Flash Purification Consumables

A Guide to Cartridges & Method Development

Biotage®

Flash Purification Cartridges for Better, Reproducible Separations

From Routine to Highly Specialized Applications, Biotage has the Solution

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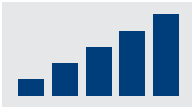
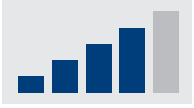
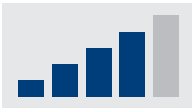
In 1994, Biotage first developed pre-packed cartridges for flash purification, and has been the leader in quality, performance, and innovation ever since.

Flash purification is a separation technique developed in 1978 by Professor W.C. Still that uses a stationary phase (a column or cartridge filled with an insoluble solid support) and a mobile phase (elution solvent mixture) to separate and purify a mixture of organic compounds. The stationary phase and the mobile phase typically have very different polarities, which work in tandem to separate compound mixtures. The separated molecules can then be collected in a purified state for use in a subsequent synthesis or as a final product.

Biotage was the first to develop and introduce pre-packed cartridges for flash purification. A broad selection of distinct cartridge styles now enable professionals to choose the cartridge which best suits the purification need and purification system.

All Biotage cartridges are designed to meet the requirements of our HPFC (high-performance flash chromatography) systems including Isolera™ Prime, One, Four and LS (with our without Isolera™ Spektra upgrade and Isolera™ Dalton), Biotage® SP1 and SP4, and Biotage® FlashMaster. Cartridge sizes start at 5 g for milligram scale purification, and extend to 40+ kg for kilogram scale process purification. Biotage cartridges are manufactured from polypropylene to meet the extractable requirements in US 21 CFR 177.1520 and packed using proprietary methods that strictly adhere to ISO 9001:2000 quality standards and ensure stable performance. Each Biotage SNAP cartridge is laser-etched with a unique lot number to ensure traceability.

Lab-scale Flash Cartridge Overview

Cartridge	Separation Mode	Silica	Loading Capacity	Loading Options
Biotage® SNAP Ultra 	Normal phase	 HP-Sphere	Half Size - Double capacity 	• Samplet • Solid loading • Direct pour-on • Liquid injection • 3-Way valve • Dry load vessel • Pump injection
Biotage® SNAP Ultra C18 	Reversed phase	 HP-Sphere-C18	Half Size - Double capacity 	• Samplet • Solid loading • Direct pour-on • Liquid injection • 3-Way valve • Dry load vessel • Pump injection
Biotage® SNAP KP-SIL 	Normal phase	 KP-Sil	Normal loading 	• Samplet • Solid loading • Direct pour-on • Liquid injection • 3-Way valve • Dry load vessel • Pump injection
Biotage® SNAP KP-NH 	Amine Purification	 KP-NH	Normal loading 	• Samplet • Solid loading • Direct pour-on • Liquid injection • 3-Way valve • Dry load vessel • Pump injection
Biotage® SNAP KP-C18-HS 	Reversed phase	 KP-C18-HS	Normal loading 	• Samplet • Solid loading • Direct pour-on • Liquid injection • 3-Way valve • Dry load vessel • Pump injection
Biotage ZIP® Sphere 	Normal phase	 KP-Sphere	Improved loading 	• Liquid injection • 3-Way valve • Dry load vessel • Pump injection
Biotage ZIP® 	Normal phase	 KP-Sil	Normal loading 	• Liquid injection • 3-Way valve • Dry load vessel • Pump injection

Biotage® SNAP Ultra

The Highest Purification Performance Available

Biotage® SNAP Ultra flash chromatography cartridges deliver the highest purification performance available. Packed with Biotage® HP-Sphere™ spherical silica with 40% more surface area, these cartridges can replace a standard cartridge twice its size.

Precision engineered Biotage® SNAP Ultra cartridges deliver double the purification capacity of other flash cartridges. The Biotage® HP-Sphere™ 25 µm spherical silica has 40% higher surface area, doubling the loading capacity of lower surface-area silicas. The small 25 µm spherical particles minimize band-broadening, while supporting faster flow rates to speed purification and improve productivity.

Performance like this means a small SNAP Ultra cartridge will replace a larger, more expensive alternative cartridge.

Designed for Isolera™ Spektra/Dalton

Isolera™ software supports all Biotage SNAP Ultra cartridges and will suggest the optimal cartridge for your conditions. The Luer-lock cartridge ports ensure secure, leak free connections to Isolera™ chromatography systems.

Biotage SNAP Ultra cartridges are available from 10 to 340 gram sizes allowing direct scale-up of samples from milligrams to grams. SNAP Ultra cartridges are also ACI™ compliant, which means it is optimized to give additional advantages in purification.

ACI™ Accelerated Chromatographic Isolation

Advantages

- Biotage® HP-Sphere™ silica with 40% more surface area
- Higher loading means smaller, faster and cheaper cartridges can be used to perform any separation
- Less solvent required
- The highest peak resolution
- SNAP/Samplet® versatility
- Higher flow rate supported

Recommended Instruments

- Isolera™ Spektra and Dalton flash purification family
- Compatible with all instruments using Luer-lock connections

Specifications

Sizes	10 g, 25 g, 50 g, 100 g, 340 g
Tube Material	Inert polypropylene
Frit Material	Inert polyethylene
Pressure Range	0–100 psi/7 bar (75 psi/5 bar for 340 g)
Media	Biotage® HP-Sphere™ – 25 micron spherical silica
Efficiency	Minimum 7000 N/m (plates per meter); typical 10 000 N/m
Compatibility	Universal Luer connections

Optional Accessories

- Dry loading vessels
- Samplet® cartridges
- 3-way injection valves
- Adapters

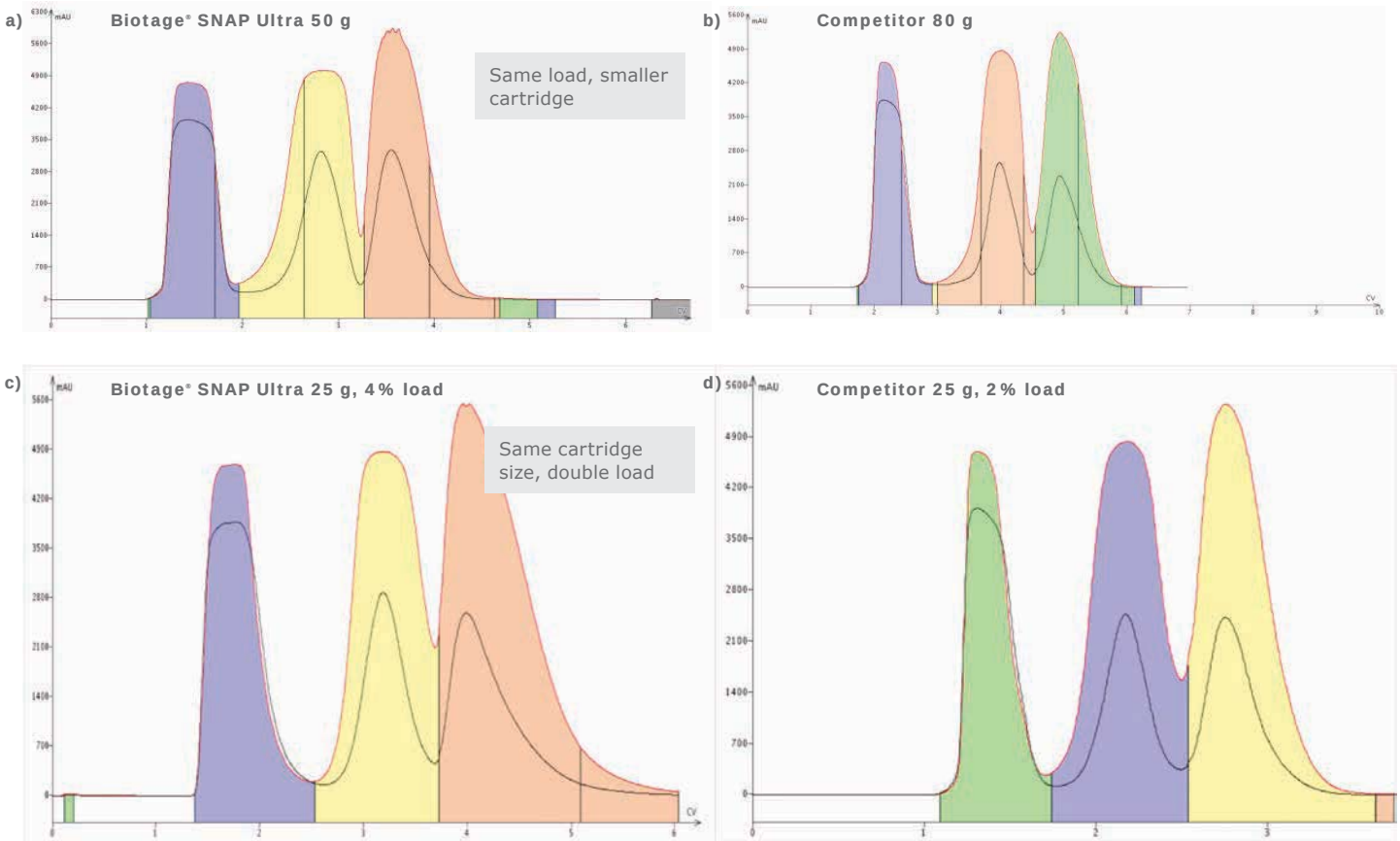


Figure 1. The very high surface area of the spherical 25 µm Biotage® HP-Sphere™ silica enables the use of smaller cartridges for the same amount of sample. In these examples, a Biotage® SNAP Ultra 50 g cartridge (a) actually purifies more sample than a competitive 80 g high-performance cartridge (b), saving 38% solvent and run time.

Similarly, At 4% load (4 g sample per 100 g of silica), a 25 g Biotage® SNAP Ultra cartridge (c) produces a separation equivalent to a competitive 25 g, 30 µm silica cartridge with a 2% sample load (d).

Biotage® SNAP Ultra C18

Reversed Phase Taken to the Next Level

Reversed phase flash chromatography is a very effective purification technique, the main application areas include polar, ionizable and highly lipophilic compounds which cannot easily be separated by normal phase techniques.

Unlike normal phase chromatography, reversed phase uses a hydrophobic stationary phase (e.g. C18 or ODS) and hydrophilic mobile phases (methanol/water, acetonitrile/water). By converting silica's active, polar silanol sites to neutral, lipophilic sites, compounds that will either aggressively stick to silica or not stick at all can be retained, separated and eluted using water-based solvent systems.

Biotage® SNAP Ultra C18 is using spherical 25 micron high surface silica particles to give improved load capacity and separation. It is now possible to routinely load 2–3 times more sample, compared to other C18 flash cartridges of the same size, and still obtain higher resolution in purification.

