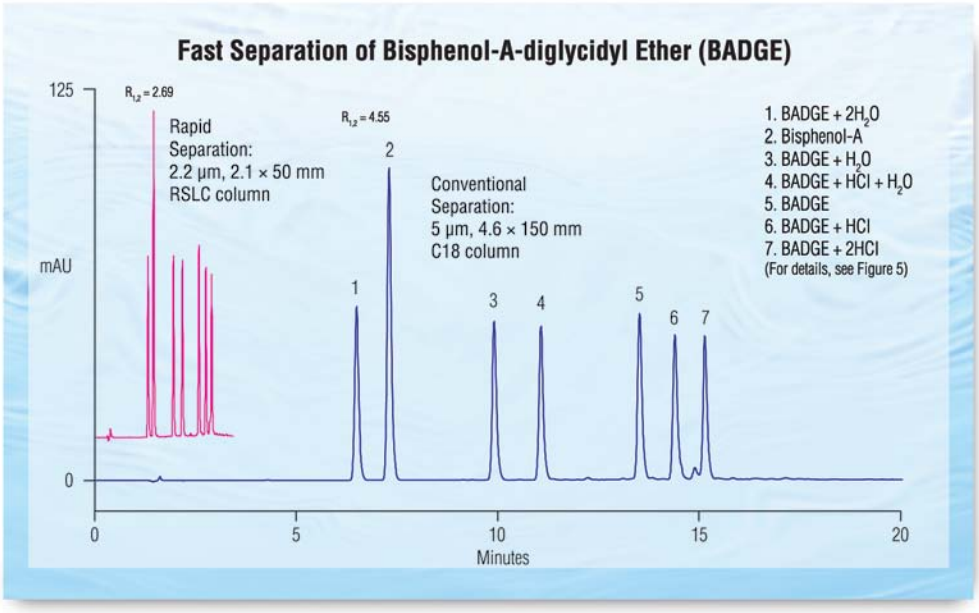
columns

Acclaim RSLC Columns (2.2 µm)



The Acclaim® RSLC 2.2 µm columns feature a well-balanced integration of high column efficiency, excellent performance, complementary selectivity, as well as stable and rugged column packing. These columns generate 25 to 50% less backpressure compared to sub-2 µm particle columns, and are more resistant to column fouling, making them compatible with both standard and ultrahigh pressure LC instrumentation. These features allow the Acclaim RSLC 2.2 µm columns to provide rapid separation solutions for a broad range of applications, including pharmaceutical, food and beverage, environmental, chemical, consumer products, and more.

Now sold under the Thermo Scientific brand

Thermo SCIENTIFIC

Column Features

- High column efficiency
- Ease of use (low backpressure and more resistance to column fouling compared to sub-2 µm columns)
- Excellent peak shape for basic analytes
- Complementary selectivity
- Broad range of applications for Rapid Separation Liquid Chromatography (RSLC)
- Easy method transfer and acceleration using the Dionex Method Speed-Up Calculator

DIONEX

Passion. Power. Productivity.

A Well-Balanced Solution

Acclaim RSLC 2.2 µm columns are based on spherical, porous, high-purity silica particles, and provide a simple and reliable solution for RSLC. Acclaim RSLC 2.2 µm columns are available in four chemistries: high-density monomeric C18 and C8, Polar-Advantage (PA), a polar-embedded reversed-phase (RP), and PolarAdvantage II (PA2), an amide-embedded chemistry which has excellent hydrolytic stability (pH 1.5 to 10).

Selectivity is the most important factor in the success of a separation. Once selectivity is obtained by choosing the right column chemistry and optimizing chromatographic conditions, higher throughput or faster analysis can be achieved by using the same column chemistry with a smaller particle size. However, small particle (e.g., sub-2 µm) columns impose some practical difficulties, such as higher backpressure

(often requiring an ultrahigh pressure LC system) and susceptibility to column fouling. Columns packed with 2.0–2.5 µm particles provide a well-balanced solution for RSLC. Compared to their sub-2 µm counterparts, Acclaim RSLC columns facilitate competitive efficiency, much-reduced backpressure, and better resistance to column fouling. Therefore, Acclaim RSLC 2.2 µm columns feature a well-balanced integration of high column efficiency, excellent performance, complementary selectivity, as well as stable and rugged column packing.

High Column Efficiency with Low Backpressure

Because of the use of spherical silica particles of uniform size, advanced surface modification process, and optimized ultra-high-pressure packing method, Acclaim RSLC 2.2 µm columns provide high efficiency (Figure 1) at significantly reduced backpressure—25 to 50% lower compared to sub-2 μm particle columns. The combination of high efficiency and low backpressure makes Acclaim RSLC 2.2 µm columns excellent choices for high-throughput applications on both ultrahigh pressure (>500 bar) and standard pressure (<500 bar) HPLC instruments.

Excellent Peak Shape for Amitriptyline

Acclaim RSLC 2.2 µm columns exhibit excellent peak shape for amitriptyline at mid-pH, indicating low silanol activity—an important quality indicator for an RP column. This desirable chromatographic feature is achieved through the employment of high surface coverage bonding and exhaustive end-capping. Figure 2 shows the amitriptyline test result at pH 6 on an Acclaim RS C18 2.2 µm column.

Free of Metal Contamination

Metal contamination results in peak tailing for basic analytes as well as metal-sensitive molecules.The high-purity silica particle combined with the high quality of reagents in the manufacturing process ensures that the bonded silica particles are free of metal contamination (Figure 3).

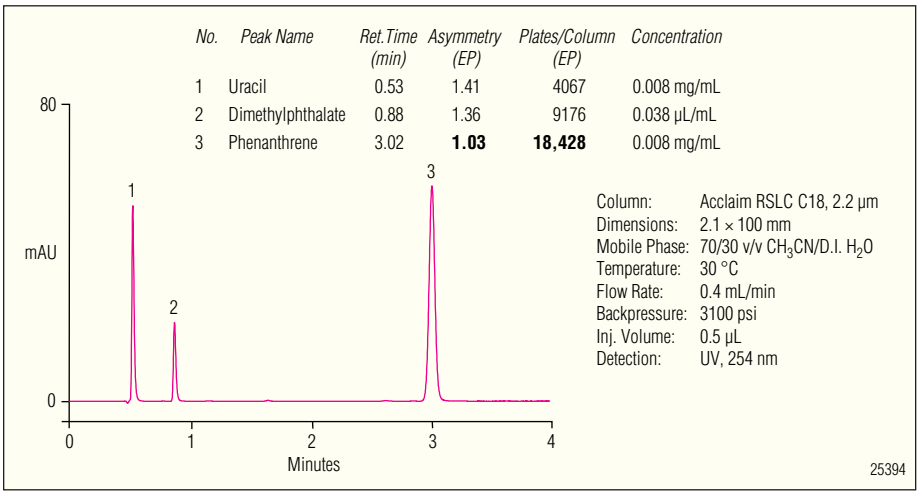


Figure 1. Acclaim RSLC columns demonstrate excellent performance.

