

## UHPLC Columns

### ► BlueOrchid



## Columns for ultra high performance liquid chromatography

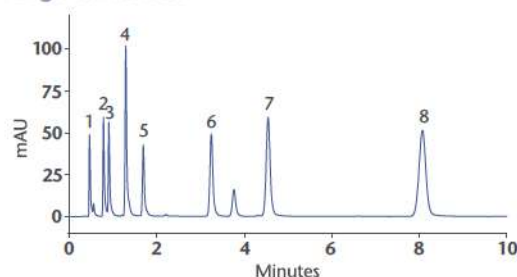
BlueOrchid sub-2  $\mu\text{m}$  columns represent a new level of performance in HPLC, offering faster separations with improved resolution.

Compared to conventional HPLC applications using 3–5  $\mu\text{m}$  particle sizes, ultra fast separations with superior efficiency are made possible through the use of sub-2  $\mu\text{m}$  particles on UHPLC systems, with significant improvements in sensitivity as well as in resolution. BlueOrchid columns packed with 1.8  $\mu\text{m}$  particles feature a very narrow particle size distribution to minimize column back pressures to values in reach of conventional HPLC systems. BlueOrchid also offers outstanding peak symmetry, even for basic compounds.

#### Advantages

- faster analysis (up to 10 times)
- improved resolution
- enhanced sensitivity
- low back pressure
- excellent peak shape

#### Engelhardt test

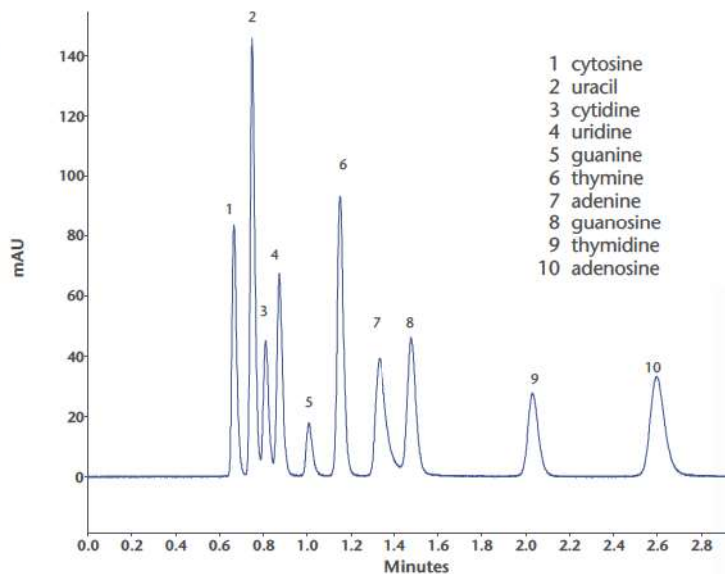


**Application areas** Ultra high performance liquid chromatography (UHPLC) columns with sub-2  $\mu\text{m}$  particles can be used to full extent with HPLC systems which feature low system dead volume, fast data acquisition, sensitive detection, and the capability to operate at pressures up to 1 000 bar. Compared with other sub-2  $\mu\text{m}$  columns, BlueOrchid UHPLC columns induce relatively low back pressure, and thus show excellent results also in HPLC systems designed for fast LC separations. By decreasing the particle size of the packing material, the analyst can maximize the number of theoretical plates, making shorter column lengths possible. At the same time, the optimum range of mobile phase linear velocities is greatly expanded. As a result, higher flow rates can be used without loss of separation performance. Both factors result in faster analysis times and increased sample throughput. Cost per sample is also significantly reduced due to less mobile phase consumption and waste.

BlueOrchid UHPLC columns have a wide range of applications.