- 2–3% sample loading capacity can easily half the cost of purification compared to standard cartridges
- Using 50% smaller cartridges can cut the time for purification in half
- Best Performance: The spherical 25 micron well-packed silica particles bring flash even closer to prep-HPLC performance at a fraction of the cost
- Chemically neutral with high chemical resistance, tested at high and low pH means robustness and reliability

Biotage® SNAP Ultra C18 Features

- Biotage® SNAP Ultra C18 cartridges are based on the design of market leading Biotage SNAP cartridges.
- SNAP Ultra C18 cartridges have Luer connections and require no compression modules or additional expensive adapter kits (when used with most flash systems), reducing costs and improving ease-of-use
- Available in seven popular sizes: 12 g, 30 g, 60 g, 120 g, 400 g, 950 g and 1850 g
- Translucent polypropylene allows chemists to view solvent migration during any purification stage
- Samplets (which can act as guard columns)

Specifications

Sizes	12 g, 30 g, 60 g, 120 g, 400 g
Tube Material	Inert polypropylene
Frit Material	Inert polyethylene
Pressure Range	0–100 psi/7 bar (75 psi/5 bar for 400 g)
Media	Biotage® HP-Sphere C18 – 25 micron spherical silica
Efficiency	Min 6000 M/n (plates per meter); 4000 for 12 g
Compatibility	Universal Luer connections

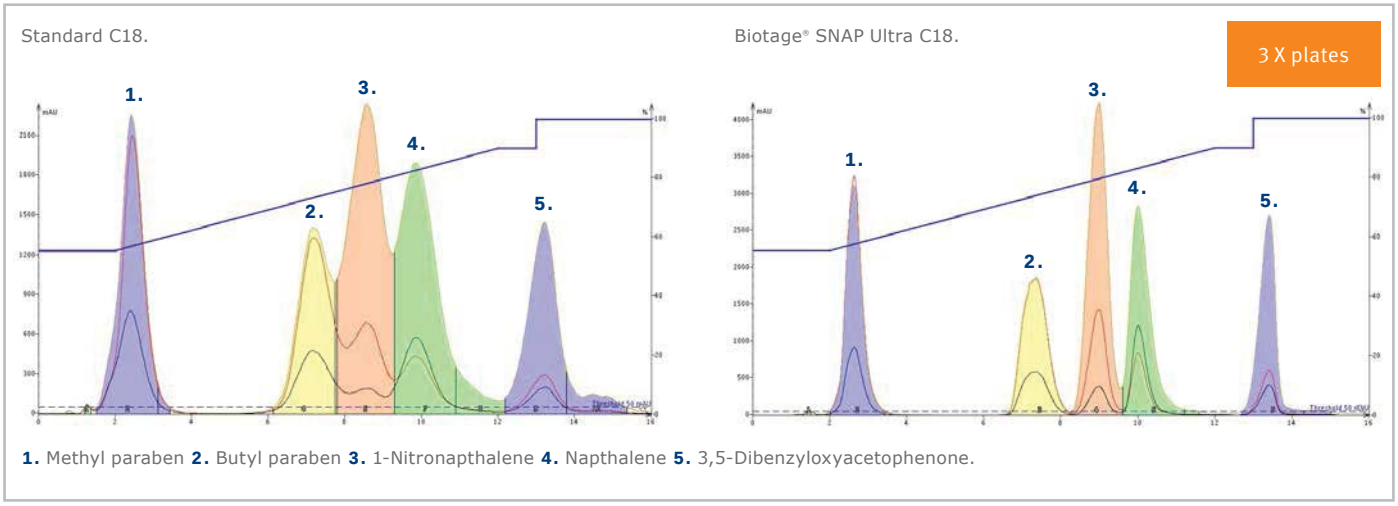


Figure 2. Comparison between standard C18 flash cartridges and Biotage® SNAP Ultra C18. Solvent A (water), B (methanol); Gradient 55% B for 2CV, 55–90% B for 10CV, 90% B held for 1CV then 100% B for 3CV (1% sample load, 300 mg sample).

Biotage® SNAP

Flexibility, Performance and Reliability

The Biotage® SNAP family of flash cartridges is the original recognized industry standard for professionals worldwide. Available in a wide range of sizes and flavors, Biotage SNAP cartridges deliver purification efficiency to meet the growing demands of a modern laboratory.

Biotage® SNAP cartridges are constructed using inert plastics for lower extractables and cleaner fractions and are packed to provide excellent resolution value.

Reliable and Flexible

Biotage SNAP cartridges packing techniques deliver larger loading capacities, tighter elution bands and purer fractions. Biotage SNAP cartridges are batch tested to ensure they meet stringent performance standards including efficiency (plate count) and peak symmetry.

The SNAP design supports the greatest number of loading techniques, including three different internal dry loading options. Available in sizes from 10 to 340 g with either silica, C18, or NH-functionalized media, Biotage SNAP cartridges will purify your valuable compounds whether you have milligram or multi-gram samples.

Advantages

- Universal fit
- Higher pressure rating
- High loading capacity
- Higher peak resolution than competitive cartridges
- Flexible SNAP/Samplet® loading options
- Several media for optimal purification
- Lot number layer etched onto each cartridge

Recommended Instruments

- Isolera™ flash purification systems
- Compatible with other instruments supporting Luer connections

Optional Accessories

- Dry loading vessels
- Samplet® cartridges
- 3-way injection valves
- Adapters

Specifications

Sizes	10 g, 25 g, 50 g, 100 g, 340 g
Tube Material	Inert polypropylene
Frit Material	Inert polyethylene
Pressure Range	0–100 psi/7 bar (75 psi/5 bar for 340 g)
Media	• Biotage® KP-Sil – 50 µm irregular silica • Biotage® KP-C18-HS – 50 µm irregular silica • Biotage® KP-NH – 50 µm irregular silica
Efficiency	Minimum 3000 N/m (plates per meter)
Compatibility	Universal Luer connections

Example Application Compability Guide

Product	Examples	Normal Phase Silica	Reversed Phase Silica	Amino Phase Silica
Alkaloids	Cocaine, morphine, nicotine, quinine	√	√	√
Amino acids			√	
Analgesics	Aspirin, acetaminophen, ibuprofen	√	√	
Aromatics		√	√	√
Basic drugs			√	√
Carbohydrates	Sugars		√	√
Flavanoids			√	
Glycosides			√	√
Lipids	Phospholipids	√	√	
Natural products	Terpenes, saponins, polyphenols	√	√	
(Oligo) nucleotides			√	
Peptides (< 2k MW)		√	√	
Steroids		√	√	
Tannins			√	
Vitamins	Tocopherols (vitamin E), retinol (vitamin A), vitamin D, vitamin K	√	√	√

Biotage ZIP® Sphere

High Performance, Low Pressure Flash Cartridge

Biotage ZIP® Sphere delivers better purification and improved throughput than comparable flash cartridges.

The silica surface area has been increased by >40%, providing up to twice the loading capacity, improving separations, and reducing purification time and solvent usage.

Biotage ZIP® Sphere cartridges contain Biotage® KP-Sphere™, a proprietary spherical silica which is manufactured under a new process that delivers 40% more surface area (700 m^2/g), no fines, and remarkably low back pressure. Typical flash cartridges use silica with a surface area of 500 m^2/g and irregular particle sizes (Figure 4). The smallest particles or fines cause higher back pressure, lower flow rates and lower capacity.

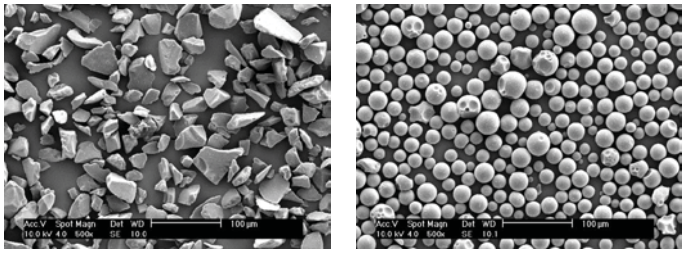


Figure 4. Typical flash cartridges use irregular silica which contains a variety of irregularly shaped particles (left). Biotage ZIP® Sphere cartridges contain Biotage® KP-Sphere™ spherical silica (right) which delivers 40% more surface area, no fines, and remarkably low back pressure.

Advantages

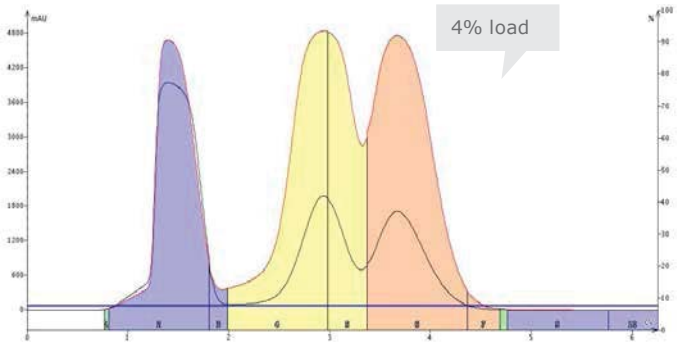
- High sample load
- Reduced purification costs
- Time to purify is reduced
- Amount of solvent use reduced
- Available from 5 g to 120 g

Optional Accessories

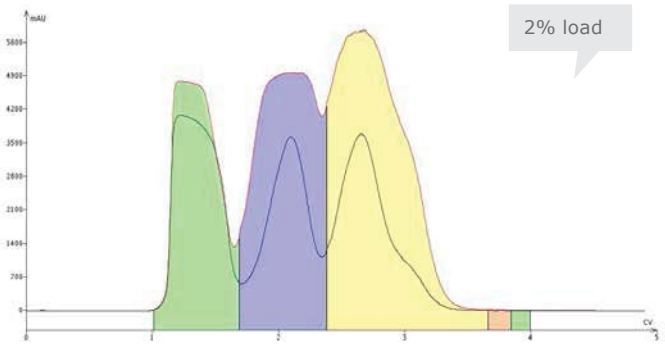
- Dry loading vessels
- 3-way injection valves
- Adapters

Specifications

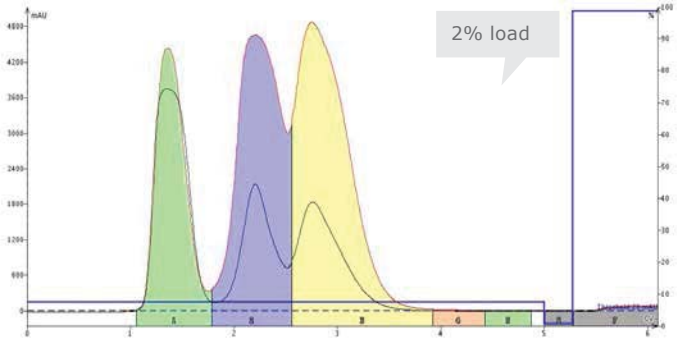
Sizes	5 g, 10 g, 30 g, 45 g, 80 g, 120 g
Tube Material	Inert polypropylene
Frit Material	Inert polyethylene
Pressure Range	0–100 psi/7 bar
Media	Biotage® KP-Sphere – 60 µm spherical silica
Efficiency	Minimum 3000 N/m (plates per meter)
Compatibility	Universal Luer connections



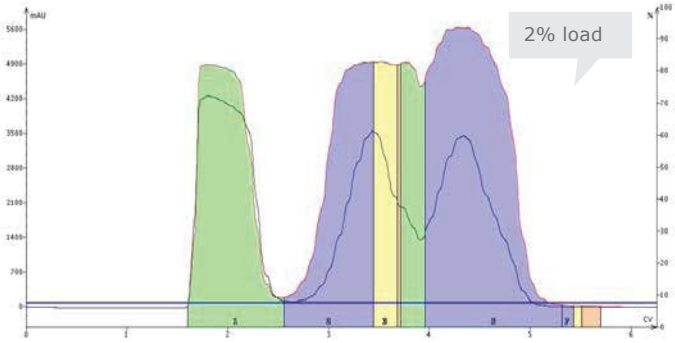
a. Biotage ZIP® Sphere 30 g, 60 µm, 4% load.



b. Competitor G, 24 g, 20–40 µm, 2% load.



c. Competitor I, 25 g, 25 µm, 2% load.



d. Competitor S, 25 g, 15–40 µm, 2% load.

Figure 5. During the testing, a Biotage ZIP® Sphere cartridge (a) with a 4% sample load (1.2 g) provided a separation equivalent or better than three competitive 25 g/25 µm silica cartridges (b–d) each loaded with a much smaller 2% sample load (0.5 g).

Cartridge Comparison

Feature	Biotage ZIP® Sphere	Competitor G	Competitor S	Competitor I
Particle Size (µm)	60	20–40	15–40	25
Particle Shape	Spherical	Spherical	Irregular	Spherical
Surface Area (m^2/g)	700	500	500	500
Pore Diameter (Å)	50	60	60	60
pH	7 ± 1	7 ± 1	7 ± 1	7 ± 1
Typical Plate Count (N/m)	3000	Not specified	Not specified	Not specified

Table 1. Biotage ZIP® Sphere key performance features compared to three competitors.

Biotage ZIP®

Simplicity, Performance and Economy

Biotage ZIP® flash cartridges are an evolution in the long history of Biotage manufacturing flash purification solutions. Biotage ZIP cartridges deliver industry-leading performance that meets the difficult challenges of day to day purification. Plug-and-play Biotage ZIP cartridges are the perfect complement to all Isolera™ flash chromatography systems.

Biotage ZIP® cartridges are laser-welded to ensure leak-free operation even at elevated pressures.

Constructed with industry-standard Luer lock inlet and Luer tip outlet ports, Biotage ZIP cartridges are universal in their use together with flash systems from around the world. No adapters are needed, so installation is quick and easy.