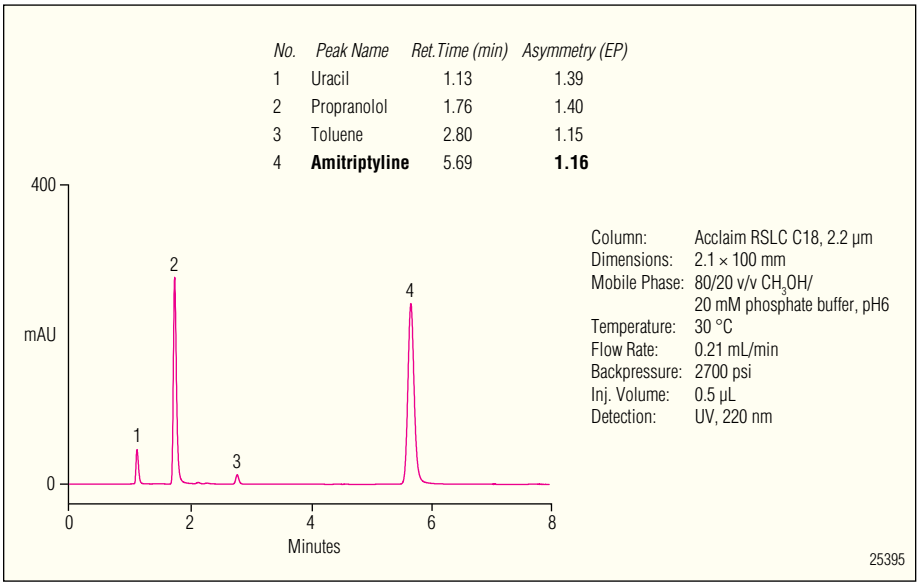


Figure 2. Excellent peak shape for amitriptyline.

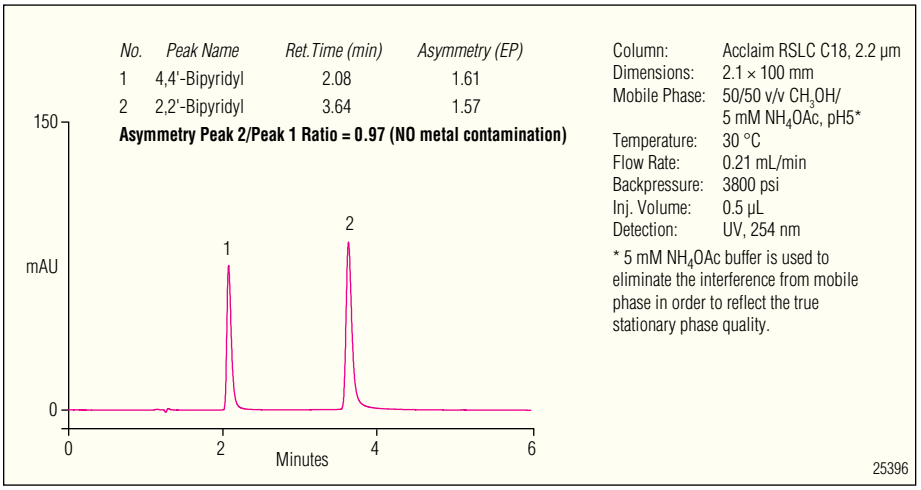


Figure 3. Free of metal contamination.

Broad Range of Applications

Bisphenol-A Diglycidyl Ether (BADGE) and Related Impurities

BADGE is a widely-used epoxy monomer derived from bisphenol-A. Because epoxies are widely used in food-contact applications, the residues of this group of substances (Figure 4) are of concern to public health officials.

Figure 5 demonstrates that a standard Acclaim 120 C18 column (5 µm, 4.6 × 150 mm) can baseline separate all seven analytes of interest in a 20 min gradient method. After transferring the method to the 2.2 µm, 2.1 × 50 mm RSLC C18 column, the same separation can be achieved within 3 min—a six-fold acceleration with only 8% mobile phase consumption.

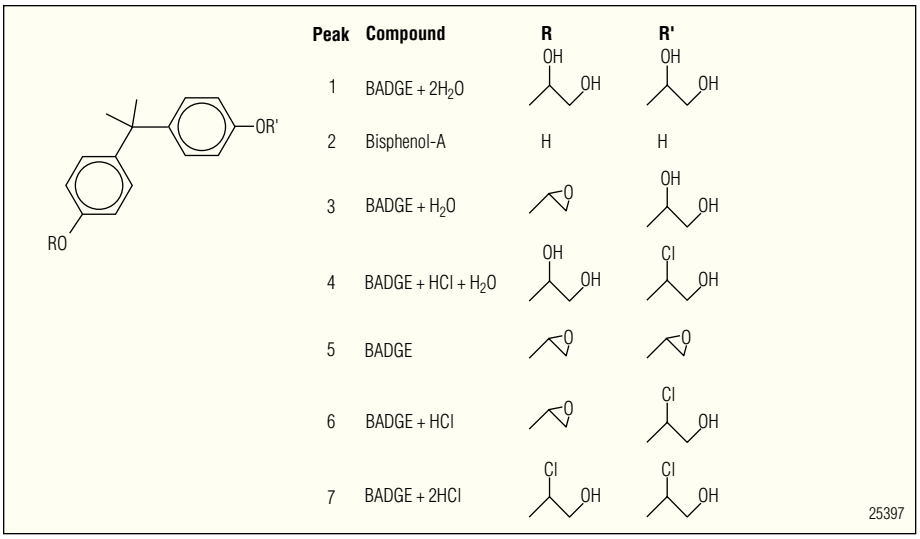


Figure 4. Structures of bisphenol-A diglycidyl ether (BADGE) and related impurities.