Modification	Application areas	Separation mechanism
C18	offers an extended pH range for analysis of acidic, basic and neutral analytes in reversed phase mode (sulphonamides, anabolic steroids, anti-psychotics, beta blockers, Sudan dyes, phenols, preservatives etc.)	hydrophobic interaction
C18 A	polar endcapped C18 phase for alternative selectivity; designed for use with 100% aqueous eluents for analysis of very polar compounds, basic pharmaceutical ingredients, water soluble vitamins, catecholamines as well as organic acids	hydrophobic and polar interaction
C8	similar selectivity to C18 phase but less retention due to the lower hydrophobicity, useful for analysis of water soluble vitamins, steroids, catecholamines, sedatives etc.	reduced hydrophobic interaction compared to C18 phase
PFP	alternative selectivity to C18 phase, especially developed for analysis of fluorinated and other halogenated polar compounds (halogenated phenols, taxane samples, polar compounds with hydroxyl, carboxyl, nitro or other polar groups)	hydrophobic and polar interaction
C4	low hydrophobicity with short alkyl chains, ideal for reversed phase separations of proteins and peptides	weak hydrophobic and hydrophilic interactions
Phenyl	alternative selectivity for aromatic and moderately polar analytes or mixtures with varying polarity and aromaticity	pi-pi interaction with aromatics
CN	for a wide range of applications in normal phase mode as well as reversed phase mode (steroids, carbohydrates, polar compounds)	hydrophobic and hydrophilic interactions
SAX	strong anion exchanger, ideally suited for use with smaller organic molecules, including nucleotides and organic acids	ion exchange interactions
HILIC	hydrophilic interaction chromatography phase which retains highly polar and hydrophilic compounds	hydrophilic interactions
PAL-HILIC	the polymer amine ligands are ideal for separating proteins, peptides, other anionic species and polar molecules; suited as anion exchange column and for HILIC separations	hydrophilic and ionic interaction
NH <sub>2</sub>	suited to the analysis of sugars and carbohydrates, applicable in three modes: weak anion exchange, reversed phase and normal phase	hydrophobic and hydrophilic interactions
Si	suited for non-polar and moderately polar organic compounds using normal phase LC	hydrophilic interactions

**Nucleosides and bases:  
BlueOrchid PFP**

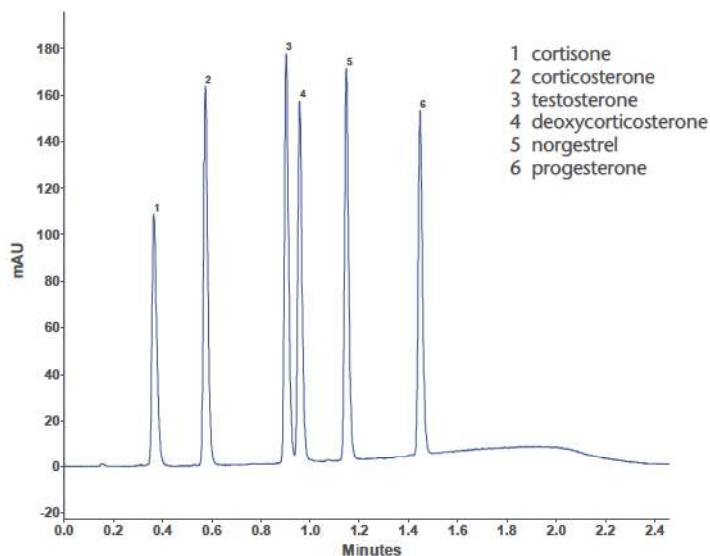


- 1 cytosine
- 2 uracil
- 3 cytidine
- 4 uridine
- 5 guanine
- 6 thymine
- 7 adenine
- 8 guanosine
- 9 thymidine
- 10 adenosine

Column: BlueOrchid PFP, 1.8  $\mu$ m 100 x 2 mm  
 Mobile phase: A: 20 mM NH<sub>4</sub>ac pH 3.5  
 B: A/MeOH 90:10 (v/v)  
 Isocratic: 90% A / 10% B  
 Flow rate: 0.5 ml/min  
 Inj. volume: 1  $\mu$ l  
 Detection: 210 nm (100 Hz, 0.001 s), 10 mm, 2  $\mu$ l flow cell  
 Temp: 30 °C



