

# DEVELOASIL®

by Nomura Chemical Co.

- **RP-Aqueous and RP-Aqueous-AR (C30) work with 100% aqueous mobile phases & give added polar compound retention**
- **Cyano-UG is extremely pH stable**
- **Combi-RP (C30) columns are specially packed for high flow rate Combinatorial Chemistry Applications**
- **C18, C8, Phenyl & Cyano-UG Series provide excellent peak shape for acidic, basic and chelating compounds**

Supplied worldwide (except Japan) by Phenomenex, Develosil® HPLC columns provide high efficiency, high resolution separations.

Four different C18 chemistries enable chromatographers to choose the specific column for their application requirements. The ODS-HG and ODS-UG have similar carbon loading, although the ODS-HG is bonded using polychlorosilylating reagents while the ODS-UG is bonded with monochlorosilylating reagents. The ODS-MG provides high retention of polar compounds and excellent reproducibility under highly aqueous conditions. Each phase provides a slightly different selectivity to help fine-tune difficult separations.

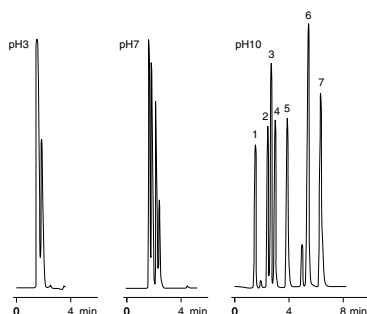
## Material Characteristics

Packing Material	Particle Shape/Size (μ)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load %	Calculated Bonded Phase Coverage (μmole/m <sup>2</sup> )	End Capping
Develosil Silica 60	Spher. 3, 5, 7, 10	60	500	n/a	–	–
Develosil Silica 100	Spher. 3, 5, 7, 10	100	350	n/a	–	–
Develosil TMS (C1)	Spher. 5, 7, 10	100	350	4, Monomeric	4.2	–
Develosil NH <sub>2</sub>	Spher. 5, 10	100	350	3, Polymeric	2.6	No
Develosil C8	Spher. 5, 7, 10	100	350	12, Monomeric	3.4	Yes
Develosil ODS	Spher. 3, 5, 7, 10	100	350	20, Monomeric	3.1	Yes
Develosil Phenyl	Spher. 5, 7, 10	100	350	9, Monomeric	3.1	Yes
Develosil ODS-UG	Spher. 3, 5	140	300	18, Monomeric	3.1	Yes
Develosil ODS-MG	Spher. 5	100	450	15, Monomeric	1.6	Yes
Develosil C8-UG	Spher. 5	140	300	11, Monomeric	4.4	Yes
Develosil Phenyl-UG	Spher. 5	140	300	8, Monomeric	4.1	Yes
Develosil CN-UG	Spher. 5	140	300	7, Monomeric	4.4	Yes
Develosil TMS-UG	Spher. 5	140	300	4.5, Monomeric	4.8	Yes
Develosil ODS-HG	Spher. 3, 5	140	300	18, Polymeric	3.4	Yes
Develosil RP-Aqueous[C30]	Spher. 3, 5	140	300	18, Monomeric	1.8	Yes
Develosil RP-Aqueous-AR[C30]	Spher. 3, 5	140	300	18, Trifunctional	1.8	Yes
Develosil Combi-RP[C30]	Spher. 3, 5	140	300	18, Monomeric	1.8	Yes
Develosil 300C8-HG	Spher. 5	300	160	6, Polymeric	4.2	Yes
Develosil 300ODS-HG	Spher. 5	300	160	11, Polymeric	3.8	Yes
Develosil 300C4-HG	Spher. 5	300	160	4, Polymeric	4.8	Yes