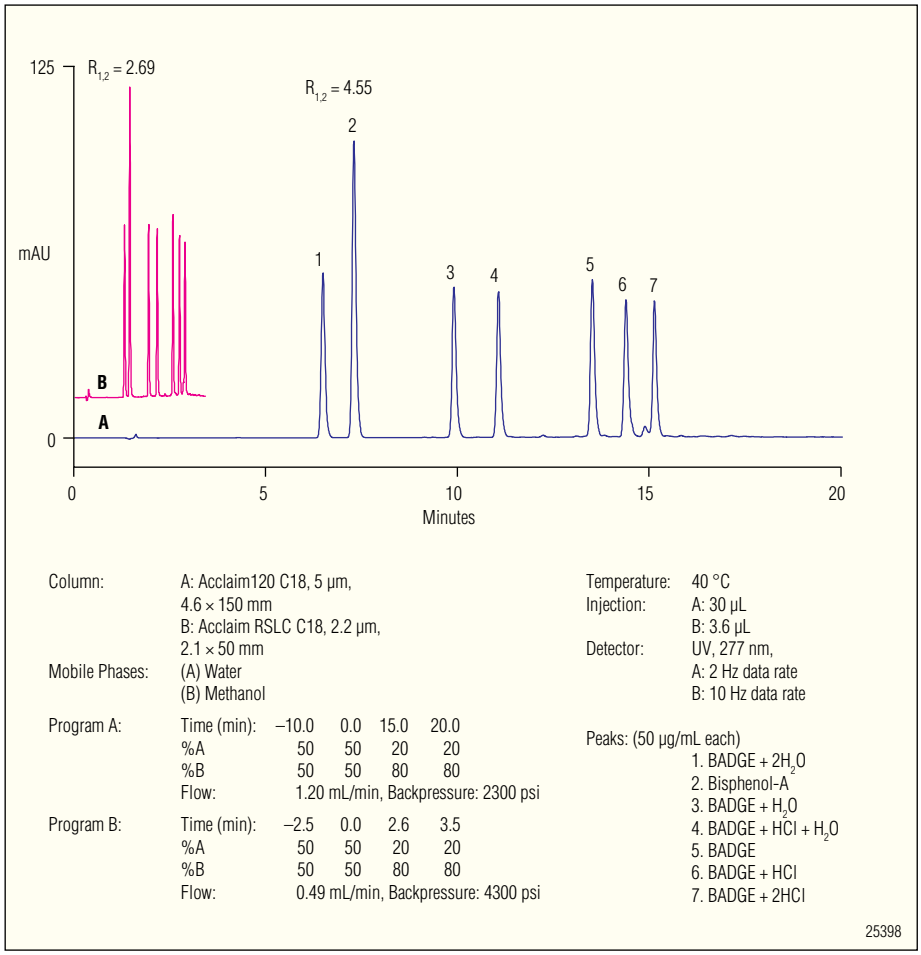
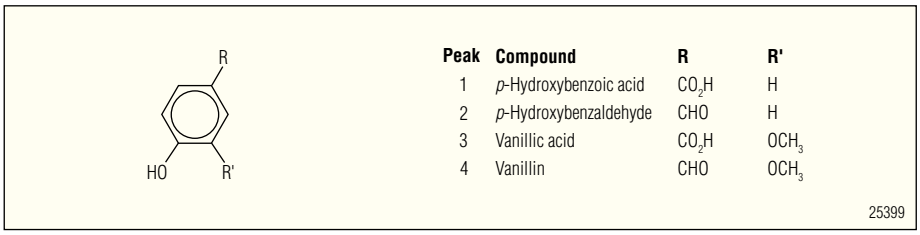


Figure 5. Separation of bisphenol-A diglycidyl ether (BADGE) and related impurities using A) Acclaim RSLC C18 2.2 µm and B) Acclaim 120 C18 5 µm columns.

Separation of Vanilla Extract

Of the 100 or so flavor components in natural vanilla, four major compounds are routinely examined as a measure of quality (Figure 6). AOAC Official Method 990.25 is a widely used for determining vanilla extract quality, but specifies a type of column that has only about 7000 plates, and takes over an hour to run. The Acclaim RSLC column has the same number of plates, better selectivity, and runs in minutes. Using well-known geometric scaling rules, the assay can be accelerated sixfold. Doubling the flow rate accelerates the analysis 12-fold, with no sacrifice in the quality of the chromatogram. This acceleration is illustrated in Figure 7.



Peak	Compound	R	R'
1	*p*-Hydroxybenzoic acid	CO_2H	H
2	*p*-Hydroxybenzaldehyde	CHO	H
3	Vanillic acid	CO_2H	OCH_3
4	Vanillin	CHO	OCH_3

Figure 6. Structures of vanilla components.

