Detection:	UV 220nm

Ordering Information

HPLC Analytical Columns

To select 5µm or 7µm particle size Hypercarb, replace XX with 05 for 5µ particle size or replace XX with 07 for 7µm particle size material.

Column	30mm	50mm	100mm	150mm
2.1mm	350XX-050	350XX-049	350XX-048	350XX-047
3mm	350XX-041	350XX-039	350XX-038	350XX-037
4mm			350XX-032	350XX-033
4.6mm	350XX-026	350XX-025	350XX-024	350XX-022

HPLC Guard Cartridges

Description	Pack size	Part Number
10x4mm	Pk2	350XX-100
10x2mm	Pk2	350XX-101
20x4mm	Pk2	350XX-102
20x2mm	Pk2	350XX-104

Direct Connect Guard Cartridge Holders

Description	Part Number
Holder for 10x4mm ID Guards	60160-308
Holder for 10x2mm ID Guards	60160-310
Holder for 20x4mm ID Guards	60160-309
Holder for 20x2mm ID Guards	60160-311

HyperSEP® SPE Columns

Part number	Bed Weight	Reservoir Volume	Quantity
60106-304	25 mg	1 ml	50 columns
60106-303	50 mg	1 ml	50 columns
60106-302	100 mg	1 ml	30 columns
60106-301	200 mg	3 ml	30 columns
60106-351	50 mg	10 ml	50 columns

MultiSEP® SPE 96 Well Plates

Part number	Bed Weight	Reservoir Volume	Quantity
60302-606	10 mg	1 ml plate	1 plate
60302-607	25 mg	1 ml plate	1 plate
60302-608	50 mg	1 ml plate	1 plate
60302-609	100 mg	1 ml plate	1 plate
60302-610	100 mg	2 ml plate	1 plate

Thermo Hypersil-Keystone

For more information on our products and services, visit our website at www.thermohypersil.co.uk

Thermo Hypersil-Keystone, 112 Chadwick Road, Runcorn. WA7 1PR
Telephone: 01928 581000 Facsimile: 01928 581078 E-mail: enquiries@thermohypersil.co.uk Internet: www.thermohypersil.co.uk