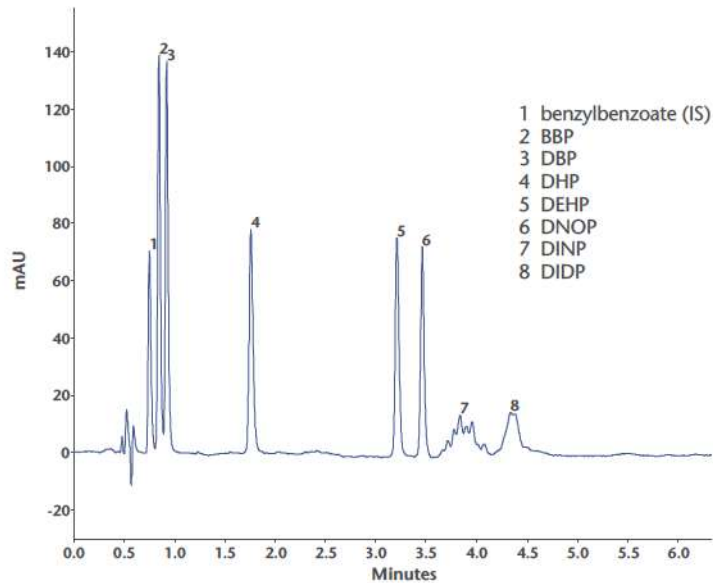
**Anabolic steroids:  
BlueOrchid C18**



- 1 cortisone
- 2 corticosterone
- 3 testosterone
- 4 deoxycorticosterone
- 5 norgestrel
- 6 progesterone

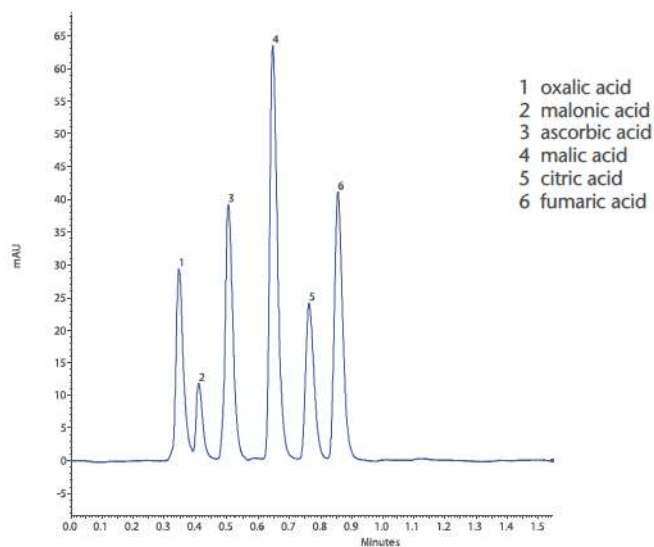
Column: BlueOrchid C18, 1.8  $\mu$ m 50 x 2 mm  
 Mobile phase: A: water (+0.1 % formic acid)  
 B: ACN (+0.1 % formic acid)  
 Gradient: 0–1.5 min 35%–75% B  
 1.5–2 min 75% B  
 Flow rate: 1 ml/min  
 Inj. volume: 0.5  $\mu$ l  
 Detection: 254 nm (100 Hz, 0.005 s), 10 mm, 2  $\mu$ l flow cell  
 Temp: 30 °C

**Phthalates:  
BlueOrchid C18**



Column: BlueOrchid C18, 1.8  $\mu$ m, 100x2 mm  
 Mobile phase: A: H<sub>2</sub>O / ACN 15 : 85  
 B: ACN  
 Gradient: 0% B 1.2 min hold  
 0%–100% B 1.2–3.2 min  
 100% B 1.8 min hold  
 Flow rate: 0.5 ml/min  
 Inj. volume: 2  $\mu$ l  
 Detection: 225 nm (50 Hz, 0.05 s), 10 mm, 2  $\mu$ l flow cell  
 Temp: 30 °C