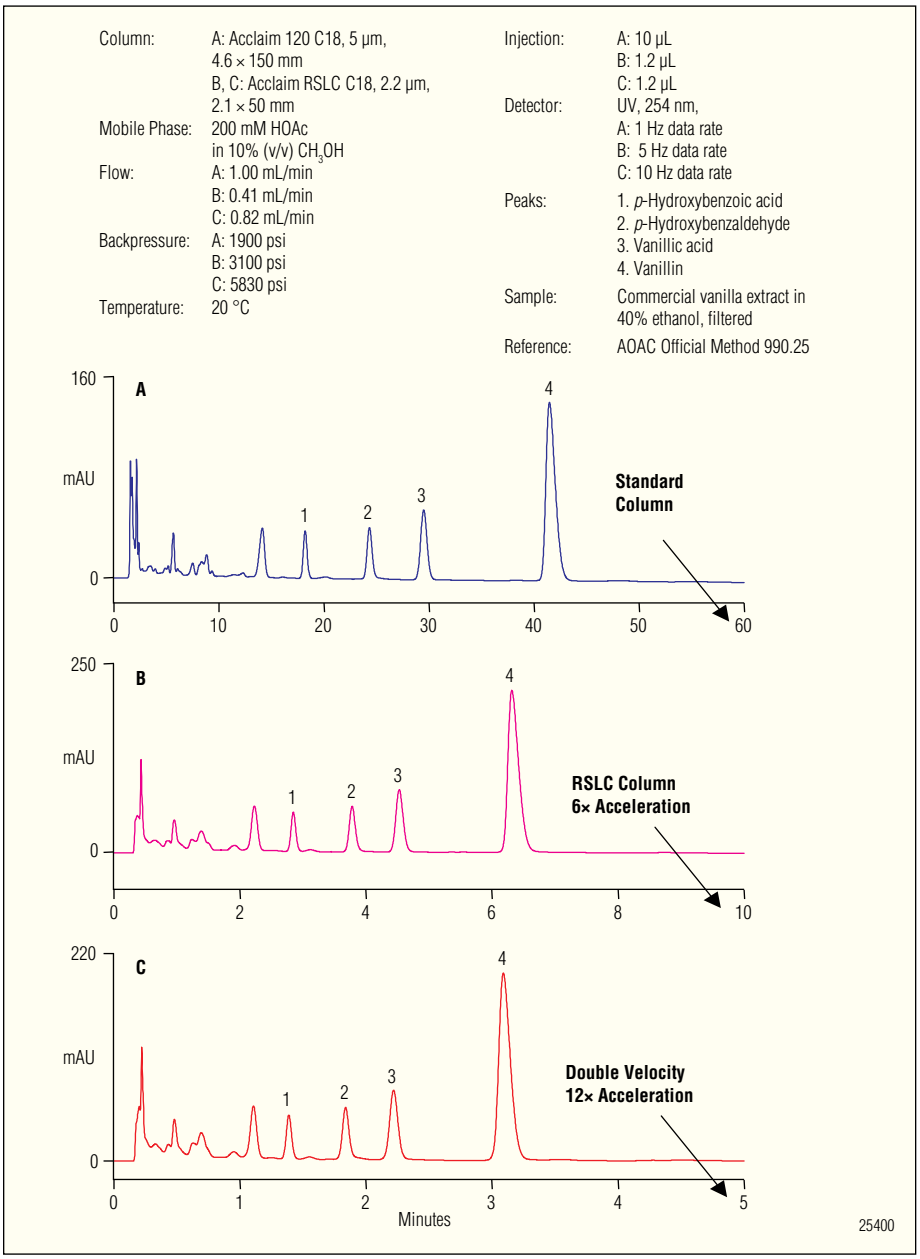
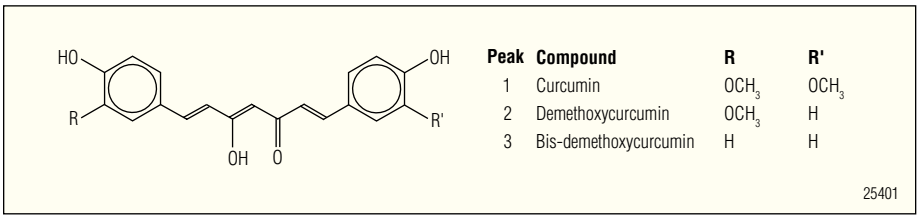


Figure 7. Accelerated assay of vanilla extract using A) Acclaim C18 5 µm and B and C) Acclaim RSLC 120 C18 2.2 µm columns.

Separation of Pigments in Turmeric

Turmeric contains three major yellow pigments known as curcuminoids, as shown in Figure 8. The unique selectivity of the Acclaim PA2 column gives resolution far superior to C18. Three components are well-resolved on an Acclaim PA2 column, while total co-elution is observed on a C18 column—even when packed with small silica particles, as shown in Figure 9.



Peak	Compound	R	R'
1	Curcumin	OCH_3	OCH_3
2	Demethoxycurcumin	OCH_3	H
3	Bis-demethoxycurcumin	H	H

25401

Figure 8. Structures of turmeric pigments

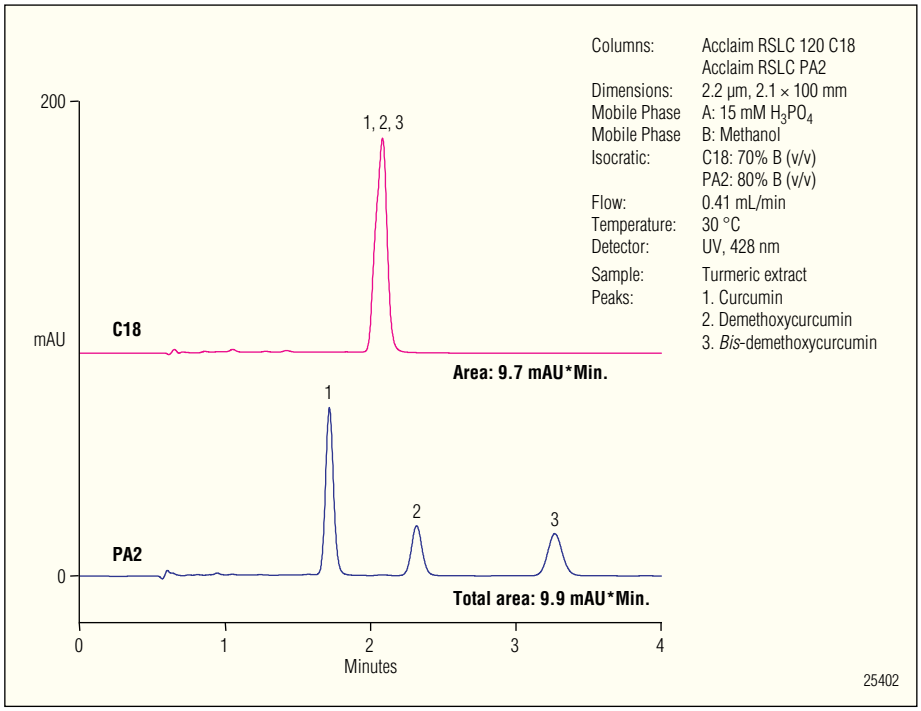
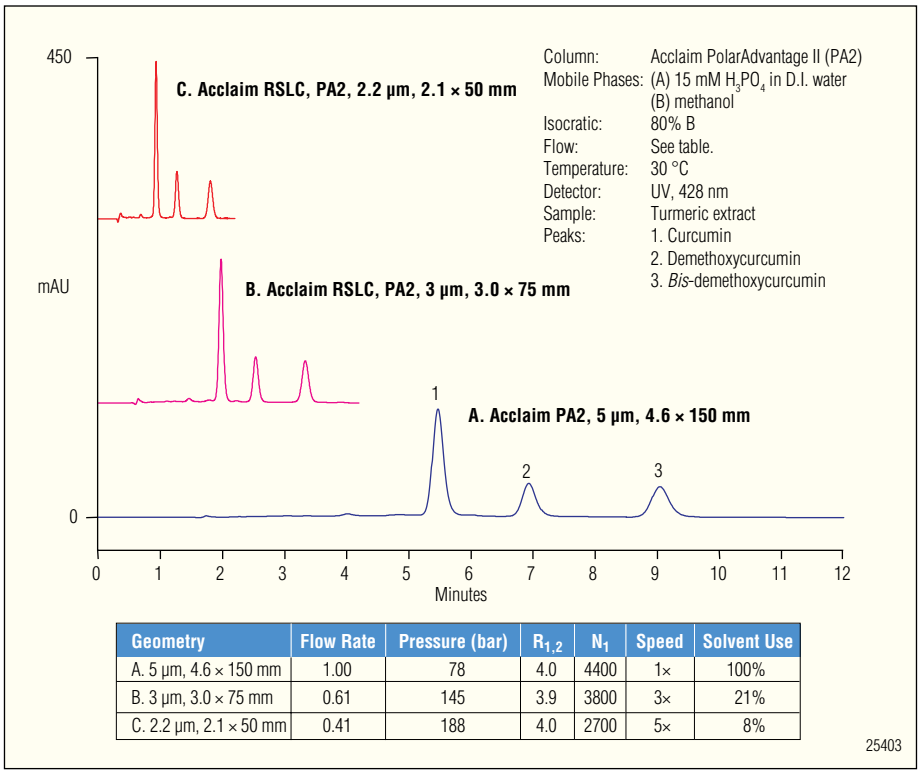