### Basic Compounds

App ID 5291

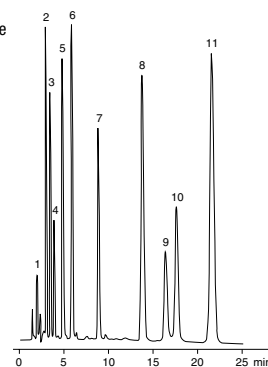
**Column:** Develosil ODS-UG-5  
**Dimensions:** 150 x 4.6mm  
**Order No.:** CHO-3379  
**Mobile Phase:** Acetonitrile/0.02M Phosphate buffer (40:60)  
**Flow Rate:** 1.0mL/min  
**Temperature:** 30°C  
**Detection:** UV @ 254nm  
**Sample:** 1. Pyridoxine 5. N-Methylbenzylamine  
 2. Pyridine 6. Metoclopramide  
 3. Procainamide 7. N,N-Dimethylbenzylamine  
 4. Benzylamine



### Water-Soluble Vitamins

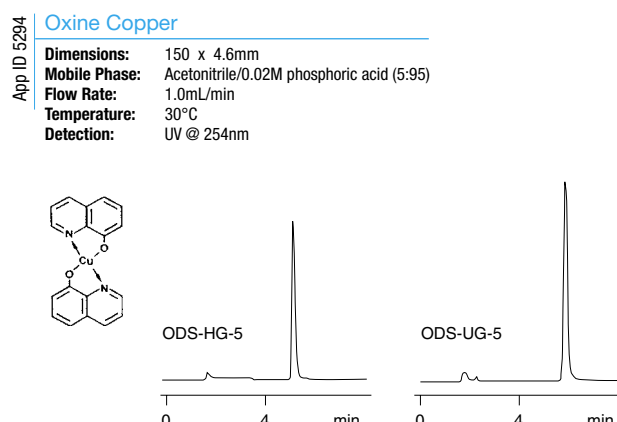
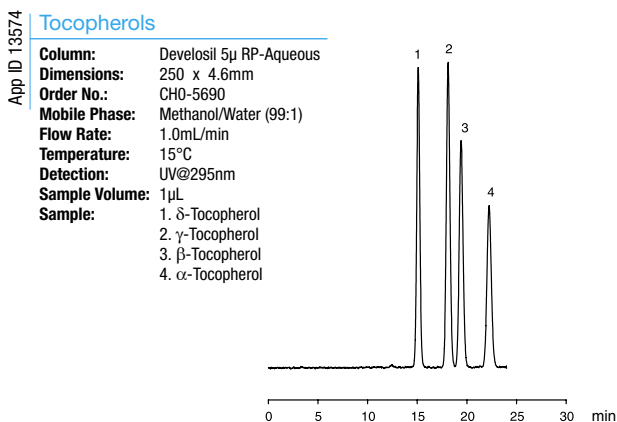
App ID 5292

**Column:** Develosil ODS-UG-5  
**Dimensions:** 150 x 4.6mm  
**Order No.:** CHO-3379  
**Mobile Phase:** Acetonitrile/5mM 1-Hexanesulfonic Acid Sodium Salt + 20mM Phosphoric Acid (8:92)  
**Flow Rate:** 1.0mL/min  
**Temperature:** 40°C  
**Detection:** UV @ 210nm  
**Injection:** 20μL  
**Sample:** 1. L (+) -Ascorbic Acid  
 2. Nicotinic Acid  
 3. Nicotinamide  
 4. Calcium (+) - Pantothenate  
 5. Pyridoxal Hydrochloride  
 6. Pyridoxine Hydrochloride  
 7. Pyridoxamine Dihydrochloride  
 8. Thiamine Hydrochloride  
 9. Folic Acid  
 10. (+)-Biotin  
 11. Riboflavin



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## COMBI-RP (Patented)

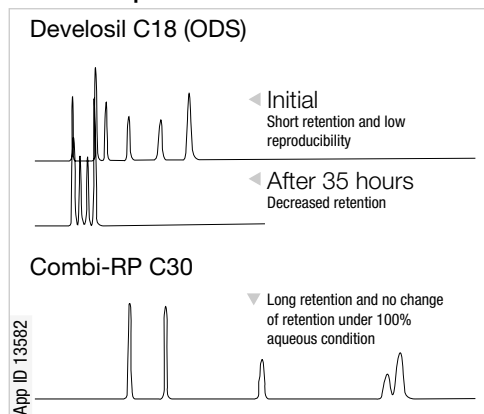
Combi-RP is a C30 chemistry engineered to provide a different selectivity compared to C18 columns with added polar compound selectivity and 100% water compatibility.