Biotage ZIP cartridges are packed with Biotage® KP-Sil brand silica. Available in sizes from 5–120 g, Biotage ZIP cartridge purifications can be directly scaled up to larger Biotage cartridges including Biotage® SNAP 340 g, 750 g and 1500 g, Flash 75 and 150, and even Flash 400.

Advantages

- 20% higher loading capacity than competitive cartridges
- Highest routine loading for a work-horse cartridge
- High resolution compared to similar cartridges (see Figure 6)
- Leak-free operation and high pressure tolerance
- Luer tip outlet is compatible with most flash systems
- Made to ISO 9001:2008 standards

Optional Accessories

- Dry loading vessels
- 3-way injection valves
- Adapters

Specifications

Sizes	5 g, 10 g, 30 g, 45 g, 80 g, 120 g
Tube Material	Inert polypropylene
Frit Material	Inert polyethylene
Pressure Range	0–150 psi/10 bar (120 psi/8 bar for 120 g)
Media	Biotage® KP-Sil – 50 µm irregular silica
Efficiency	Minimum 3000 N/m (plates per meter)
Compatibility	Universal Luer connections

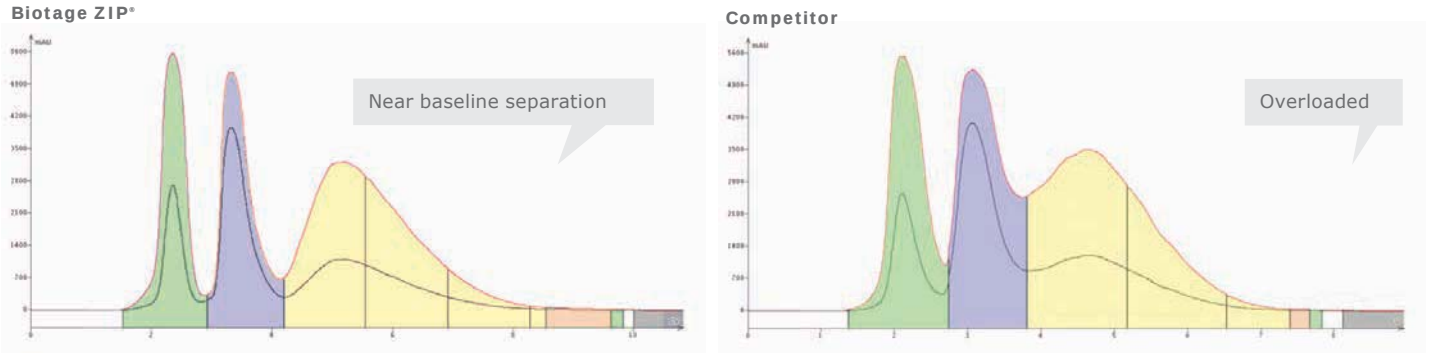


Figure 6. A 30 g Biotage ZIP® cartridge (left) and a competitive 30 g flash cartridge with spherical silica (right) are used to isocratically separate a 3-component mix. The Biotage ZIP® cartridge provides more compound resolution and sharper peaks for the same sample load.

Biotage® SNAP XL

Cartridges for Large and Industrial Scale Purification

SNAP 750 g and 1500 g cartridges address a growing need for optimized purification on the 150+ gram scale, increasing purification efficiency while reducing costs.

Biotage® SNAP XL cartridges are rugged and laser welded for safe operation at pressures up to 100 psi, enabling high flow rates and use of higher viscosity solvents.

Operating at flow rates up to 500 mL/min, these cartridges allow you to quickly purify large sample masses, saving hours or even days of purification runtime.

Direct Scale-Up

Biotage® SNAP XL cartridges provide seamless scale-up from milligrams to over 150 grams simply and efficiently without method modification (Figure 7).

Biotage® SNAP XL cartridges are available with a variety of standard media: Biotage® HP-Sphere™, Biotage® HP-Sphere C18, Biotage® KP-SIL, Biotage® KP-C18-HS, and Biotage® KP-NH, enabling direct scale-up from smaller Biotage® SNAP cartridges.

Advantages

- Laser welded for strength and safety
- High loading capacity increases purification throughput
- Seamless scale-up from other Biotage flash cartridges
- Up to 100 psi (7 bar) pressure rating enables fast flow rates
- Translucent barrel provides optical monitoring of progress
- Inert polypropylene construction materials minimize extractables, providing cleaner purified products

Recommended Instruments

- Isolera™ LS
- Compatible with most manufacturers' development-scale instruments

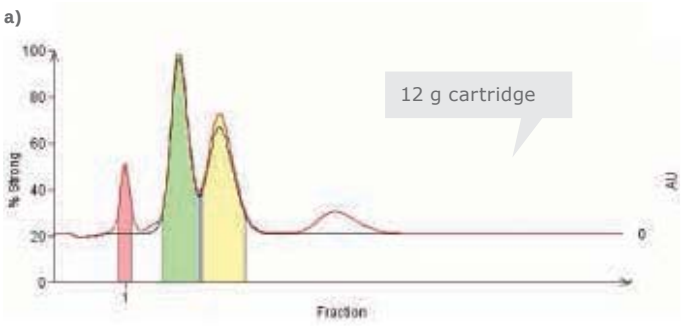
Optional Accessories

- 3-way large-bore injection valve
- Inlet and outlet Luer fittings
- Cartridge holder for Isolera™ systems
- External dry load vessel (DLV-500)

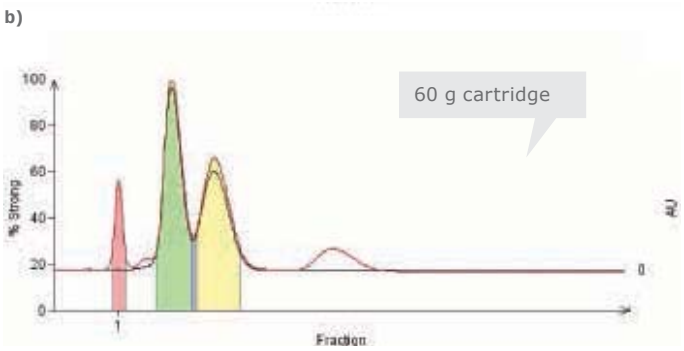
Specifications

Sizes	750 g, 1500 g
Tube Material	Inert polypropylene
Frit Material	Inert polyethylene
Pressure Range	0–100 psi/7 bar
Media	• Biotage® HP-Sphere™ – 25 µm spherical silica • Biotage® HP-Sphere™ C18 – 25 µm spherical silica • Biotage® KP-Sil – 50 µm irregular silica • Biotage® KP-C18-HS – 50 µm irregular silica • Biotage® KP-NH – 50 µm irregular silica
Efficiency	Minimum 3000 N/m (plates per meter)

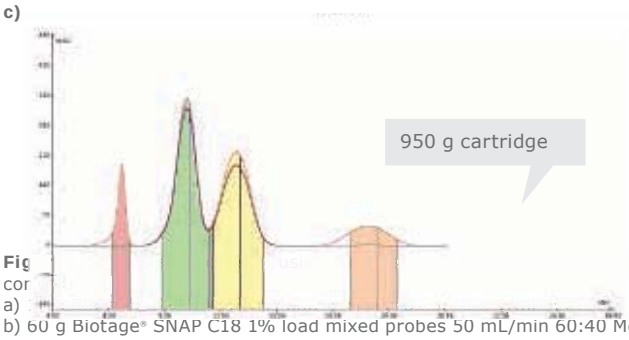
a)



b)



c)



d)

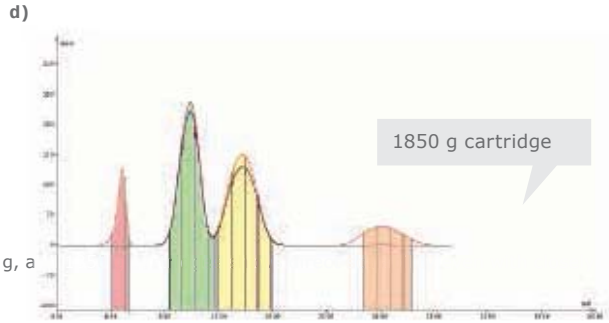


Fig …0 g, 950 g, a… luting
cor…
a) …eCN:H$_2$0.
b) 60 g Biotage® SNAP C18 1% load mixed probes 50 mL/min 60:40 MeCN:H$_2$0.
c) 950 g Biotage® SNAP XL C18 1% load mixed probes 250 mL/min 60:40 MeCN:H$_2$0.
d) 1850 g Biotage® SNAP XL C18 1% load mixed probes 500 mL/min 60:40 MeCN:H$_2$0.

Biotage® Flash 75 and Flash 150

The Original Industry Standard for Industrial Scale Purification

The original flash cartridges invented by Biotage deliver world class purification and ease of use. These industrial scale cartridges provide a straight-forward purification scale-up path from other flash cartridges.

Routinely operating at a flow rate of 250 mL/min or more, Biotage® Flash 75 and 150 cartridges can save hours or even days of purification time compared to using glass-column flash purification. Flash 75 and 150 cartridges operate in radially compressed barrels that squeeze the cartridge walls, improving bed density and minimizing the chance of voiding and channeling.

Reliable Gram-Scale Purification

The range of available sizes and media enable purification from tens to hundreds of grams of crude reaction mixtures. Choose from Biotage® KP-Sil, Biotage® KP-Sphere™, Biotage® HP-Sphere™, Biotage® KP-C18-HS, Biotage® KP-NH, activated carbon, HP20, or HP20SS media. Cartridges are available in five sizes: 200 g, 400 g, and 800 g (Flash 75), and 2.5 kg and 5 kg (Flash 150) .

Advantages

- Compression modules maximize sample contact with silica
- Large scale economical workhorse

Recommended Instruments

- Biotage® Flash 75
- Biotage® Flash 150

Optional Accessories

- Biotage SIMs (Sample injection module)
- 3-way injection valve

Specifications

	Flash 75M	Flash 75L	Flash 150M	Flash 150L
Available Media	Biotage® KP-Sil Biotage® KP-Sphere™ Biotage® HP-Sphere™ Biotage® KP-C18-HS Flash-AC Diaion® HP20 Diaion HP20SS			
Diameter (mm)	75	75	150	150
Bed Length (mm)	150	300	300	600
Packing Weight (g)	400	800	2500	5000
Column Volume (mL)	535	1070	4300	8600
Flow Rate (mL/min)	250	250	500–1000	500–1000
Recommended Sample Size (g)	0.4–20	0.8–40	3–160	6–320
Easy ΔCV = 4+	10–20	20–40	80–160	160–320
Typical ΔCV = 2–3.9	2–10	4–20	16–80	32–160
Difficult ΔCV = 0.1–1.9	0.4–2	0.8–4	3–16	6–32
SIM* Volume (mL)	500	500	1000	2000
Reservoir Volume (L)	12	12	37	6

*SIM, sample-injection module for low-solubility samples or viscous oils.

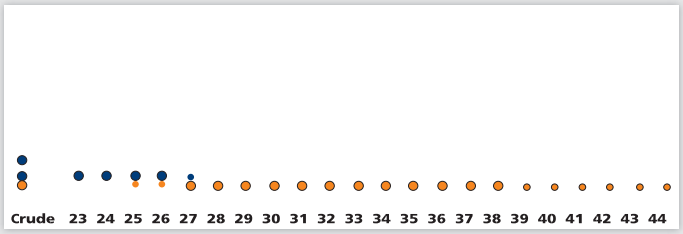
Flash 150 vs. Glass Column Comparison

	Flash 150M	Glass Column
Cartridge Size (mm)	150 x 300	120 x 660
Silica Volume (kg)	2.5	3
Sample Load (g)	180	450
Flow Rate (mL/min)	500	70
Number of Fractions	45	45
Purification Time (min)	90	430
Pure Compound (g/run)	70.5	45
Recovery (%)	87.0	22.2
Purification Throughput (g/hr)	120	63

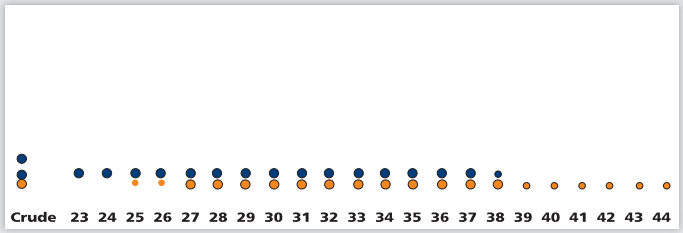
Figure 8. The TLC of the collected fractions in the Flash 75L (a) and 150M (c) vs. glass column (b, d) comparisons show that more pure fractions were collected with the Flash cartridges than the glass column. That improvement along with a faster flow rate yielded a throughput enhancement double that of the glass column.