Figure 9. Separation of pigments in turmeric using Acclaim RSLC C18 and RSLC PA2 columns. Selectivity is more important than efficiency.

Method Speed-Up

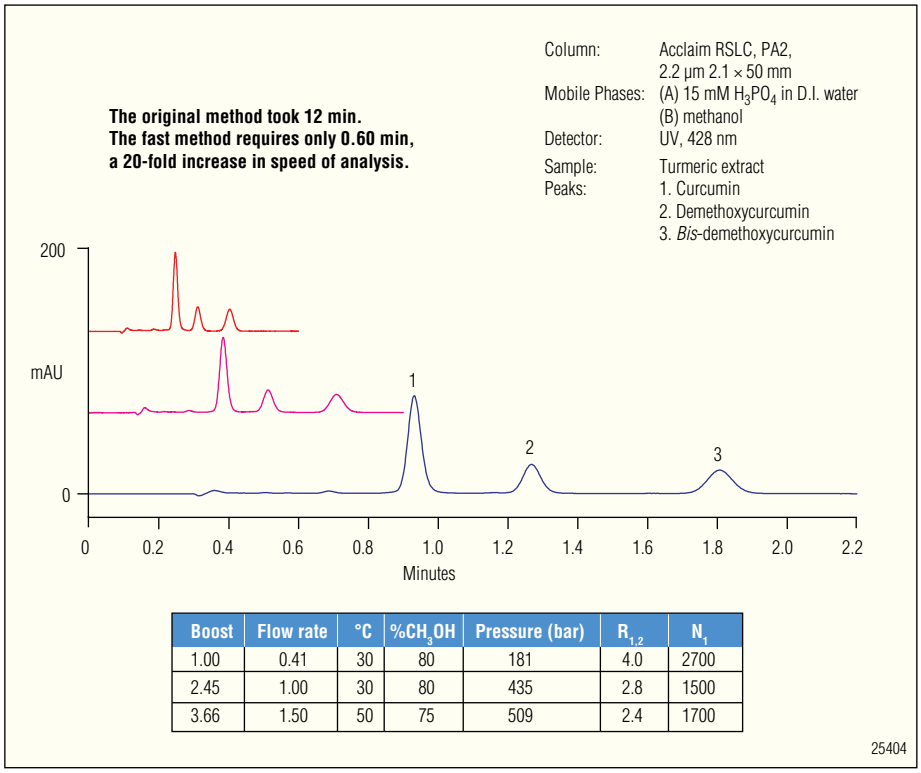
The separation of three curcuminoids can be achieved on an Acclaim PA2, 5 µm, 4.6 × 150 mm column in 10 min, as shown in Figure 10. Using the Method Speed-Up Calculator to determine appropriate flow rates and injection volumes, this separation can be transferred to Acclaim RSLC columns with substantial time savings and substantial reduction in mobile phase consumption. In this example, an Acclaim RSLC PA2, 3 µm, 3.0 × 75 mm column provides threefold acceleration and 80% mobile phase savings, while an Acclaim RSLC PA2, 2.2 µm, 2.1 × 50 mm column gives fivefold speedup with 92% mobile phase reduction.

Further throughput increase can be achieved by raising the flow rate and column temperature, as shown in Figure 11. The Method Speed-Up Calculator predicts backpressure increases resulting from changes in flow rate, suggesting that even faster methods are feasible with the RSLC columns. As the result, a 12 min method is easily transformed into a 0.6 min RSLC method (a 20-fold acceleration) while consuming only 8% of original mobile phase volume.



Geometry	Flow Rate	Pressure (bar)	$R_{1,2}$	N_1	Speed	Solvent Use
A. 5 µm, 4.6 × 150 mm	1.00	78	4.0	4400	1×	100%
B. 3 µm, 3.0 × 75 mm	0.61	145	3.9	3800	3×	21%
C. 2.2 µm, 2.1 × 50 mm	0.41	188	4.0	2700	5×	8%

Figure 10. Accelerated separation of pigments in turmeric using A) Acclaim PA2 5 µm, B) Acclaim RSLC PA2 3 µm, and C) Acclaim RSLC PA2 2.2 µm columns.



Boost	Flow rate	°C	%CH_3OH	Pressure (bar)	$R_{1,2}$	N_1
1.00	0.41	30	80	181	4.0	2700
2.45	1.00	30	80	435	2.8	1500
3.66	1.50	50	75	509	2.4	1700

Figure 11. Ultrafast separation of pigments in turmeric using the Acclaim RSLC PA2 2.2 µm column. Increased flow, temperature, and pressure further accelerate the method.

Antioxidant Separation in Aritchoke

Artichoke (*Cynara scolymus L.*) is reputed to have a variety of beneficial biological effects. Mono- and dicaffeoylquinic acid derivatives are believed to be the active substances. The Acclaim PolarAdvantage II column provides superior selectivity and resolution for this group of compounds compared to conventional C18 columns; the unknown and peak 2 co-elute on C18. The RSLC column is three times faster and uses only 16% of the solvent, yet produces the same quality of chromatogram (Figure 12).

