



Agilent 1290 Infinity 2D-LC Solution

Selectable separation performance



Agilent Technologies

SELECTABLE SEPARATION PERFORMANCE

The new Agilent 1290 Infinity 2D-LC solution lets you match separation performance with sample complexity. At the flip of a switch you can select between single-dimension UHPLC and the ultimate chromatographic power of 2D-LC. What's more, Agilent's solution takes 2D-LC to a new dimension of ease-of-use for fast access to orthogonal data from heart-cutting, multiple heart-cutting or comprehensive analyses.

Boost performance through ultrahigh peak capacity

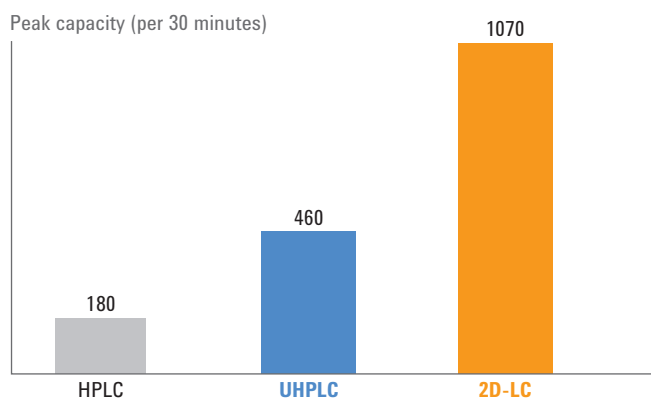
The Agilent 1290 Infinity 2D-LC solution achieves peak capacities in excess of 1000, giving you unmatched power to separate your most complex samples. Within a single 2D-LC analysis you gain a deeper insight than ever before – even more than you would get from multiple one-dimensional UHPLC runs.

Save time through trouble-free instrument setup

Get up-and-running fast with our quick-start kit, which comes with a complete set of columns, analytes and methods. Let the quick-start guide take you stepwise through method development for heart-cutting, multiple heart-cutting and comprehensive 2D-LC.

Reduce costs through single-vendor solution

Get higher returns on your investment with one system for both 1D-LC and 2D-LC. Upgrade seamlessly from your current Agilent instrument to gain ultimate flexibility in separation performance.



Within 30 minutes the Agilent 1290 Infinity 2D-LC solution can achieve peak capacities of 1000 or higher – for ultimate chromatographic separation power.

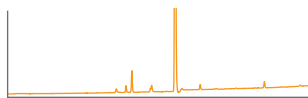


Select your separation performance – match system power with sample complexity at the flip of a switch between single-dimension UHPLC and the ultimate chromatographic power of 2D-LC.

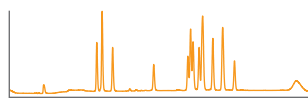


On one system you can perform single-dimension UHPLC as well as aspire to the ultimate chromatographic power of heart-cutting and comprehensive 2D-LC.

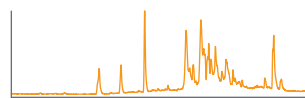
Inside: see how the Agilent 1290 Infinity 2D-LC solution can make complex samples easy to separate!



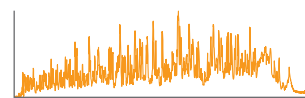
PAGE 4
Heart-cutting 2D-LC



PAGE 5
Multiple heart-cutting 2D-LC



PAGE 6
Comprehensive 2D-LC



PAGE 7
Comprehensive 2D-LC with mass-selective detection

HEART-CUTTING 2D-LC

Simple heart-cutting 2D-LC gives you the confidence you have identified all peaks in your sample and that none are concealed by larger peaks.

An extra dimension of confidence

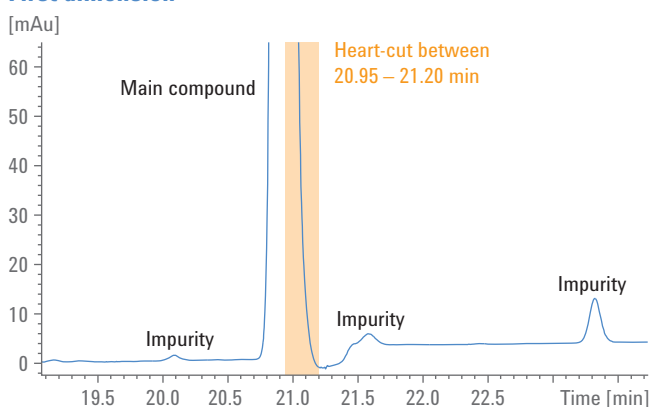
Evaluating the purity of synthesis products is a challenge that all analysts in QA/QC laboratories face on a day-to-day basis. Chemical similarities between product and byproducts, and the sheer size of a main compound's peak hinder accurate determination of purity and unequivocal identification of all impurities.