Under 100% aqueous conditions, conventional phases such as C18 collapse and fold on the silica gel surface in an effort to escape from water. The collapsing of ligands leads to changes in retention time and poor reproducibility. Additionally, column lifetime decreases under 100% aqueous mobile phase conditions.

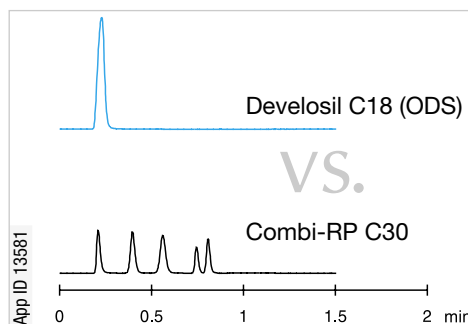
For these reasons, C18 columns are intended for use with >10% organic in the mobile phase.

The lifetime of some conventional C18 columns may greatly decrease when the organic content of the mobile phase is less than 10%. Develosil Combi-RP is very stable because of the long C-30 ligand, and can be used from pH 2 to pH 8 under 100% aqueous conditions.

### Under 100% Aqueous Conditions

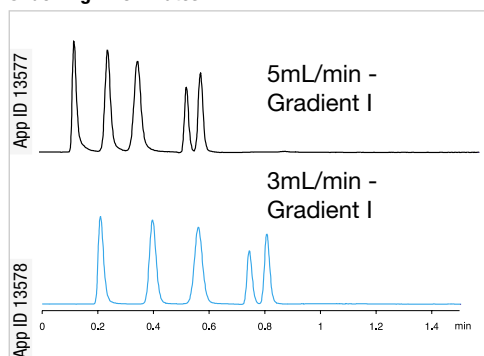


The Develosil C18(ODS) Column Shows Only One Peak, Combi-RP C-30 Separates 5 Peaks!

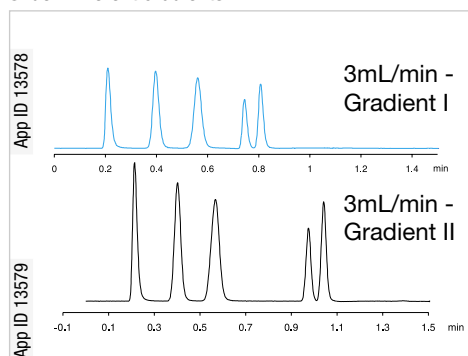


**Dimensions:** 50 x 4.6mm  
**Mobile Phase:**  
 A) Buffer (pH7.0)  
 B) Acetonitrile  
**Gradient:**  
 C18 column:  
 10% B to 100% B in 5 minutes  
 Combi-RP:  
 0% B to 100% B in 5 minutes  
**Flow Rate:** 3.0 mL/min  
**Detection:** UV@254nm  
**Sample:** Nucleic Acid Bases

### Under High Flow Rates



### Under Different Gradients



**Column:** Develosil Combi-RP-5  
**Dimensions:** 50 x 4.6mm  
**Order Number:** CH0-5902  
**Mobile Phase:**  
 A) 10 mM Sodium phosphate (pH7.0)  
 B) Acetonitrile  
**Gradient:**  
 I - 0% B to 100% B in 5 minutes  
 II - 0% B hold for 15 seconds to 100% B in 5 minutes  
**Flow Rate:** 5 mL/min or 3 mL/min  
**Detection:** UV@254nm  
**Sample:** Nucleic acid bases