Accelerated USP Assay of Aspirin

The original USP method uses a 4 × 300 mm column at a flow rate of 2 mL/min. It delivers resolution of 5.7 when used with the Acclaim 120 C18 column. This is an excellent candidate for acceleration with RSLC (Figure 13). Simply re-computing the operating parameters for a 2.1 × 50 mm column, using the Dionex Method Speed-Up Calculator, leads to a 10-fold increase in throughput and 96% savings in mobile phase per assay. The accelerated method still gives baseline resolution of the two components.

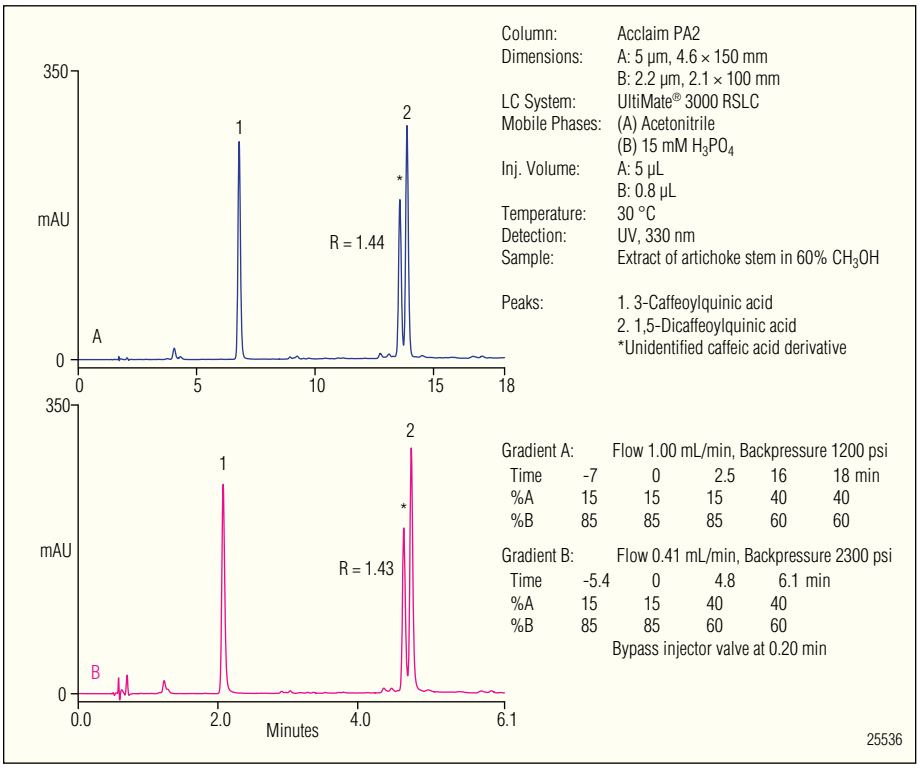


Figure 12. Separation of artichoke antioxidants using A) Acclaim PA2 5 µm and B) Acclaim RSLC PA2 2.2 µm columns.

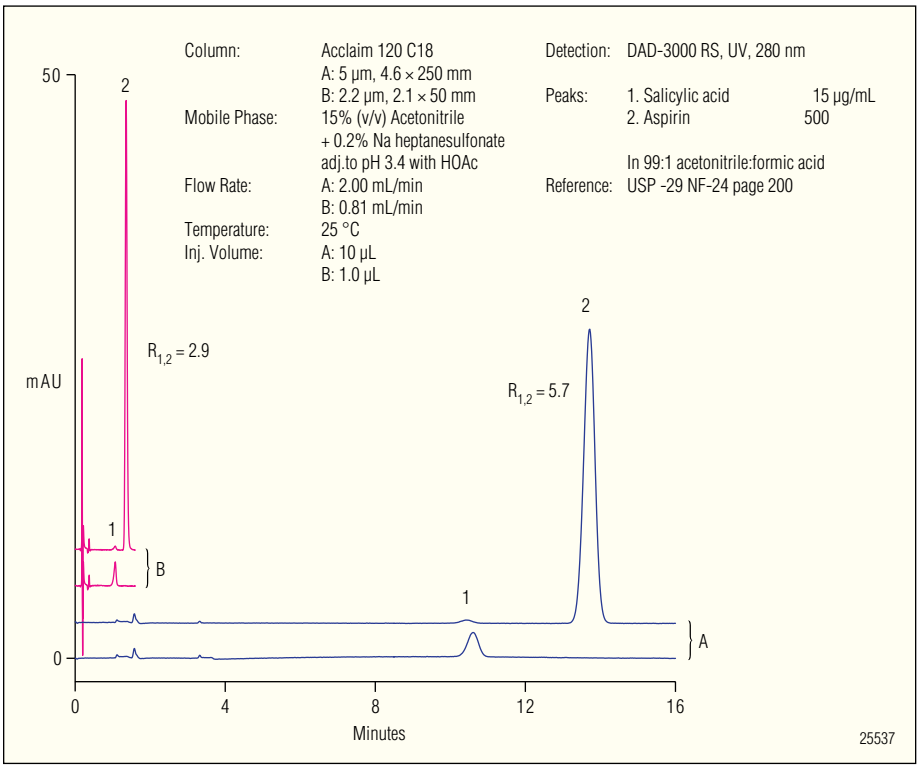


Figure 13. USP assay of aspirin on the A) Acclaim 120 C18 5 µm and B) Acclaim RSLC 120 C18 2.2 µm columns.