In this application the Flash 150 system saved nearly four weeks of purification time on a 1 kg scale synthesis project.

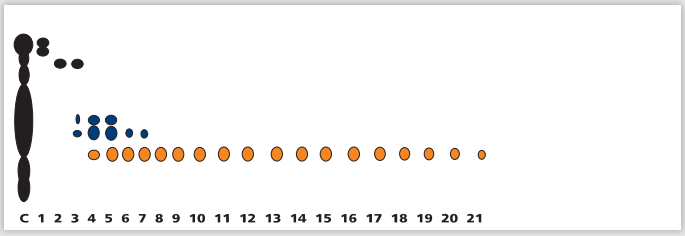
c) Flash 150M



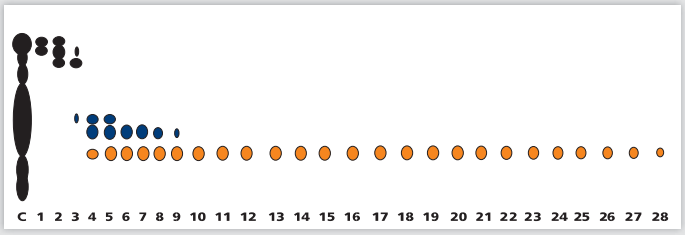
d) Glass Column



a) Flash 75L



b) Glass Column



Biotage® Flash 400

The Industry Standard Original for Industry Scale Purification

Biotage® Flash 400 cartridges are pre-packed, radially compressed cartridges designed for large scale chromatography. Built to last and engineered to perform, Flash 400 cartridges provide maximum reliability and are faster, safer and easier to use than traditional glass or steel columns, making them the first choice of industries around the world.

Biotage production-scale flash cartridges can be run at flow rates up to 7 liters per minute, allowing operators to save hours, even days of separation time. The media in each cartridge is self-contained, eliminating exposure to contamination and impurities, and when dealing with toxic compounds, Flash 400 greatly reduces the risk of exposure.

Flash 400 cartridges are designed for both chromatographic purification and adsorption processing of a variety of organic synthetic and natural products.

Patented Radial Compression Technology

Our proprietary process ensures that each flash cartridge is shipped tightly packed. The application of our proven, patented radial compression technology maintains the bed's stability for cleaner, purer fractions in less time delivering higher yield. The extra force from radial compression ensures near zero "wall effects" and channeling inside each cartridge.

Scalable Results

Technologies such as crystallization and adsorption can be difficult and time consuming to scale up. With our extensive cartridge range, reliable results are verifiable and easy to achieve with any separation. Often a separation is evaluated with a Biotage® SNAP 10 g cartridge and those conditions ultimately scaled to larger cartridges all the way up to 40 kg Flash 400L size, a 4000x increase in scale.

Specifications

	Flash 400M	Flash 400L
Available Media	Biotage® KP-Sil Biotage® KP-Sphere™ Biotage® HP-Sphere™ Biotage® KP-C18-HS (reversed phase) Biotage® KP-NH (amine-functionalized) Mitsubishi Diaion® HP20 and HP20SS Activated Carbon	
Diameter (mm)	400	400
Bed Length (mm)	300	600
Flow Rate (L/min)	1–7	1–7
Biotage KP-Sil Silica Packing Weight (kg)	20	40
Biotage KP-C18-HS Packing Weight (kg)	24	48
Flash-AC Activated Carbon Packing Weight (kg)	13	26
Mitsubishi HP20	38	76
Sample size (g)	200–4000	400–8000
Column volume (L)	25	50

*SIM, sample-injection module for low-solubility samples or viscous oils.

Compatibility

Flash 400 cartridges are designed for use together with the Biotage® Flash 400 chromatography system. The system has interchangeable compression modules to accommodate either the Flash 400M or Flash 400L cartridges, with the capacity to purify up to 4 kg of crude reaction mixture.

Two Sizes

Flash 400M is a 30 cm cartridge with 28 L column volume. The Flash 400L is a 60 cm, 56 L cartridge typically holding up to 48 kg of media.

Both cartridges are available with standard or reversed phase silica, activated carbon or polymer resin. Cartridges with custom packed media are also prepared for clients with specific needs.

Advantages

- Radial compression
- Pre-packed cartridges
- Good Manufacturing Compliant (GMP) for production of Active Pharmaceutical Ingredients (APIs)
- Improves safety by eliminating the need to handle kilogram amounts of media
- Can purify more than 4 kg of crude reaction mixture
- Minimizes exposure to active or toxic compounds
- Shipped in a re-sealable container for disposal and incineration

Recommended Instruments

- Biotage® Flash 400

Samplet® Cartridges (Samplets)

Internal Dry Loading Improves Recovery and Purity

Boost flash purification without changing cartridge.

Creating dried, adsorbed samples will improve the separation performance on any cartridge. Our Samplet® cartridges are designed for quick and convenient loading of concentrated samples. After the sample has been applied the solvent is allowed to evaporate, the Samplet is then inserted into the SNAP cartridge, now loaded with a concentrated sample. This will eliminate the strong dissolution solvent effect.

For more information, please refer to the Biotage SNAP User Guide.

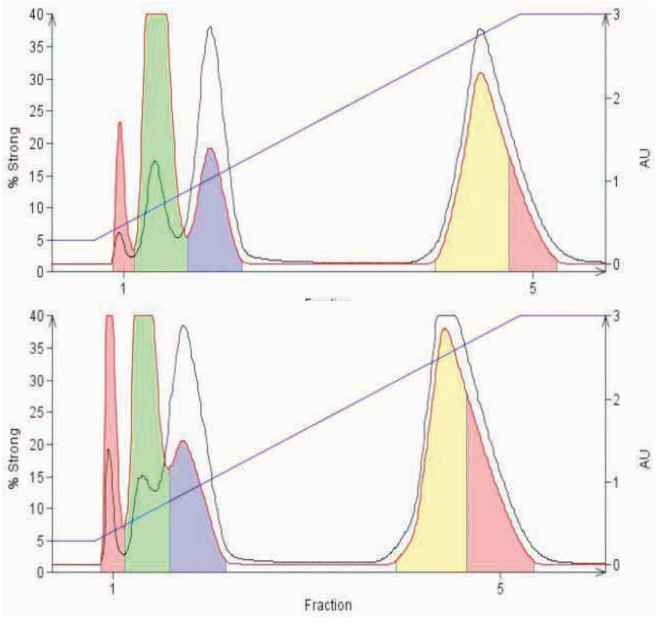


Figure 9. Increased performance of a Samplet-loaded cartridge (top) versus a liquid-loaded cartridge (bottom) is seen by the improved peak resolution. By allowing the sample to dry in the Samplet® cartridge, the sample diluent's strong displacement effects are eliminated, improving purification.

Dry Loading Vessels

Improve Purification Results with Higher Sample Loads

The solution to hard-to-dissolve crude samples.

One of the most common flash purification challenges is dealing with hard-to-dissolve crude samples. Because excess polar solvents cause poor chromatographic results, other sample load options are needed.

A commonly used solution is dry loading, which involves dissolving the sample in a suitable polar solvent, mixing the solution with an inert, clean, dry adsorbent such as silica or diatomaceous earth, and then drying the slurry. By drying the mixture, the polar solvent is removed and will have no impact on the purification. The dried sample is then loaded into an empty vessel and inserted in front of the purification cartridge.

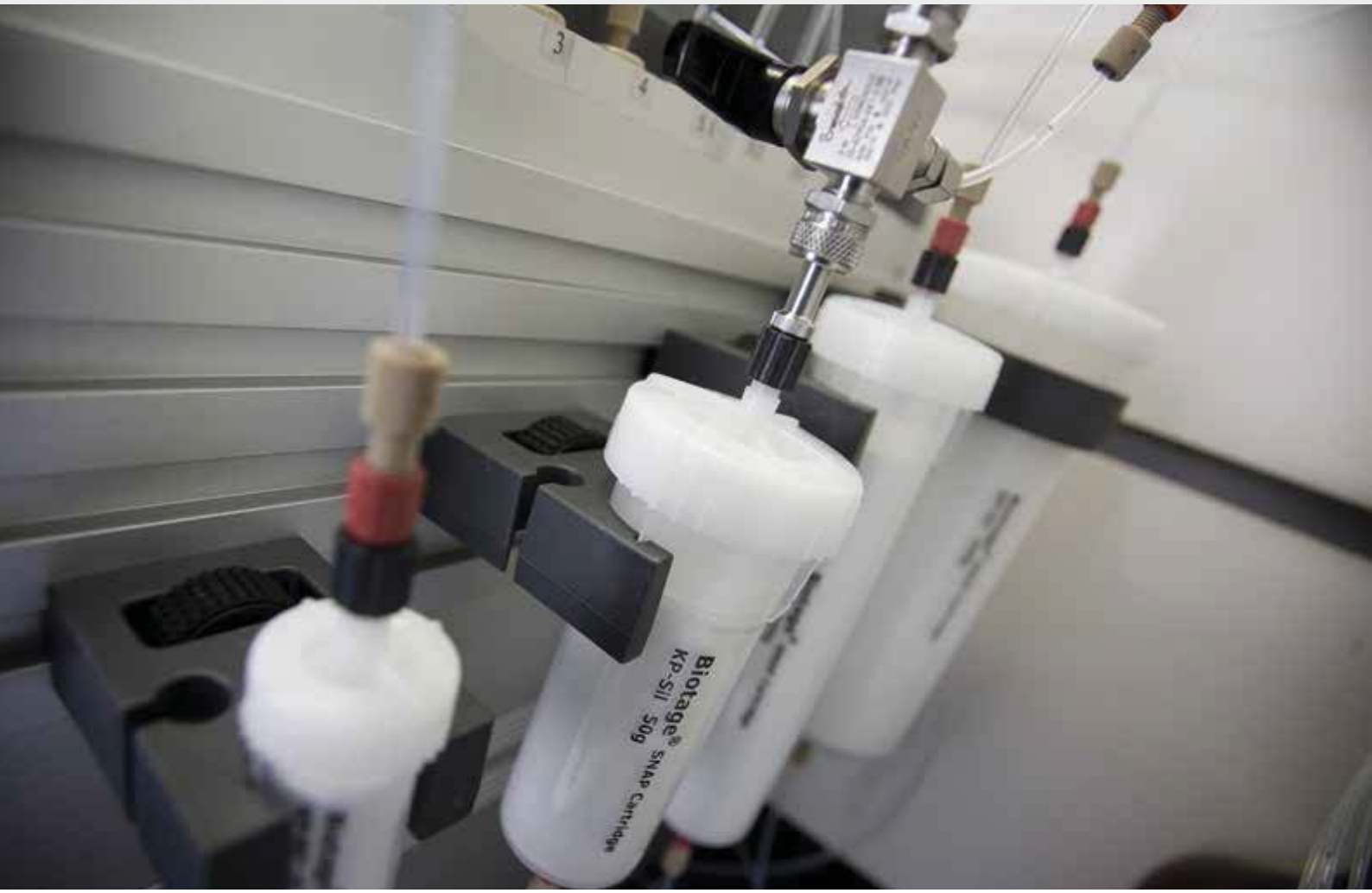
Dry load vessels are available for use with all Biotage cartridges.

Advantages

- Improved sample separation
- Higher loading capacity
- Increased fraction purity

DLV Accessories

- Replacement barrels and frits
- DLV holders



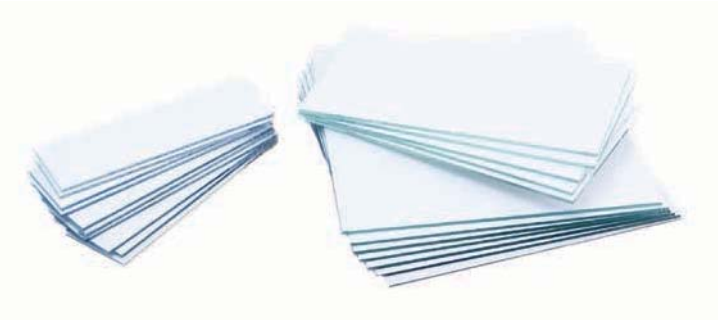
Accessories

Helpful Tools and Gadgets

Even with the most sophisticated equipment, flash chromatography can be time consuming or labor intensive. Biotage offers a wide range of accessories that make lab work even more efficient.