**Organic acids:  
BlueOrchid C18 A**



Column: BlueOrchid C18 A, 1.8  $\mu$ m 50 x 2 mm  
 Mobile phase: 0.2 g NaH<sub>2</sub>PO<sub>4</sub> (pH 2.5); isocratic  
 Flow rate: 0.7 ml/min  
 Inj. volume: 1  $\mu$ l  
 Detection: 210 nm (100 Hz, 0.001 s), 10 mm, 2  $\mu$ l flow cell  
 Temp: 30 °C



**Back pressure** Due to its narrow particle size distribution, the column back pressure of BlueOrchid columns is lower than other high speed column materials on the market.

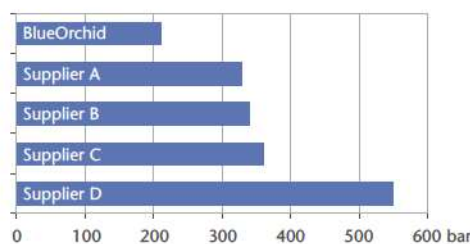
Pressures up to 1 000 bar (15 000 psi) are possible. To preserve the column's lifetime, we recommend that BlueOrchid columns generally be used at pressures below 800 bar (10 000 psi). This is an optimal balance between speed, resolution and column lifetime.

**Typical back pressure<sup>1)</sup> Dimensions**

320 bar (4 800 psi)	50 x 2 mm
550 bar (8 250 psi)	100 x 2 mm
780 bar (11 700 psi)	150 x 2 mm

<sup>1)</sup> measured with BlueOrchid C18 columns at ambient temperature at 500 µl/min, acetonitrile/water, 50:50

**Back pressure<sup>2)</sup> for sub-2 µm RP columns**



<sup>2)</sup> measured with BlueOrchid C18, 50 x 2 mm at ambient temperature, flow rate: 500 µl/min, acetonitrile/water, 65:35

**Column types** Eleven bonded phases and one plain silica material are available for reversed phase and normal phase chromatography. Every BlueOrchid column type features:

- exceptional peak symmetry and resolution
- 1.8 µm narrow particle size distribution for low back pressure
- next-generation ultra pure spherical silica
- outstanding pH stability

Modification	Carbon load (%)	rec. pH range	Endcapping	USP code	Order no.
C18	10	1–11	yes	L1	xxBI181BOE
C18 A	12	2–9	yes (polar)	L1	xxBI184BOE
C8	8	2–9	yes	L7	xxBI081BOE
PFP	8	2–8	no	L43	xxBI057BOE
C4	5	2–8	no	L26	xxBI040BOE
Phenyl	8	2–8	no	L11	xxBI050BOE
CN	4	2–8	no	L10	xxBI200BOE
SAX	2.5	2–8	no	L14	xxBI150BOE
HILIC	6	2–8	no		xxBI120BOE
PAL-HILIC	6	2–8	no		xxBI130BOE
NH <sub>2</sub>	2	2–8	no	L8	xxBI190BOE
Si	–	2–8	no	L3	xxBI000BOE

**UHPLC column hardware** The BlueOrchid stationary phase is packed in our new Vertex plus UHP hardware, specially designed for ultra high-performance applications which demand pressure resistance up to 1 000 bar (15 000 psi) and extremely low dead volume. Instead of traditional sieve-filter sandwiches, thin frits retain the packing material in the column for low dispersion. Various dimensions are available, providing more flexibility to adapt resolution and analysis speed.