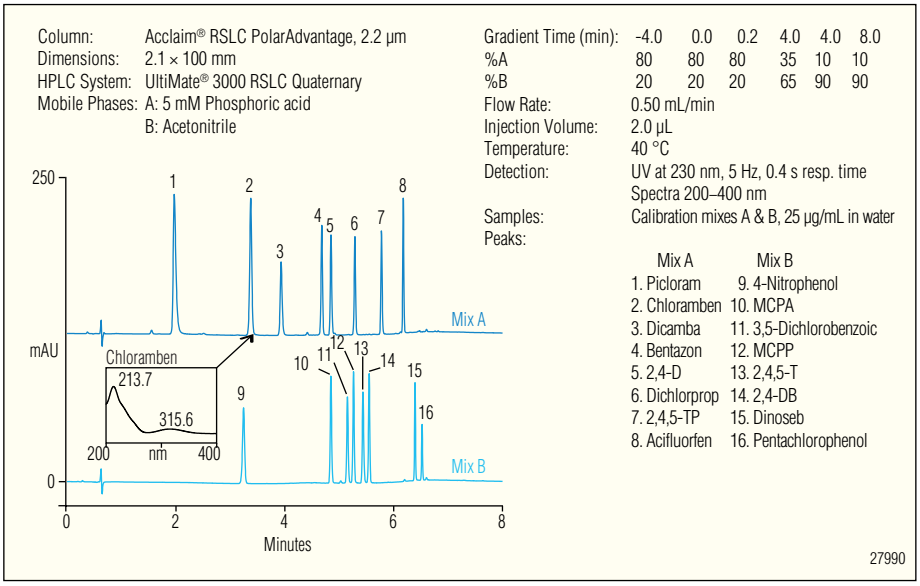


Figure 14. Chlorinated Acids Separation (EPA Method 555).

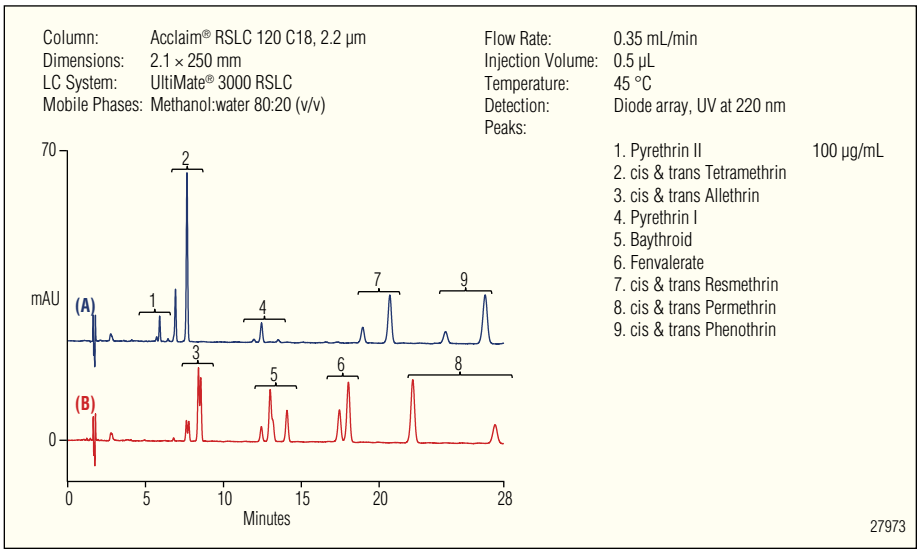


Figure 15. Ultrahigh efficiency separation of insecticides.

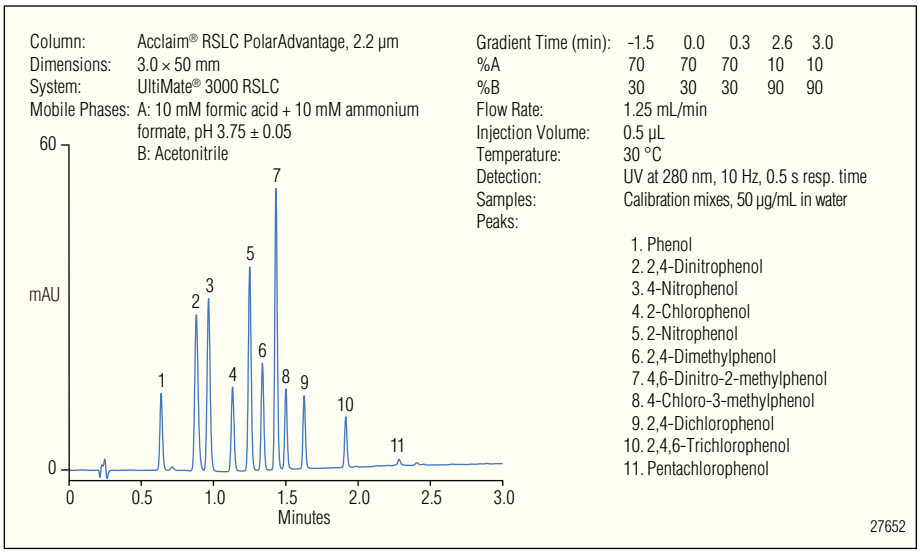


Figure 16. Fast, high-resolution phenol separation (EPA 604).

Chlorinated Acids in Water

Chlorinated acids are used as herbicides, and sometimes are found to contaminate water supplies. EPA Method 555 is an HPLC method for the determination of certain chlorinated acids in ground water and finished drinking water using reversed-phase columns and diode-array detection. Figure 14 shows a fast, high-resolution separation is achieved using the Acclaim RSLC PolarAdvantage 2.2 µm, 2.1 × 100 mm column, with an analysis cycle of about 12 min.

Pyrethrin in Seeds

Pyrethrin is a natural insecticide extracted from seeds of *Chrysanthemum cinerariaefolium*. Pyrethroids are synthetic analogs. These are nonpersistent, have relatively low mammalian toxicity, and have replaced organophosphate insecticides in many applications. The synthetic substances are produced as a mixture of isomers, hence the complex chromatograms shown in Figure 15. The Acclaim RSLC 120 C18 2.2 µm column in the 2.1 × 250 mm format offers extraordinary efficiency (>40,000 theoretical plates/column) and pressure rating (1200 bar) for the ultimate in high-resolution LC.

Phenols in Wastewater

Phenols are often found in municipal and industrial wastewater. They are traditionally analyzed by gas chromatographic (GC) methods such as U.S. EPA Method 604 and Method 625, but HPLC can be used to separate and detect a variety of these important compounds. Figure 16 shows the fast, high-resolution column Acclaim RSLC PolarAdvantage (PA) 2.2 µm 3.0 × 50 mm column, the analysis cycle is complete in under 5 min.