Cartridge Adapters

Luer lock-to-tip adapters enable Biotage® SNAP cartridges to be used with the Biotage® FlashMaster and on other competitive flash systems. The adapter is very easy to install and attaches directly to the Biotage SNAP cartridge outlet, converting the Biotage SNAP cartridge from Luer lock to Luer tip.



Thin-Layer Chromatography (TLC) Plates

TLC is commonly used method in development. Product mixtures separated using TLC can generally be purified by flash chromatography. TLC-to-flash method transfer accuracy is improved when TLC plates and flash cartridges are made with identical Biotage silica. For synthetic chemists, the benefits of matched TLC plates and flash cartridges include better purification throughput, increased compound purity and yield, and reduced solvent cost.

Liquid Sample Injection Valves and Adapters

For liquid samples, Biotage offers two 3-way injection valves (standard and wide bore) that attach directly to Biotage cartridges and compression modules. These stainless steel valves come complete with finger tight fittings and a Luer adapter for syringe injection. The straight-through injection design minimizes wash volume and precipitation potential.

Cartridge Holders

Designed for simple attachment onto Isolera™ systems, these cartridge holders accommodate 10 g, 25 g, 50 g, 100 g, 340 g, 750 g and 1500 g Biotage® SNAP cartridges.

Stationary Phases

Useful Information

Normal Phase Purification

Most organic synthesis products are soluble in organic solvents such as dichloromethane (DCM), acetone or ethyl acetate (EtOAc), and are lipophilic. Lipophilic molecules are typically separated using a polar stationary phase and a nonpolar mobile phase. This technique is called normal phase purification.

Common mobile phases for normal phase purification include hexane/EtOAc and DCM/MeOH. DCM/MeOH is primarily used for organic molecules with highly polar functional groups (acids, amines, alcohols), which have a higher affinity for silica than esters, amides and ethers.

In normal phase purification, Biotage cartridges packed with Biotage® KP-Sphere™, Biotage® HP-Sphere™ or Biotage® KP-NH are typically used.

Reversed Phase Purification

Some synthetic mixtures and natural products are soluble in more polar solvents such as MeOH, DMSO, DMF, MeCN, or water. Polar solvents are very disruptive to normal phase mass-transfer kinetics and should only be used with reversed phase purification, in which case the stationary phase is hydrophobic.

Reversed stationary phases typically consist of a hydrocarbon chain of 18 carbons, covalently bonded to the silica. The bonding creates a highly lipophilic environment, separating compounds on the basis of hydrophobic partitioning, similar to liquid-liquid extraction. Unlike silica cartridges, reversed phase cartridges can be re-used many times.

Four Main Purification Modes Available with Biotage Silicas

Normal Phase

Biotage® HP-Sphere™

Biotage HP-Sphere is a high-performance silica. Its spherical shape, 25 µm particle size, and extremely high surface area make Biotage HP-Sphere the most efficient flash silica available. Its spherical shape reduces backpressure while the 25 µm particle diameter and 700 m^2/g surface area combine to provide maximum resolving power and enable sample loads twice that of other silicas.

Biotage® KP-Sil

The most frequently used silica for flash purification features high surface area (500 m^2/g), moderate porosity (60 Å), a tight uniform particle distribution (40–63 µm), neutral pH, and low metals content. These factors combine to provide high loading capacity, efficiency and reproducibility.

Normal Phase – Amine Functionalized

Biotage® KP-NH

Biotage® KP-NH chemistry shields synthetic organic amines from acidic silanols providing improved selectivity, peak shape, purity and yield. Unlike traditional silica and 1° amine (propyl amine) bonded silica, Biotage KP-NH does not require the use of chlorinated solvents or amine additives. Biotage KP-NH flash cartridges and matching TLC plates separate 2°, 3°, and heterocyclic amines using non-chlorinated solvents. The TLC plates are made using the same chemistry as Biotage KP-NH flash cartridges. Methods developed using Biotage KP-NH TLC plates therefore accurately transfer to Biotage KP-NH flash cartridges simplifying flash purification.

Reversed Phase

Reversed phase flash chromatography is a very effective purification technique. Its main application areas include polar, ionizable and highly lipophilic compounds which cannot easily be separated by normal phase techniques. Unlike normal phase chromatography, reversed phase uses a hydrophobic stationary phase (e.g. C18 or ODS) and hydrophilic mobile phases (methanol/water, acetonitrile/water). By converting the silica's active, polar silanols sites to neutral lipophilic sites, compounds that will either aggressively stick to silica or not stick at all can be retained, separated and eluted using water-based solvent systems. Biotage Reversed Phase cartridges are available with two different media:

Biotage® HP-Sphere™ C18

Biotage® HP-Sphere™ C18 is a high-performance silica. Its spherical shaped, 25 µm particle size, and high surface area of 400–450 m^2/g which can load twice that of other silicas.

Biotage® KP-C18-HS

Biotage® KP-C18-HS features a tight uniform particle distribution (40–63 µm) and a surface area of 400 m^2/g for routine processing with standard loading.

Chemisorptive

Diaion HP20, HP20SS

HP20 and HP20SS are styrene-divinyl benzene copolymers primarily used as traps for organic molecules from aqueous fermentation solutions. HP20 has a particle size of 250–600 µm, while HP20SS has a particle size of 75–150 µm. Each has a high 600 m2/g surface area, which allows a large concentration of organic materials to accumulate from aqueous solutions.

Activated carbon

For color, by-product, catalyst, or liposaccharide (LPS) pyrogen removal from active compound solutions prior to crystallization Biotage offers activated carbon packed into cartridges. Use of pre-packed cartridges is generally safer and more efficient than batch mode scavenging. Biotage activated carbon is scalable to Flash 400 and can be used in a cGMP environment when API cleanliness is required.

Physical Properties of Biotage Flash Chromatography Media

	Chemistry Particle Size (µm)	Surface Area (m^2/g)	Pore Volume (mL/g)	Pore Diameter (Å)
Biotage® HP-Sphere™	25	700	0.9	50
Biotage® HP-Sphere™ C18	25	400	0.9	85
Biotage® KP-Sil	50	500	0.7	60
Biotage® KP-C18-HS	50	400	0.95	90
Biotage® KP-NH amine	50	230	0.6	100
HP20 S-DVB	250–600	600	1.3	300–600
HP20SS S-DVB	75–150	600	1.3	300–600

Flash Chromatography

Method Development

This guide covers the stages of optimizing flash chromatography for three popular types of flash purification methods — isocratic normal phase, gradient normal phase, and reversed phase. These guidelines address important issues related to achieving successful flash purification.

Developing Normal Phase Methods — Isocratic

Stage 1: Converting TLC Rf to CV

Biotage recommends method development using Biotage TLC plates since the silica on the plates matches with cartridge flash silica. Retention on TLC plates is denoted by Rf. In flash purification, retention is usually measured in CV. Methods developed using TLC are generally transferable to flash chromatography because the relationship between Rf and CV is reciprocal, CV=1/Rf (Figure 10).

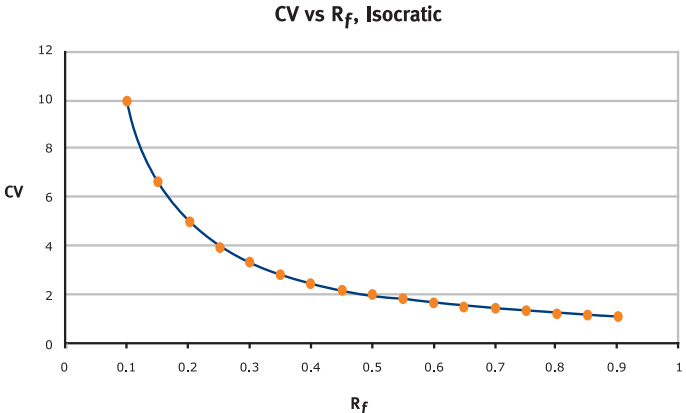


Figure 10. Rf to CV correlation, isocratic elution.

Normal Phase

Stage 1

Converting TLC (thin-layer chromatography) Rf (retention factors) to CV (column volumes)

Stage 2

Determining the best solvent selectivity using TLC

Stage 3

Determining the best solvent strength using TLC

Stage 4

Determining the optimal cartridge size and sample load based on TLC data

Reversed Phase

Stage 1

Converting HPLC (high-performance liquid chromatography) retention times and gradient methods to CV

Stage 2

Determining the optimal cartridge size and sample load based on TLC data

When scouting TLC solvent systems, it is important to realize a low Rf (0.15–0.35) is preferred because a lower Rf means a greater CV. Large CVs indicate increased compound-silica contact time, improving the chances of component resolution. Since CV is a measure of compound retention, then ΔCV is the measure of compound resolution, (see Figure 11). In flash purification, ΔCV dictates the sample load range possible for any given cartridge size, (see table 4 on page 29). For two adjacent components, a large ΔCV is desirable.

Stage 2: Determining the best solvent selectivity using TLC

The first step in successful flash purification is maximizing ΔCV. Accomplish this by evaluating various solvent mixtures by TLC. Look for a binary mixture that provides the largest ΔCV between the compound of interest and all the impurities. All solvents fall into one of the selectivity groups below. Each group has a different impact on a sample component's relative retention to another compound (selectivity). Table 2 shows the most frequently used flash solvents and their selectivity groups.

Solvent	Selectivity Group
Ether	I
Methanol	II
Ethanol	II
Isopropanol	II
Tetrahydrofuran	III
Dichloromethane	V
Acetone	VIa
Ethyl acetate	VIa
Acetonitrile	VIb
Toluene	VII
Chloroform	VIII
Hexane	—
Heptane	—
Isooctane	—

Table 2. Commonly used flash chromatography solvents.

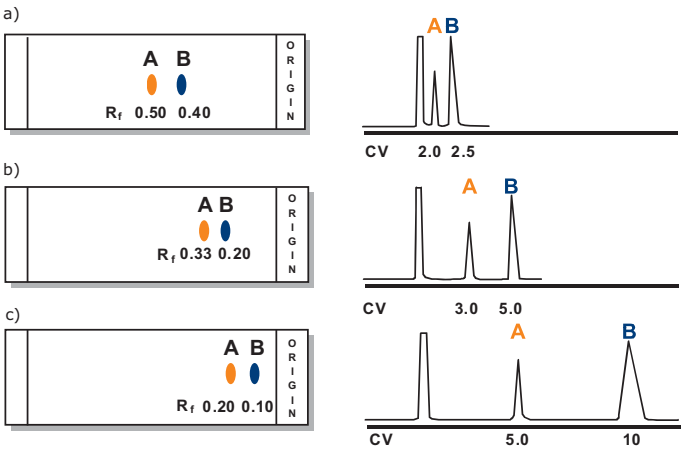


Figure 11. The Rf–CV relationship is illustrated in this graphic.
a) Although compounds A and B are well resolved on TLC with Rf of 0.5 and 0.4, respectively, flash purification with the same solvent conditions provides low retention and low resolution (ΔCV = 0.5) for A and B, respectively.
b) Lowering the Rf (A = 0.33, B = 0.20) provides increased retention and resolution (ΔCV = 2).
c) Extremely high resolution (ΔCV = 5) is obtained by further reducing the compounds' Rf.

When possible, optimization should include mixtures of hexane with ethyl acetate (VIa), methylene chloride (V), toluene (VII), tetrahydrofuran (III), and ether (I). For more polar compounds and amines, mixtures of methylene chloride (V) with methanol (II) or acetonitrile (VIb) should be evaluated. These solvent combinations provide a broad range of separation selectivity and will help define the correct solvents for purification (Figure 12).

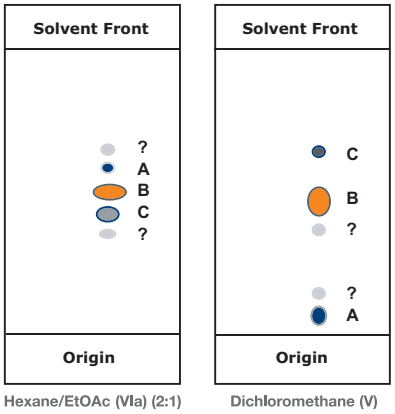


Figure 12. Impact of solvent selectivity on a chromatographic separation. In hexane/ethyl acetate the compound of interest (B) is poorly resolved from its major impurities (A and C). In dichloromethane, retention of impurities A and C has been dramatically altered, providing a better purification of B.