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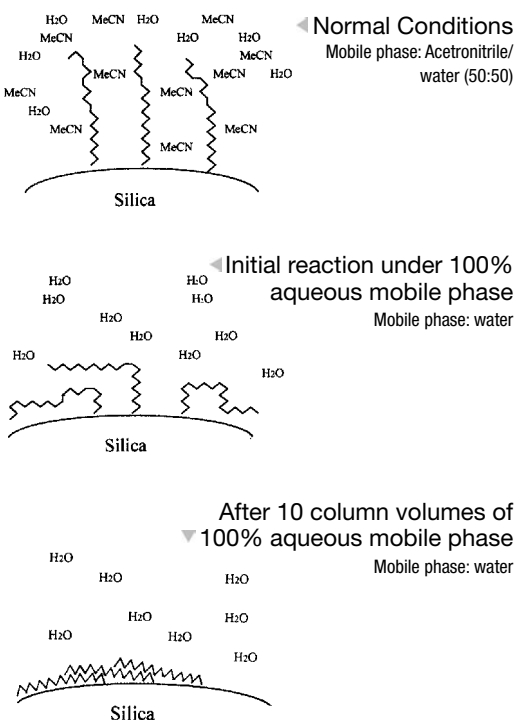
## RP-AQUEOUS AND RP-AQUEOUS-AR

(Patented C30 Phases)

For Difficult Polar Compounds; Use AR Phase for Improved Acid Resistance

### The Problem

The problem with running 100% aqueous mobile phases on a typical C8 or C18 column is: the long hydrophobic ligands bonded to the silica may mat down in an effort to escape from the water.



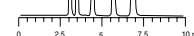
### The Result

The result when ligands become matted down is ligand-sample interaction decreases and becomes inconsistent. This results in short retention time and poor reproducibility.

**Column:** Typical C18 column  
**Dimensions:** 250 x 4.6 mm  
**Mobile Phase:** Water  
**Flow Rate:** 1.0 mL/min  
**Detection:** UV @ 254nm  
**Temperature:** 40°C  
**Sample:**

1. Cytosine
2. Uracil
3. Cytidine
4. Uridine
5. Thymine

After 3 hours ▶



After 20 hours ▶



After 35 hours ▶



App ID 5295

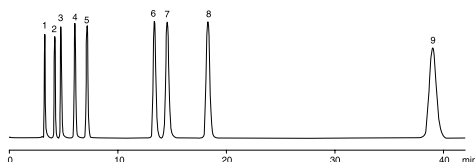
### The Solution: Develosil RP-Aqueous

App ID 13551

#### Nucleotides

**Column:** Develosil 5µ RP-Aqueous  
**Dimensions:** 250 x 4.6 mm  
**Order Number:** CHO-5690  
**Mobile Phase:** 0.1M  $K_2HPO_4$  with KOH, pH6.0  
**Flow Rate:** 1.0 mL/min  
**Temperature:** 30°C  
**Detection:** UV @ 260nm  
**Sample volume:** 4µL  
**Sample:**

1. 5'-CTP
2. 5'-CDP
3. 5'-CMP
4. 5'-GTP
5. 5'-GDP
6. 5'-GMP
7. 5'-ATP
8. 5'-ADP
9. 5'-AMP

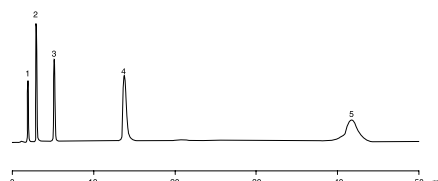


App ID 13555

#### Fructo-Oligosaccharides

**Column:** Develosil 5µ RP-Aqueous  
**Dimensions:** 250 x 4.6 mm  
**Order Number:** CHO-5690  
**Mobile Phase:** Water  
**Flow Rate:** 1.0 mL/min  
**Temperature:** 30°C  
**Detection:** RI  
**Sample volume:** 10µL  
**Sample:**