Heart-cutting 2D-LC is a simple solution to this challenge, delivering orthogonal data in a single run – without having to re-inject the sample. The first dimension identifies and

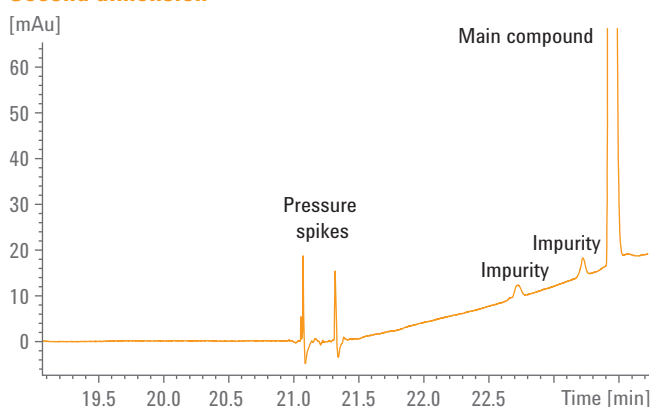
quantifies those compounds of interest that are well separated from the major peaks. Cutting selected parts out of the heart of the chromatogram – and analyzing on a second column – reveals further compounds of interest concealed by the larger peaks.

When analysis durations allow and there is no overlap between the first and second-dimension analyses, two or more heart-cuts out of the first-dimension chromatogram can be made, giving you an extra dimension of confidence in your results.

First dimension



Second dimension



Purity determination of an active pharmaceutical ingredient – Heart-cutting 2D-LC reveals additional impurities that were concealed by the main compound's peak. This simple technique is ideal for purity determination of enantiomers by using a chiral column for the second-dimension separation.

MULTIPLE HEART-CUTTING 2D-LC

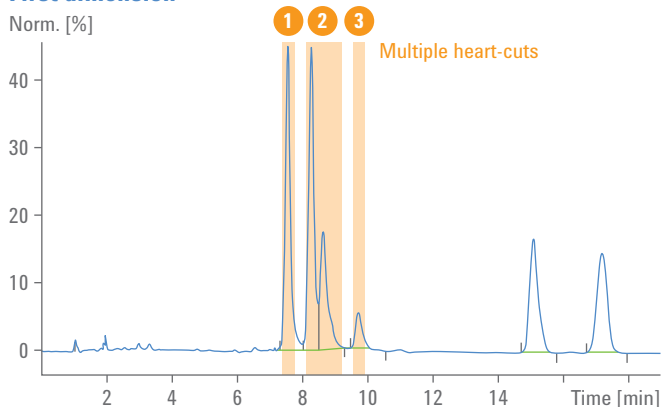
Multiple heart-cutting 2D-LC gives you deeper insights into several regions of your initial separation – without re-injecting your sample.

Revealing the secrets of your sample

Samples of medium complexity often require you to collect orthogonal data from several peaks in your initial separation. Multiple heart-cutting 2D-LC is the approach of choice but faces the dilemma of overlap between first and second-dimension analyses.