Stage 3: Determining the best solvent strength using TLC
When the correct solvents have been determined, the next step is to adjust the solvent composition (solvent strength) so the compound of interest elutes within the Rf range 0.15–0.35 (6.7–2.8 CV). By adjusting solvent strength to provide elution within this window, the chances for optimal purification are greatly enhanced. As with selectivity, each solvent has its own polarity (Table 3). Each solvent mixture or mobile phase then has its own unique solvent strength. Calculation of a solvent mixture's strength is useful for comparison to other solvent mixtures. Solvent mixtures with the same strength but different selectivity can then be evaluated.

To bring the Rf of the compound of interest into the optimal range, reduce the amount of polar solvent in the mobile phase. As an example, in Figure 13, the results of a solvent selectivity study show a mobile phase of 50% hexane and 50% ethyl acetate (solvent strength = 0.30), providing adequate selectivity for a crude sample (Figure 13, a). The Rf for the compound of interest (B) is 0.4 (2.5 CV) and the Rf of the impurity (A) is 0.55 (1.8 CV), providing a ΔCV of 0.7. With a ΔCV this low, only a small sample amount can be flash purified before overload (resolution loss, low purity fractions) occurs. By weakening the solvent strength to 60% hexane and 40% ethyl acetate (solvent strength 0.24) (Figure 13, b); the Rf of compound B falls to 0.2 (5 CV) and impurity A's Rf is lowered to 0.3 (3.3 CV) with a resulting ΔCV of 1.7, enabling a potential fivefold increase in sample load on a flash cartridge (Table 4).

If you find adequate component retention with a particular solvent mixture, you can prepare other solvent mixtures of similar strength but different selectivity for comparison (Figure 13, c).

Solvent	Solvent Strength
Methanol	0.95
Ethanol	0.88
Isopropanol	0.82
Acetonitrile	0.65
Ethyl acetate	0.58
Tetrahydrofuran	0.57
Acetone	0.56
Dichloromethane	0.42
Chloroform	0.40
Ether	0.38
Toluene	0.29
Hexane	0.01
Heptane	0.01
Isooctane	0.01

Table 3. A solvent mixture's strength is calculated using volume proportions and the individual solvent's strength. In this example, diluting a solvent mixture with a less polar solvent (hexane) from 50% to 60% reduces solvent strength, increasing compound retention and resolution (ΔCV). Also, solvent combinations of similar strength but different selectivity can also be compared. Both hexane/ethyl acetate (50:50) and hexane/dichloromethane (30:70) have solvent strength of 0.3, but ethyl acetate and dichloromethane provide different selectivity.

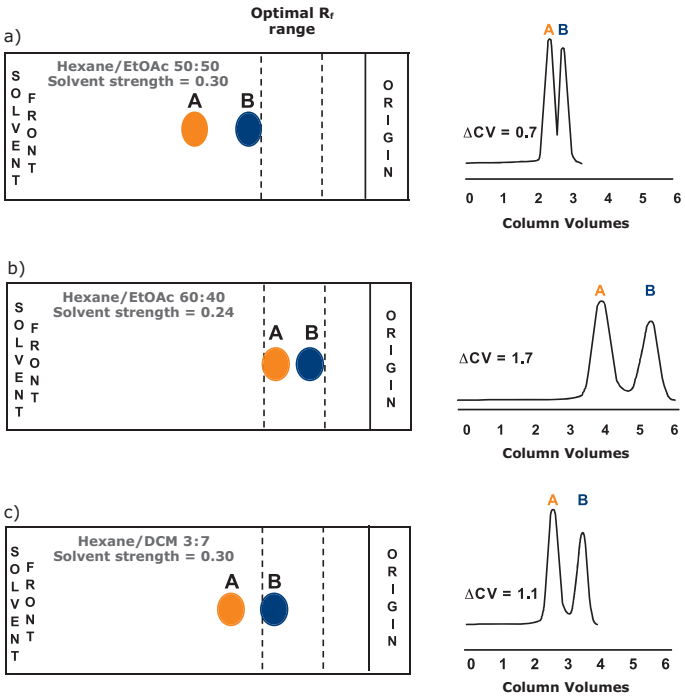


Figure 13. Examples of solvent strength on compound retention and resolution.
a) TLC shows two sample components resolved with a 50:50 hexane/ethyl acetate solvent system (ΔCV = 0.7). Neither the component of interest (B) nor the impurity (A) has an Rf value within the optimal 0.15–0.35 range. This leads to poor flash purification.
b) After adjusting the solvent to 60% hexane/40% ethyl acetate, the Rf values for both A and B fall into the optimal zone. Flash chromatography with these conditions shows increased compound retention and greatly improved resolution (ΔCV = 1.7).
c) Replacing 50:50 hexane/ethyl acetate with 30:70 hexane/dichloromethane (both 0.30 solvent strength) alters both selectivity and resolution (ΔCV = 1.1).
Once a solvent system has been selected, Rf values measured, and ΔCV values calculated, use Table 4 to select the correct cartridge for your sample size and ΔCV. The data generated from your TLC method development efforts are applicable to any sized Biotage cartridge.

Stage 4: Determining the optimal cartridge size and sample load based on TLC data

Having calculated CVs, Table 4 may be used to help in selecting the most appropriate Biotage cartridge size.

Type of Silica	Dimensions (mm)	Column Volume	Flow Rate (mL/min)	Load ΔCV = 0.1–1.9	Load ΔCV = 2.0–3.9	Load ΔCV = 4.0+
Biotage SNAP Ultra 10 g	21 x 55	17 mL	10–50	<200 mg	200–1000 mg	1–2 g
Biotage SNAP Ultra 25 g	30 x 72	45 mL	20–100	<500 mg	500–2500 mg	2.5–5 g
Biotage SNAP Ultra 50 g	39 x 81	85 mL	30–150	<1 g	1–5 g	5–10 g
Biotage SNAP Ultra 100 g	39 x 157	164 mL	30–150	<2 g	2–10 g	10–20 g
Biotage SNAP Ultra 340 g	71 x 168	582 mL	65–325	<6.8 g	6.8–34 g	34–68 g
Biotage SNAP 10 g	21 x 55	15 mL	10–20	<100 mg	100–500 mg	500–1000 mg
Biotage SNAP 25 g	30 x 72	33 mL	20–40	<250 mg	250–750 mg	750–2500 mg
Biotage SNAP 50 g	39 x 81	66 mL	30–50	<500 mg	500–2500 mg	2.5–5 g
Biotage SNAP 100 g	39 x 157	132 mL	30–50	<1 g	1–5 g	5–10 g
Biotage SNAP 340 g	71 x 168	470 mL	65–100	<3.4 g	3.4–17 g	17–34 g
Biotage SNAP XL 750 g	82 x 291	990 mL	100–300	<7.5 g	7.5–40 g	40–75 g
Biotage SNAP XL 1500 g	107 x 328	1980 mL	300–500	<15 g	15–80 g	80–150 g
Biotage ZIP Sphere 5 g	15.5 x 61	10 mL	5–25	<75 mg	75–325 mg	325–1000 mg
Biotage ZIP Sphere 10 g	20 x 69	19 mL	10–50	<150 mg	150–750 mg	750–3000 mg
Biotage ZIP Sphere 30 g	27 x 116	58 mL	20–100	<450 mg	450–2250 mg	2.25–4.5 g
Biotage ZIP Sphere 45 g	32 x 107	75 mL	30–150	<600 mg	800–4000 mg	4–8 g
Biotage ZIP Sphere 80 g	38 x 130	129 mL	30–150	<1.2 g	1.2–6 g	6–12 g
Biotage ZIP Sphere 120 g	42 x 176	213 mL	50–200	<1.8 g	1.8–10 g	10–20 g
Biotage ZIP 5 g	15.5 x 61	8 mL	5–20	<50 mg	50–250 mg	250–500 mg
Biotage ZIP 10 g	20 x 69	15 mL	10–20	<100 mg	100–500 mg	500–1000 mg
Biotage ZIP 30 g	27 x 116	45 mL	20–40	<300 mg	300–1500 mg	1.5–3 g
Biotage ZIP 45 g	32 x 107	60 mL	30–50	<450 mg	450–2250 mg	2.25–4.5 g
Biotage ZIP 80 g	38 x 130	102 mL	30–50	<800 mg	800–4000 mg	4–8 g
Biotage ZIP 120 g	42 x 176	170 mL	50–75	<1.2 mg	1.2–6 mg	6–12 g
Flash 75M	75 x 150	500 mL	100–250	<4 g	4–20 g	10–40 g
Flash 75L	75 x 350	1000 mL	100–250	<8 g	8–40 g	40–80 g
Flash 150M	150 x 300	4.3 L	500–1000	<25 g	25–125 g	125–250 g
Flash 150L	150 x 600	8.6 L	500–1000	<50 g	50–250 g	250–500 g
Flash 400M	400 x 300	28 L	7000	<200 g	0.2–1.0 kg	1–2 kg
Flash 400L	400 x 600	56 L	7000	<400 g	0.4–2.0 kg	2–4 kg

Table 4. Gradient loading table. Look for the CV that is the closest match to your system, scan down the table based on scale of reaction and select cartridge.

Normal Phase Gradients

Gradient elution enables chemists to speed purification, improve recovery and yield, and even increase fraction purity. Gradients are slightly different to Isocratic elution modes since the stronger eluting solvent concentration is increased over time relative to the weaker solvent, increasing the solubility of more highly retained compounds. This causes compounds to elute sooner and in tighter bands compared to isocratic systems. As solvent strength increases during the purification, the classic isocratic CV=1/Rf relationship is not applicable. In a gradient, compounds elute with fewer column volumes than predicted by the isocratic equation. The exact number of elution CV depends on the gradient slope.

Biotage has developed an algorithm to help chemists transfer TLC Rf data to gradient CVs. This algorithm is incorporated in all Isolera™ Spektra and Dalton instrumentation. Using these conditions, a compound with an Rf of 0.4 elutes near the middle of the purification and is separated from other compounds within the Rf range of 0.1 to 0.9.

TLC-to-gradient

To convert TLC data into a gradient elution method uses the same optimization tools as previously discussed. After determining the best selectivity and best solvent strength you can use the patented Biotage algorithm to create the best gradient. If you use a Biotage system, the instrument will do all of this for you.

- First determine the Rf values for the compound of interest
- Second determine the Rf value for the compound preceding the compound of interest
- Third determine the Rf value for the compound eluting just after the compound of interest

Then, convert all Rf values to CV using the equation CV=1/Rf. Whichever pair has the lowest ΔCV dictates sample load. The algorithm has three steps for the three gradient segments:

1. Use 1/4 of the strong solvent % used with the TLC run, hold for 1 CV
2. Create a linear segment from the step 1 % to 2x the % used with the TLC run over 10 CV
3. Hold this % for 2 CV

Then, using Table 4, locate the ΔCV from your calculation above and the cartridge you plan on using and the result will be the recommended sample load.

Scale-up

Scaling up flash purification methods is easy and straight forward. Any method developed on a Biotage flash cartridge can be scaled-up to a larger cartridge simply by referring to Table 5.

Developing Reversed Phase Methods

Stage 1: Converting HPLC (high-performance liquid chromatography) retention times and gradient methods to CV

As a technique used for purification of water-soluble compounds, reversed phase flash purification method development is different to normal phase. The recommended approach for reversed phase includes developing and optimizing methods using HPLC and a Biotage KP-C18-HS scaling column (4.6 x 250 mm). The scaling column is packed with the identical C18 phase as the Biotage KP-C18-HS flash cartridges. Begin by creating a gradient on the HPLC from 10–90% acetonitrile (or methanol) in water at 3 mL/min (1 CV/min) with this gradient. A recommended starting point is:

- Segment 1: 10% ACN (or MeOH) for 1 min
- Segment 2: 10-90% ACN (MeOH) over 10 min
- Segment 3: Hold 90% ACN for 2 min

Continue to modify this until the compound of interest is fully separated from its impurities and has a retention time of at least five minutes. On the HPLC, optimal load can be determined by increasing the sample amount until resolution has been lost. To transfer the HPLC method to flash, convert compound retention time (Tr) to column volume using the following equation:

- Compound CV = compound Tr/To, where
- To = the void time (about 1 min at 3 mL/min)

Use the same formula to convert the gradient program from time to CV:

- Gradient segment length (time)/
- To = flash segment length (CV)

By using these formulas and the same solvents, reproducible reversed phase flash gradients can be developed. In many cases flash methods can be developed from HPLC style methods using scaling columns. Some caution must be noted when transferring methods from commercial HPLC columns (typically 3–5 micron silica) to flash (typically 40–60 micron silica).