SPECIFICATIONS				
Column	Acclaim 120 C8	Acclaim 120 C18	Acclaim PA	Acclaim PA2
Bonded Phase	C8	C18	Sulfonamide-embedded	Amide-embedded
Endcapped	Yes	Yes	Yes	Yes
Substrate	2.2 µm ultrapure spherical silica	2.2 µm ultrapure spherical silica	2.2 µm ultrapure spherical silica	2.2 µm ultrapure spherical silica
Average Pore Diameter	120 Å	120 Å	120 Å	120 Å
Surface Area (m^2/g)	320	320	320	320
Total Carbon Content*	10%	17%	16%	16%
pH Range	2.0–8.0	2.0–8.0	2.0–8.0	1.5–10
Metal Impurity (ppm) Na, Fe, Al	<10 ppm	<10 ppm	<10 ppm	<10 ppm
Temperature Limit (°C)	60	60	60	60
Maximum Pressure**	3.0 × 30 mm: 300 bar 3.0 × 50 mm: 500 bar 3.0 × 75 mm: 500 bar 3.0 × 100 mm: 700 bar 2.1 × 30 mm: 300 bar 2.1 × 50 mm: 600 bar 2.1 × 100 mm: 800 bar 2.1 × 150 mm: 800 bar 2.1 × 250 mm: 1200 bar	3.0 × 30 mm: 300 bar 3.0 × 50 mm: 500 bar 3.0 × 75 mm: 500 bar 3.0 × 100 mm: 700 bar 2.1 × 30 mm: 300 bar 2.1 × 50 mm: 600 bar 2.1 × 100 mm: 800 bar 2.1 × 150 mm: 800 bar 2.1 × 250 mm: 1200 bar	3.0 × 30 mm: 300 bar 3.0 × 50 mm: 500 bar 3.0 × 75 mm: 500 bar 3.0 × 100 mm: 700 bar 2.1 × 30 mm: 300 bar 2.1 × 50 mm: 600 bar 2.1 × 100 mm: 800 bar 2.1 × 150 mm: 800 bar 2.1 × 250 mm: 1200 bar	3.0 × 30 mm: 300 bar 3.0 × 50 mm: 500 bar 3.0 × 75 mm: 500 bar 3.0 × 100 mm: 700 bar 2.1 × 30 mm: 300 bar 2.1 × 50 mm: 600 bar 2.1 × 100 mm: 800 bar 2.1 × 150 mm: 800 bar 2.1 × 250 mm: 1200 bar
Aqueous Compatibility	0–90%	0–90%	0–100%	0–100%

*Expected and approximate values

**During long-term use, it is recommended the column be operated below 80% of its maximum pressure.

ORDERING INFORMATION

To order in the U.S., call (800) 346-6390 or contact the Dionex Regional Office nearest you. Outside the U.S., order through your local Dionex office or distributor. Refer to the following part numbers.

Acclaim RSLC Columns

Acclaim RSLC 120 C18 Columns

Acclaim RSLC 120, C18, 2.2 µm, 2.1 × 30 mm.....071400
Acclaim RSLC 120 C18, 2.2 µm, 2.1 × 50 mm.....068981
Acclaim RSLC 120 C18, 2.2 µm, 2.1 × 100 mm.....068982
Acclaim RSLC 120 C18, 2.2 µm, 2.1 × 150 mm.....071399
Acclaim RSLC 120, C18, 2.2 µm, 2.1 × 250 mm.....074812
Acclaim RSLC 120, C18, 2.2 µm, 3.0 × 30 mm.....071606
Acclaim RSLC 120 C18, 2.2 µm, 3.0 × 50 mm.....071605
Acclaim RSLC 120 C18, 2.2 µm, 3.0 × 75 mm.....075697
Acclaim RSLC 120 C18, 2.2 µm, 3.0 × 100 mm.....071604

Acclaim RSLC 120 C8 Columns

Acclaim RSLC 120, C8, 2.2 µm, 2.1 × 30 mm.....072614
Acclaim RSLC 120 C8, 2.2 µm, 2.1 × 50 mm.....072615
Acclaim RSLC 120 C8, 2.2 µm, 2.1 × 100 mm.....072616
Acclaim RSLC 120 C8, 2.2 µm, 2.1 × 150 mm.....072617
Acclaim RSLC 120, C8, 2.2 µm, 2.1 × 250 mm.....074811
Acclaim RSLC 120, C8, 2.2 µm, 3.0 × 30 mm.....072618
Acclaim RSLC 120 C8, 2.2 µm, 3.0 × 50 mm.....072619
Acclaim RSLC 120 C8, 2.2 µm, 3.0 × 75 mm.....075696
Acclaim RSLC 120 C8, 2.2 µm, 3.0 × 100 mm.....072620

Acclaim RSLC PolarAdvantage Columns

Acclaim RSLC PolarAdvantage (PA), 2.2 µm, 2.1 × 30 mm 072621
Acclaim RSLC PolarAdvantage (PA), 2.2 µm, 2.1 × 50 mm 072622
Acclaim RSLC PolarAdvantage (PA), 2.2 µm, 2.1 × 100 mm 072623
Acclaim RSLC PolarAdvantage (PA), 2.2 µm, 2.1 × 150 mm 072624
Acclaim RSLC Polar Advantage (PA), 2.2 µm, 2.1 × 250 mm..... 074813
Acclaim RSLC PolarAdvantage (PA), 2.2 µm, 3.0 × 30 mm 072625
Acclaim RSLC PolarAdvantage (PA), 2.2 µm, 3.0 × 50 mm 072626
Acclaim RSLC Polar Advantage (PA), 2.2 µm, 3.0 × 75 mm..... 075698
Acclaim RSLC PolarAdvantage (PA), 2.2 µm, 3.0 × 100 mm 072627

Acclaim RSLC PolarAdvantage II Columns

Acclaim RSLC PolarAdvantage II (PA2), 2.2 µm, 2.1 × 30 mm.....071402
Acclaim RSLC PolarAdvantage II (PA2), 2.2 µm, 2.1 × 50 mm.....068989
Acclaim RSLC PolarAdvantage II (PA2), 2.2 µm, 2.1 × 100 mm.....068990
Acclaim RSLC PolarAdvantage II (PA2), 2.2 µm, 2.1 × 150 mm.....071401
Acclaim RSLC Polar Advantage II (PA2), 2.2 µm, 2.1 × 250 mm.....074814
Acclaim RSLC PolarAdvantage II (PA2), 2.2 µm, 3.0 × 30 mm.....071609
Acclaim RSLC PolarAdvantage II (PA2), 2.2 µm, 3.0 × 50 mm.....071608
Acclaim RSLC Polar Advantage II (PA2), 2.2 µm, 3.0 × 75 mm.....075699
Acclaim RSLC PolarAdvantage II (PA2), 2.2 µm, 3.0 × 100 mm.....071607

Dionex Method Speed-Up Calculator

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