<b>Available column dimensions</b>	30 x 2 mm	50 x 2 mm	100 x 2 mm	150 x 2 mm
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**Reproducibility** To obtain the most accurate results when performing quantitative analyses, it is important that retention time and peak area remain consistent. BlueOrchid columns are manufactured in ISO 9001:2008 accredited laboratories employing strict manufacturing procedures and 100% quality control testing. BlueOrchid columns show excellent reproducibility, column after column.

BlueOrchid columns are your first choice for new method development.  
Experience a new level of performance with BlueOrchid columns from KNAUER.

## Ordering information

Order No.	BlueOrchid C18
03BI181BOE	1.8 µm, 30 x 2 mm ID
05BI181BOE	1.8 µm, 50 x 2 mm ID
10BI181BOE	1.8 µm, 100 x 2 mm ID
15BI181BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid C18 A
03BI184BOE	1.8 µm, 30 x 2 mm ID
05BI184BOE	1.8 µm, 50 x 2 mm ID
10BI184BOE	1.8 µm, 100 x 2 mm ID
15BI184BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid C8
03BI081BOE	1.8 µm, 30 x 2 mm ID
05BI081BOE	1.8 µm, 50 x 2 mm ID
10BI081BOE	1.8 µm, 100 x 2 mm ID
15BI081BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid PFP
03BI057BOE	1.8 µm, 30 x 2 mm ID
05BI057BOE	1.8 µm, 50 x 2 mm ID
10BI057BOE	1.8 µm, 100 x 2 mm ID
15BI057BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid C4
03BI040BOE	1.8 µm, 30 x 2 mm ID
05BI040BOE	1.8 µm, 50 x 2 mm ID
10BI040BOE	1.8 µm, 100 x 2 mm ID
15BI040BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid Phenyl
03BI050BOE	1.8 µm, 30 x 2 mm ID
05BI050BOE	1.8 µm, 50 x 2 mm ID
10BI050BOE	1.8 µm, 100 x 2 mm ID
15BI050BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid CN
03BI200BOE	1.8 µm, 30 x 2 mm ID
05BI200BOE	1.8 µm, 50 x 2 mm ID
10BI200BOE	1.8 µm, 100 x 2 mm ID
15BI200BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid SAX
03BI150BOE	1.8 µm, 30 x 2 mm ID
05BI150BOE	1.8 µm, 50 x 2 mm ID
10BI150BOE	1.8 µm, 100 x 2 mm ID
15BI150BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid HILIC
03BI120BOE	1.8 µm, 30 x 2 mm ID
05BI120BOE	1.8 µm, 50 x 2 mm ID
10BI120BOE	1.8 µm, 100 x 2 mm ID
15BI120BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid PAL-HILIC (weak)
03BI130BOE	1.8 µm, 30 x 2 mm ID
05BI130BOE	1.8 µm, 50 x 2 mm ID
10BI130BOE	1.8 µm, 100 x 2 mm ID
15BI130BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid NH <sub>2</sub>
03BI190BOE	1.8 µm, 30 x 2 mm ID
05BI190BOE	1.8 µm, 50 x 2 mm ID
10BI190BOE	1.8 µm, 100 x 2 mm ID
15BI190BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid Si
03BI000BOE	1.8 µm, 30 x 2 mm ID
05BI000BOE	1.8 µm, 50 x 2 mm ID
10BI000BOE	1.8 µm, 100 x 2 mm ID
15BI000BOE	1.8 µm, 150 x 2 mm ID

Order No.	BlueOrchid RP Method Development Kit
A66050	C18 1.8 µm, 50 x 2 mm ID
	C18A 1.8 µm, 50 x 2 mm ID
	C8 1.8 µm, 50 x 2 mm ID
A66100	C18 1.8 µm, 100 x 2 mm ID
	C18A 1.8 µm, 100 x 2 mm ID
	C8 1.8 µm, 100 x 2 mm ID

Technical data are subject to change without notice.



[www.knauer.net/blueorchid](http://www.knauer.net/blueorchid)



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