Stage 2: Determining the optimal cartridge size and sample load based on TLC data

Flash scale-up is based on consolidating the solvent's linear velocity and sample load in cartridges of different sizes/volumes. Small scale flash purification is easily scaled with scale-up factors based, which take into account the cartridge differences.

Scaling up a method performed on a Biotage scaling column or flash cartridge is easily accomplished by using Table 5 below. Locate the cartridge used for method development (left column) and then locate the required scale-up factor. Read up that column to determine which cartridge is needed.

Cartridge Scale-up Conversion Table

Development Cartridge Size	Required Large Scale Media Mass													
	4.6 x 250	20	32	40	48	80	136	160	300	320	600	1000	2000	8000	16000
	5 g	10	16	20	24	40	68	80	150	160	300	500	1000	4000	8000
	10 g	5	8	10	12	20	34	40	75	80	150	250	500	2000	4000
	25 g	2	3	4	5	8	14	16	30	32	60	100	200	800	1600
	30 g	2	3	3.5	4	7	12	14	25	27	50	83	167	667	1333
	45 g	1.1	1.8	2.2	3	4.5	7.5	9	17	18	33	56	111	444	888
	50 g		1.6	2	2.4	4	6.8	8	15	16	30	50	100	400	800
	80 g			1.25	1.5	2.5	4.3	5	9.5	10	19	31	62	250	500
	100 g				1.2	2	3.4	4	7.5	8	15	25	50	200	400
	120 g					1.7	2.8	3.5	6.5	7	12	21	42	167	333
	200 g						1.7	2	3.8	4	7.5	13	25	100	200
	340 g							1.2	2.2	2.4	4.4	7.4	15	60	120
	400 g								1.9	2	3.8	6.3	13	50	100
	750 g									1.1	2	3.5	7	27	54
	800 g										1.9	3.1	6.2	25	50
	1.5 kg											1.7	3.3	13.5	27
	2.5 kg												2	8	16
	5.0 kg													4	8
	20 kg														2
	40 kg														

Scale-up factor from lab to large scale

	50 g	80 g	100 g	120 g	200 g	340 g	400 g	750 g	800 g	1.5 kg	2.5 kg	5 kg	20 kg	40 kg
Range	50–400 g						400–800 g		800–2500 g		2.5–5 Kg	5–20 Kg	20–40 Kg	
Cartridge Size	400 g						800 g		2.5 Kg		5 Kg	20 Kg	40 Kg	
Cartridge	SNAP 340 g/75M						SNAP XL/75L		150M		150L	400M	400L	




Example 1

A 25 g Biotage® SNAP cartridge was used to develop a 2.3 gram purification. The requirement is now to purify 130 g. The **scale-up factor is then 56 (130/2.3)**. We therefore move right in the chart on the 25 g row and stop at "32". The appropriate large scale cartridge is in the 800–2500 g range, which corresponds to the Biotage® Flash 150M cartridge.

Example 2

A 100 g Biotage® SNAP cartridge was used to develop a 6.5 gram purification. The requirement is now to purify 900 g. The **scale-up factor is then 138 (900/6.5)**. We therefore move right in the chart on the 100 g row and stop at "50". The appropriate large scale cartridge is in the 5-20 Kg range, which corresponds to the Biotage® Flash 400M cartridge.

Ordering Information

Biotage® SNAP Ultra

Product	Qty.	Part Number
Cartridge		
Biotage SNAP Ultra cartridge, 10 g	20	FSUL-0442-0010
Biotage SNAP Ultra cartridge, 25 g	20	FSUL-0442-0025
Biotage SNAP Ultra cartridge, 50 g	20	FSUL-0442-0050
Biotage SNAP Ultra cartridge, 100 g	20	FSUL-0442-0100
Biotage SNAP Ultra cartridge, 340 g	6	FSUL-0442-0340
Biotage SNAP Ultra cartridge, 750 g	2	FSUL-0442-0750
Biotage SNAP Ultra cartridge, 1500 g	2	FSUL-0442-1500
Samplet		
Biotage SNAP Ultra Samplet, 1 g	20	SAS-0442-0010
Biotage SNAP Ultra Samplet, 3 g	20	SAS-0442-0025
Biotage SNAP Ultra Samplet, 10 g	20	SAS-0442-0100
Biotage SNAP Ultra Samplet, 34 g	6	SAS-0442-0340

Biotage® SNAP Ultra C18

Product	Qty.	Part Number
Cartridge		
Biotage SNAP Ultra C18 cartridge, 12 g	2	FSUL-0401-0012
Biotage SNAP Ultra C18 cartridge, 30 g	2	FSUL-0401-0030
Biotage SNAP Ultra C18 cartridge, 60 g	2	FSUL-0401-0060
Biotage SNAP Ultra C18 cartridge, 120 g	2	FSUL-0401-0120
Biotage SNAP Ultra C18 cartridge, 400 g	1	FSUL-0401-0400
Biotage SNAP Ultra C18 cartridge, 950 g	1	FSUL-0401-0950
Biotage SNAP Ultra C18 cartridge, 1850 g	1	FSUL-0401-1850
Samplet		
Biotage SNAP Ultra C18 Samplet, 1.2 g	20	SAS-0401-0012
Biotage SNAP Ultra C18 Samplet, 3 g	20	SAS-0401-0030
Biotage SNAP Ultra C18 Samplet, 12 g	20	SAS-0401-0120
Biotage SNAP Ultra C18 Samplet, 40 g	6	SAS-0401-0400

Biotage® SNAP KP-Sil

Product	Qty.	Part Number
Cartridge		
Biotage SNAP Cartridge, silica, 10 g	20	FSK0-1107-0010
Biotage SNAP Cartridge, silica, 25 g	20	FSK0-1107-0025
Biotage SNAP Cartridge, silica, 50 g	20	FSK0-1107-0050
Biotage SNAP Cartridge, silica, 100 g	20	FSK0-1107-0100
Biotage SNAP Cartridge, silica, 340 g	6	FSK0-1107-0340
Biotage SNAP Cartridge, silica, 750g	2	FSK0-1107-0750
Biotage SNAP Cartridge, silica, 1500g	2	FSK0-1107-1500
Samplet		
Biotage SNAP Samplet, 1 g	20	SAS-1107-0010
Biotage SNAP Samplet, 3 g	20	SAS-1107-0025
Biotage SNAP Samplet, 10 g	20	SAS-1107-0100
Biotage SNAP Samplet, 34 g	6	SAS-1107-0340
Bulk		
KP-Sil, bulk 5 kg	1	K0-1107-05000

Biotage® SNAP KP-C18-HS

Product	Qty.	Part Number
Cartridge		
Biotage SNAP Cartridge, 12 g	2	FSL0-1118-0012
Biotage SNAP Cartridge, 30 g	2	FSL0-1118-0030
Biotage SNAP Cartridge, 60 g	2	FSL0-1118-0060
Biotage SNAP Cartridge, 120 g	2	FSL0-1118-0120
Biotage SNAP Cartridge, 400 g	1	FSL0-1118-0400
Biotage SNAP Cartridge, 950 g	1	FSL0-1118-0950
Biotage SNAP Cartridge, 1850 g	1	FSL0-1118-1850
Samplet		
Biotage SNAP Samplet, 1 g	20	SAS-1118-0012
Biotage SNAP Samplet, 3 g	20	SAS-1118-0030
Biotage SNAP Samplet, 12 g	20	SAS-1118-0120
Biotage SNAP Samplet, 40 g	6	SAS-1118-0400
Bulk		
KP-C18-HS, bulk 100 g	1	L0-1118-00100
KP-C18-HS, bulk 1 kg	1	L0-1118-01000
KP-C18-HS, bulk 5 kg	1	L0-1118-05000

Biotage® SNAP KP-NH

Product	Qty.	Part Number
Cartridge		
Biotage SNAP Cartridge, 11 g	10	FSN0-0909-0011
Biotage SNAP Cartridge, 28 g	10	FSN0-0909-0028
Biotage SNAP Cartridge, 55 g	10	FSN0-0909-0055
Biotage SNAP Cartridge, 110 g	10	FSN0-0909-0110
Biotage SNAP Cartridge, 375 g	1	FSN0-0909-0375
Biotage SNAP Cartridge, 900 g	1	FSN0-0909-0900
Biotage SNAP Cartridge, 1800 g	1	FSN0-0909-1800
Samplet		
Biotage SNAP Samplet, 1 g	20	SAS-0909-0011
Biotage SNAP Samplet, 3 g	20	SAS-0909-0028
Biotage SNAP Samplet, 11 g	20	SAS-0909-0110
Biotage SNAP Samplet, 37 g	6	SAS-0909-0375
Bulk		
KP-NH, bulk 100 g	1	N0-0909-00100
KP-NH, bulk 250 g	1	N0-0909-00250
KP-NH, bulk 500 g	1	N0-0909-00500
KP-NH, bulk 1 kg	1	N0-0909-01000
KP-NH, bulk 5 kg	1	N0-0909-05000

Biotage® ZIP Sphere

Product	Qty.	Part Number
Cartridge		
ZIP Sphere Silica cartridge, 5 g	20	445-0500-DZ-20
ZIP Sphere Silica cartridge, 10 g	20	445-1000-EZ-20
ZIP Sphere Silica cartridge, 30 g	20	445-3000-FZ-20
ZIP Sphere Silica cartridge, 45 g	20	445-4500-SZ-20
ZIP Sphere Silica cartridge, 80 g	20	445-8000-JZ-20
ZIP Sphere Silica cartridge, 120 g	20	445-120G-UZ-20

Biotage ZIP®

Product	Qty.	Part Number
Cartridge		
Biotage ZIP cartridge, 5 g	20	440-0500-DZ-20
Biotage ZIP cartridge, 10 g	20	440-1000-EZ-20
Biotage ZIP cartridge, 30 g	20	440-3000-FZ-20
Biotage ZIP cartridge, 45 g	20	440-4500-SZ-20
Biotage ZIP cartridge, 80 g	20	440-8000-JZ-20
Biotage ZIP cartridge, 120 g	20	440-120G-UZ-20

Biotage® SNAP XL Ultra

Product	Qty.	Part Number
Cartridge		
Biotage SNAP XL Ultra, 750 g	2	FSUL-0442-0750
Biotage SNAP XL Ultra, 1500 g	2	FSUL-0442-1500

Biotage® SNAP XL Ultra C18

Product	Qty.	Part Number
Cartridge		
Biotage SNAP XL Ultra C18, 950 g	1	FSUL-0401-0950
Biotage SNAP XL Ultra C18, 1850 g	1	FSUL-0401-1850

Biotage® SNAP XL KP-Sil

Product	Qty.	Part Number
Cartridge		
Biotage SNAP XL KP-Sil, 750 g	2	FSK0-1107-0750
Biotage SNAP XL KP-Sil, 1500 g	2	FSK0-1107-1500

Biotage® SNAP XL KP-C18-HS

Product	Qty.	Part Number
Cartridge		
Biotage SNAP XL KP-C18-HS, 950 g	1	FSL0-1118-0950
Biotage SNAP XL KP-C18-HS, 1850 g	1	FSL0-1118-1850

Biotage® SNAP XL KP-NH

Product	Qty.	Part Number
Cartridge		
Biotage SNAP XL KP-NH, 900 g	1	FSN0-0909-0900
Biotage SNAP XL KP-NH, 1800 g	1	FSN0-0909-1800