1. Glucose
2. Saccharose
3. 1-Kestose
4. Nystose
5. 1F-Fructofuranosylnystose



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## ORDERING INFORMATION

Columns					Columns (continued)				
Order No.	Mfr. No.	Description	Size (mm)	Price	Order No.	Mfr. No.	Description	Size (mm)	Price
<b>3µ ODS-UG (C18)</b>					<b>3µ RP-Aqueous</b>				
CHO-3506	UG11346050W	ODS-UG-3	50 x 4.6		CHO-5991	RPAQ310100W	RP-AQUEOUS-3	100 x 1.0	
CHO-3406	UG11346075W	ODS-UG-3	75 x 4.6		CHO-5992	RPAQ310150W	RP-AQUEOUS-3	150 x 1.0	
CHO-3407	UG11346100W	ODS-UG-3	100 x 4.6		CHO-5996	RPAQ320050W	RP-AQUEOUS-3	50 x 2.0	
CHO-3408	UG11346150W	ODS-UG-3	150 x 4.6		CHO-5998	RPAQ320150W	RP-AQUEOUS-3	150 x 2.0	
<b>5µ ODS-UG (C18)</b>					<b>5µ RP-Aqueous</b>				
CHO-3378	UG11546100W	ODS-UG-5	100 x 4.6		CHO-5999	RPAQ330050W	RP-AQUEOUS-3	50 x 3.0	
CHO-3379	UG11546150W	ODS-UG-5	150 x 4.6		CHO-6001	RPAQ330150W	RP-AQUEOUS-3	150 x 3.0	
CHO-3380	UG11546250W	ODS-UG-5	250 x 4.6		CHO-6002	RPAQ346035W	RP-AQUEOUS-3	35 x 4.6	
CHO-3384	UG11540010W	ODS-UG-5 (Guard Column)	10 x 4.0		CHO-6003	RPAQ346050W	RP-AQUEOUS-3	50 x 4.6	
<b>5µ C8-UG</b>					<b>5µ RP-Aqueous</b>				
CHO-4220	UG12546100W	C8-UG-5	100 x 4.6		CHO-5683	RPAQ520050W	RP-AQUEOUS-5	50 x 2.0	
CHO-4221	UG12546150W	C8-UG-5	150 x 4.6		CHO-5685	RPAQ520150W	RP-AQUEOUS-5	150 x 2.0	
CHO-4222	UG12546250W	C8-UG-5	250 x 4.6		CHO-5686	RPAQ520250W	RP-AQUEOUS-5	250 x 2.0	
<b>5µ Ph-UG (Phenyl)</b>					<b>5µ RP-Aqueous</b>				
CHO-4237	UG15546150W	Ph-UG-5	150 x 4.6		CHO-5687	RPAQ546050W	RP-AQUEOUS-5	50 x 4.6	
CHO-4238	UG15546250W	Ph-UG-5	250 x 4.6		CHO-5688	RPAQ546100W	RP-AQUEOUS-5	100 x 4.6	
<b>5µ CN-UG (Cyano)</b>					<b>5µ RP-Aqueous</b>				
CHO-4244	UG16546100W	CN-UG-5	100 x 4.6		CHO-5689	RPAQ546150W	RP-AQUEOUS-5	150 x 4.6	
CHO-4245	UG16546150W	CN-UG-5	150 x 4.6		CHO-5690	RPAQ546250W	RP-AQUEOUS-5	250 x 4.6	
CHO-4246	UG16546250W	CN-UG-5	250 x 4.6		CHO-5695	RPAQ5P1250W	RP-AQUEOUS-5	250 x 10.0	
CHO-4250	UG16540010W	CN-UG-5 (Guard Column)	10 x 4.0		CHO-5699	RPAQ5P2050W	RP-AQUEOUS-5	50 x 20.0	
<b>5µ TMS-UG (C1)</b>					<b>3µ RP-Aqueous-AR</b>				
CHO-4228	UG14546100W	TMS-UG-5	100 x 4.6		CHO-7393	RPAR310050W	RP-AQUEOUS-AR-3	50 x 1.0	
CHO-4229	UG14546150W	TMS-UG-5	150 x 4.6		CHO-7394	RPAR310150W	RP-AQUEOUS-AR-3	150 x 1.0	
CHO-4230	UG14546250W	TMS-UG-5	250 x 4.6		CHO-7395	RPAR320150W	RP-AQUEOUS-AR-3	150 x 2.0	
CHO-4234	UG14540010W	TMS-UG-5 (Guard Column)	10 x 4.0		CHO-7409	RPAR346050W	RP-AQUEOUS-AR-3	50 x 4.6	