ISOLUTE® HM-N Diatomaceous Earth

Product	Qty.	Part Number
Cartridge		
ISOLUTE HM-N, 0.3 mL	100	800-0040-BM
ISOLUTE HM-N, 1 mL	100	800-0100-CM
ISOLUTE HM-N, 3 mL	100	800-0220-DM
ISOLUTE HM-N, 5 mL	100	800-0350-EM
ISOLUTE HM-N, 10 mL	50	800-0700-EM
ISOLUTE HM-N, 20 mL	50	800-1300-FM
Tab-Less Columns for High Throughput Applications		
ISOLUTE HM-N, 0.3 mL, tab-less	100	800-0040-BMG
ISOLUTE HM-N, 1 mL, tab-less	100	800-0100-CMG
Bulk		
ISOLUTE HM-N, bulk 1 kg	1	9800-1000
ISOLUTE HM-N, bulk 5 kg	1	9800-5000

ISOLUTE® Flash Silica II

Product	Qty.	Part Number
Cartridge		
ISOLUTE Flash Silica II, 2 g, 25 mL cartridges	20	440-0200-D
ISOLUTE Flash Silica II, 5 g, 25 mL cartridges	20	440-0500-E
ISOLUTE Flash Silica II, 10 g, 70 mL cartridges	16	440-1000-F
ISOLUTE Flash Silica II, 20 g, 70 mL cartridges	16	440-2000-F
ISOLUTE Flash Silica II, 25 g, 150 mL cartridges	8	440-2500-J
ISOLUTE Flash Silica II, 50 g, 150 mL cartridges	8	440-5000-J
ISOLUTE Flash Silica II, 70 g, 150 mL cartridges	8	440-7000-J

ISOLUTE® Flash C18

Product	Qty.	Part Number
Cartridge		
ISOLUTE Flash C18, 2 g, 15 mL cartridges	20	451-0200-D
ISOLUTE Flash C18, 5 g, 25 mL cartridges	20	451-0500-E
ISOLUTE Flash C18, 10 g, 70 mL cartridges	16	451-1000-F
ISOLUTE Flash C18, 20 g, 70 mL cartridges	16	451-2000-F
ISOLUTE Flash C18, 25 g, 150 mL cartridges	8	451-2500-J
ISOLUTE Flash C18, 50 g, 150 mL cartridges	8	451-5000-J
ISOLUTE Flash C18, 70 g, 150 mL cartridges	8	451-7000-J

ISOLUTE® Flash SCX-2

Product	Qty.	Part Number
Cartridge		
ISOLUTE Flash SCX-2, 2 g, 15 mL cartridges	20	456-0200-D
ISOLUTE Flash SCX-2, 5 g, 25 mL cartridges	20	456-0500-E
ISOLUTE Flash SCX-2, 10 g, 70 mL cartridges	16	456-1000-F
ISOLUTE Flash SCX-2, 20 g, 70 mL cartridges	16	456-2000-F
ISOLUTE Flash SCX-2, 25 g, 150 mL cartridges	8	456-2500-J
ISOLUTE Flash SCX-2, 50 g, 150 mL cartridges	8	456-5000-J
ISOLUTE Flash SCX-2, 70 g, 150 mL cartridges	8	456-7000-J

Biotage® Flash 75/Flash 150 Cartridges

Product	Qty.	Part Number
Biotage KP-Sil		
Flash 75M, 400 g, 75 x 150 mm	2	FK0-1107-19045
Flash 75L, 800 g, 75 x 350 mm	2	FK0-1107-19075
Flash 75M (Jumbo), 400 g, 75 x 150 mm	10	FK0-1107-19043
Flash 75L (Jumbo), 800 g, 75 x 350 mm	10	FK0-1107-19073
Flash 150M, 2500 g, 150 x 300 mm	2	FK0-1107-25075
Flash 150L, 5000 g, 150 x 600 mm	2	FK0-1107-25155
Biotage KP-C18-HS		
Flash 75M, 480 g, 75 x 150 mm	1	FL0-1118-19040
Flash 75L, 960 g, 75 x 350 mm	1	FL0-1118-19070
Flash 150M, 3000 g, 150 x 300 mm	1	FL0-1118-25070
Flash 150L, 6000 g, 150 x 600 mm	1	FL0-1118-25150

Product	Qty.	Part Number
Biotage KP-NH		
Flash 75M, 440 g, 75 x 150 mm	1	FPNH-75M
Flash 75L, 880 g, 75 x 350 mm	1	FPNH-75L
Flash 150M, 2750 g, 150 x 300 mm	1	FPNH-150M
Flash 150L, 5500 g, 150 x 600 mm	1	FPNH-150L
Diaion HP20		
Flash 75M, 75 x 150 mm	2	FT6-2030-19045
Flash 75L, 75 x 350 mm	2	FT6-2030-19075
Flash 75M (Jumbo), 75 x 150 mm	10	FT6-2030-19043
Flash 75L (Jumbo), 75 x 350 mm	10	FT6-2030-19073
Flash 150M, 150 x 300 mm	2	FT6-2030-25075
Flash 150L, 150 x 600 mm	2	FT6-2030-25155
Diaion HP20SS		
Flash 75M, 450 g, 75 x 150 mm	1	FT6-2530-19040
Flash 75L, 900 g, 75 x 350 mm	1	FT6-2530-19070
Flash 150M, 3600 g, 150 x 300 mm	1	FT6-2530-25070
Flash 150L, 7200 g, 150 x 600 mm	1	FT6-2530-25150

Biotage® Flash 400 Cartridges

Product	Qty.	Part Number
Biotage KP-Sil		
Flash 400M, 20 kg	2	FK0-1107-50075
Flash 400L, 40 kg	2	FK0-1107-50155
Biotage KP-C18-HS		
Flash 400M, 24 kg	1	FL0-1118-50070
Flash 400L, 48 kg	1	FL0-1118-50150
Flash-WAC		
Flash 400M, 13 kg	2	C1YR-4021-50075
Flash 400L, 26 kg	2	C1YR-4021-50155

Accessories

Product	Qty.	Part Number
Injection Valve Adapter		
Adapter to attach a Biotage 3-way injection valve to a Biotage SNAP Cartridge	1	411081
Empty Samplets		
Empty Samplet kit for 10 g Cartridge	20	SES-0010
Empty Samplet kit for 25 g Cartridge	20	SES-0025
Empty Samplet kit for 50 and 100 g Cartridge	20	SES-0100
Empty Samplet kit for 340 g Cartridge	6	SES-0340

Product	Qty.	Part Number
Dry Load Frits and Insertion Tools		
Frit insertion tool for 1 g empty Biotage SNAP Samplet cartridges	1	SFS-0010
Frit insertion tool for 3 g empty Biotage SNAP Samplet cartridges	1	SFS-0025
Frit insertion tool for 10 g empty Biotage SNAP Samplet cartridges	1	SFS-0100
Frit insertion tool for 34 g empty Biotage SNAP Samplet cartridges	1	SFS-0340
Frit insertion rod for SNAP 10 g cartridge	1	SFR-0010
Frit insertion rod for SNAP 25 g cartridge	1	SFR-0025
Frit insertion rod for SNAP 50 and 100 g cartridge	1	SFR-0100
Frit insertion rod for SNAP 340 g cartridge	1	SFR-0340
SNAP cap wrench, 50 and 100 g	1	SFW-0100
SNAP cap wrench, 340 g	1	SFW-0340
Dry load frits for SNAP 10 g cartridge	20	SLF-0010
Dry load frits (100) and insertion rod (1) set for SNAP 10 g cartridge	1	SLF-0010-R
Dry load frits for SNAP 25 g cartridge	20	SLF-0025
Dry load frits (100) and insertion rod (1) set for SNAP 25 g cartridge	1	SLF-0025-R
Dry load frits for SNAP 50 and 100 g	20	SLF-0100
Dry load frits (100) and insertion rod (1) set for SNAP 50 and 100 g cartridge	1	SLF-0100-R
Dry load frits for SNAP 340 g cartridge	6	SLF-0340
Dry load frits (6) and insertion rod (1) set for SNAP 340 g cartridge	1	SLF-0340-R
Dry Load Vessel (DLV)		
Dry load vessel kit with holder, 1 pack dry load vessels & frits, 30 g	1	DLV-030
Dry load vessel kit with holder, 1 pack dry load vessels & frits, 70 g	1	DLV-070
Dry load vessel kit with holder, 1 pack dry load vessels & frits, 500 g	1	DLV-500
Dry load vessels and frits, 30 g	20	DLV-035
Dry load vessels and frits, 70 g	20	DLV-075
Dry load vessels and frits, 500 g	4	DLV-505
Thin-Layer Chromatography (TLC)		
Biotage KP-NH TLC plate, 5 x 10 cm	50	TLC-KPNH-0510-FI
Biotage KP-Sil TLC plate, 5 x 10 cm, glass	50	TLC-0510-FI
Biotage KP-Sil TLC plate, 10 x 10 cm, glass	25	TLC-1010-FI
Biotage KP-Sil TLC plate, 2.5 x 7.5 cm, glass	100	TLC-2575-FI

Product	Qty.	Part Number
Cartridge Adapters		
Biotage SNAP to Biotage FlashMaster II and PersonalPlus adapter	1	411069
Biotage SNAP 10 g cartridge adapter ring and connecting tubing for SP systems	1	410792
Biotage SNAP 25 g cartridge adapter ring and connecting tubing for SP systems	1	411824
Biotage SNAP 50 g/100 g cartridge adapter ring and connecting tubing for SP systems	1	410797
Biotage SNAP 340g cartridge adapter kit for non-Biotage SP systems	1	410805
Female Luer inlet fitting for SNAP 750 g and 1500 g cartridges	1	412358
Male Luer outlet fitting for SNAP 750 g and 1500 g cartridges	1	412537
Luer lock to Luer tip adapter	25	120-1110
Cartridge Holders		
Biotage SNAP 10 g cartridge	1	411922
Biotage SNAP 25 g cartridge	1	411776
Biotage SNAP 50 g and 100 g cartridge	1	411923
Biotage SNAP 340 g cartridge	1	411924
Biotage ZIP 5 g and 10 g cartridge	1	413902
Biotage ZIP 30 g cartridge	1	413302
Biotage ZIP 45 g cartridge	1	413303
Biotage ZIP 80 g cartridge	1	413304
Biotage ZIP 120 g cartridge	1	413305
Biotage SNAP 340g cartridge holder for SP systems	1	410800
Biotage SNAP 750 g and 1500 g cartridge holder for Biotage Isolera systems	1	412422
DLV-030 and -070 holder for use with Biotage SNAP 10–100 g cartridges	1	413127
DLV-030 and -070 holder for use with Biotage SNAP 340 g cartridges	1	413128
Biotage SIMs (Sample Injection Module)		
Stainless steel Biotage SIM for Flash 75, 100 mL	1	SIM-0102
Stainless steel Biotage SIM for Flash 75, 500 mL	1	SIM-0502
Stainless steel Biotage SIM for Flash 150, 1000 mL	1	SIM-1002
Stainless steel Biotage SIM for Flash 150, 2000 mL	1	SIM-2002

Note

This brochure contains a selection of available part numbers. For more information, contact Biotage using the information on the back cover or visit www.biotage.com.

Flash Cartridge-Instrument Compatibility

	Cartridge	Media Mass	Automated Systems				Scale-up Systems			
			Isolera™ One	Isolera™ Four	Isolera™ LS	Isolera™ Prime	Isolera™ LS	Flash 75	Flash 150	Flash 400
	Biotage® SNAP and Biotage® SNAP Ultra	10 g	✓	✓		✓				
		25 g	✓	✓		✓				
		50 g	✓	✓	✓	✓	✓			
		100 g	✓	✓	✓	✓	✓			
		340 g	✓	✓	✓	✓	✓			
	Biotage® SNAP XL	750 g	✓	✓	✓	✓	✓	✓	✓	
		1500 g			✓		✓	✓	✓	
	Biotage ZIP™ & Biotage ZIP™ Sphere	5 g	✓	✓		✓				
		10 g	✓	✓		✓				
		30 g	✓	✓		✓				
		45 g	✓	✓		✓				
		80 g	✓	✓	✓	✓	✓			
		120 g	✓	✓	✓	✓	✓			
	Flash 75M	400 g	✓	✓	✓		✓	✓		
	Flash 75L	800 g	✓	✓	✓		✓	✓		
	Flash 150M	2.5 kg			✓		✓		✓	
	Flash 150L	5 kg			✓		✓		✓	
	Flash 400M	20 kg								✓
	Flash 400L	40 kg								✓

✓ Attaches directly

✓ Requires external cartridge stand or adapter

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