<b>5µ ODS-MG</b>					<b>3µ RP-Aqueous-AR</b>				
CHO-4468	MG11546100W	ODS-MG-5	100 x 4.6		CHO-7396	RPAR346100W	RP-AQUEOUS-AR-3	100 x 4.6	
CHO-4469	MG11546150W	ODS-MG-5	150 x 4.6		CHO-7397	RPAR346150W	RP-AQUEOUS-AR-3	150 x 4.6	
CHO-4470	MG11546250W	ODS-MG-5	250 x 4.6		<b>5µ RP-Aqueous-AR</b>				
CHO-4477	MG11540010W	ODS-MG-5 (Guard Column)	10 x 4.0		CHO-7398	RPAR510050W	RP-AQUEOUS-AR-5	50 x 1.0	
<b>3µ ODS-HG (C18)</b>					<b>5µ RP-Aqueous-AR</b>				
CHO-3411	HG11346050W	ODS-HG-3	50 x 4.6		CHO-7399	RPAR510150W	RP-AQUEOUS-AR-5	150 x 1.0	
CHO-3413	HG11346100W	ODS-HG-3	100 x 4.6		CHO-7400	RPAR510250W	RP-AQUEOUS-AR-5	250 x 1.0	
CHO-3414	HG11346150W	ODS-HG-3	150 x 4.6		CHO-7401	RPAR520150W	RP-AQUEOUS-AR-5	150 x 2.0	
<b>5µ ODS-HG (C18)</b>					<b>5µ RP-Aqueous-AR</b>				
CHO-3387	HG11546150W	ODS-HG-5	150 x 4.6		CHO-7402	RPAR520250W	RP-AQUEOUS-AR-5	250 x 2.0	
CHO-3388	HG11546250W	ODS-HG-5	250 x 4.6		CHO-7403	RPAR546150W	RP-AQUEOUS-AR-5	150 x 4.6	
CHO-3392	HG11540010W	ODS-HG-5 (Guard Column)	10 x 4.0		CHO-7404	RPAR546250W	RP-AQUEOUS-AR-5	250 x 4.6	
<b>3µ COMBI-RP</b>					<b>5µ 300 ODS-HG (Widopore C18)</b>				
CHO-5893	COMB330035W	Combi-RP-3	35 x 4.6		CHO-3396	HG31546250W	300ODS-HG-5	250 x 4.6	
CHO-5896	COMB346050W	Combi-RP-3	50 x 4.6		<b>5µ 300 C8-HG (Widopore C8)</b>				
<b>5µ COMBI-RP</b>					<b>5µ 300 C4-HG (Widopore C4)</b>				
CHO-5899	COMB530035W	Combi-RP-5	35 x 4.6		CHO-3399	HG32546150W	300C8-HG-5	150 x 4.6	
CHO-5902	COMB546050W	Combi-RP-5	50 x 4.6		CHO-3400	HG32546250W	300C8-HG-5	250 x 4.6	
CHO-5904	COMB5P2050W	Combi-RP-5	50 x 20.0		<b>5µ 300 C4-HG (Widopore C4)</b>				
CHO-5905	COMB5P2100W	Combi-RP-5	100 x 20.0		CHO-3403	HG33546150W	300C4-HG-5	150 x 4.6	
CHO-5906	COMB5P2150W	Combi-RP-5	150 x 20.0		CHO-3404	HG33546250W	300C4-HG-5	250 x 4.6	
CHO-5909	COMB5P3050W	Combi-RP-5	50 x 28.0		<b>Guard Cartridges for UG and HG columns</b>				
CHO-5910	COMB5P3250W	Combi-RP-5	250 x 28.0		CHO-3417	UG11540010C	ODS-UG-5 (4/pk.)	10 x 4.0	
					CHO-3418	HG11540010C	ODS-HG-5 (4/pk.)	10 x 4.0	
					<b>Guard Cartridge Holder for UG and HG columns</b>				
					CHO-3419	H000040010C	Guard Cartridge Holder	10 x 4.0	



Every Develosil column, including 6.0mm ID, is available from Phenomenex upon request. 5, 7 and 10µ packings are available in the following phases in prepacked 150 x 4.6mm or 250 x 4.6mm columns as well as guard columns: TMS, C8, ODS and Phenyl.