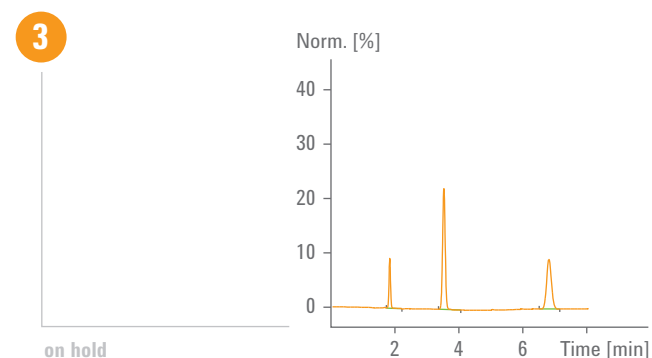
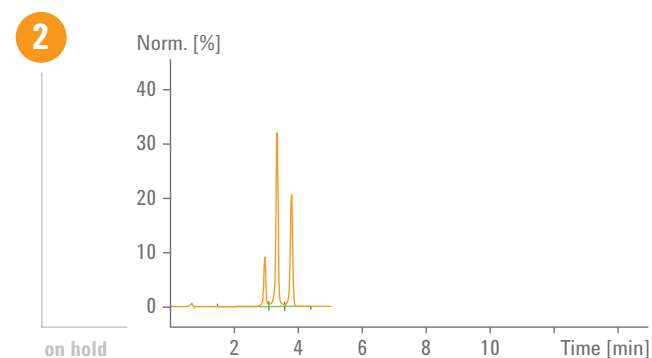
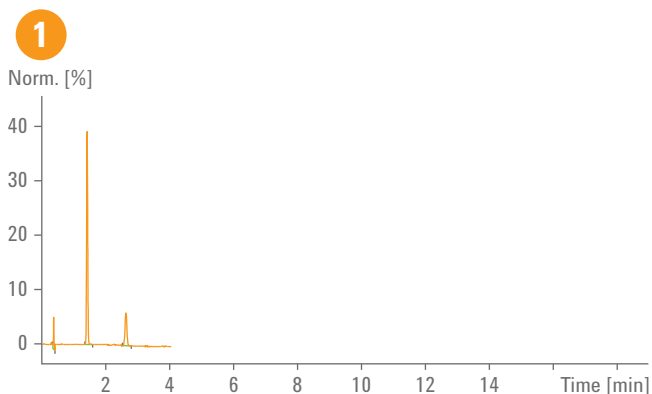
The 1290 Infinity 2D-LC solution solves this challenge easily by storing the heart-cut peaks in a specifically-designed and intelligently-controlled module. The peaks are held in this module's loops until the second dimension is free to proceed with the next analysis of a stored heart-cut peak.

First dimension



Multiple heart-cutting 2D-LC provides a deeper insight into this mixture. Three groups of poorly separated peaks are first cut and then stored prior to analysis on the second-dimension column. The first cut revealed a small impurity under a large peak. The second cut of the doublet turned out to be a triplet. The final cut revealed three peaks under the minor peak.

Second dimension



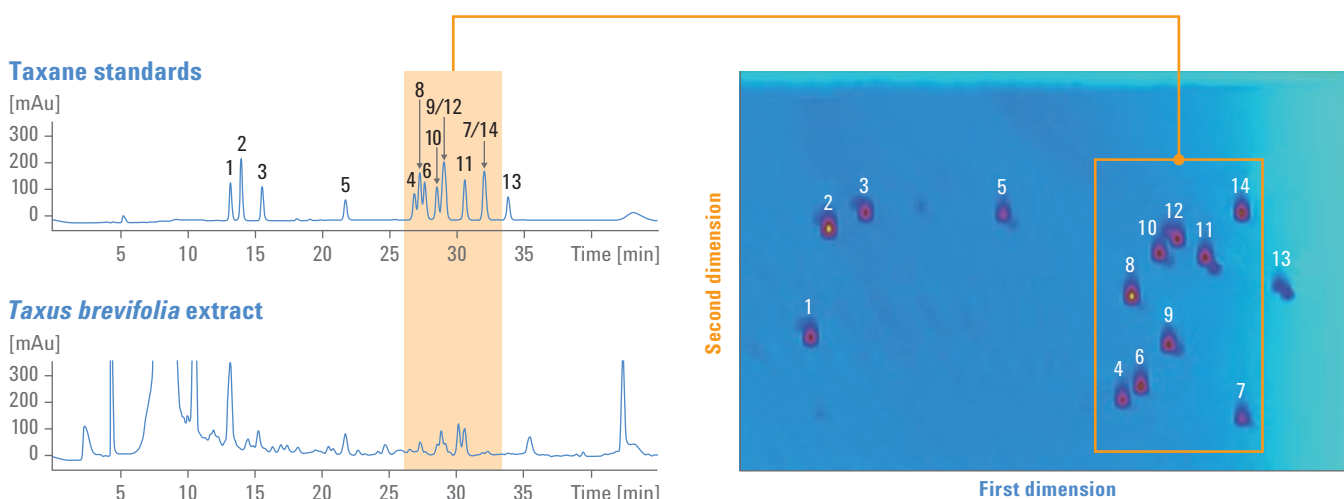
COMPREHENSIVE 2D-LC

Comprehensive 2D-LC gives you ultimate separation performance and leaves you in no doubt as to the composition of your most complex samples. What's more, you get absolute confidence in your results within a single run – without using stop-flow or trapping techniques.

Absolute confidence in a single run

Comprehensive 2D-LC provides the ultimate separation performance you need to analyze complex matrixes such as herbal extracts, food samples or polymer synthesis products. It gives you the chromatographic power to overcome not only the challenge of separating the analytes from the matrix, but also overlapping peaks from the first dimension.

In contrast to heart-cutting, comprehensive 2D-LC transfers the entire effluent from the first dimension separation to the second dimension column. This is achieved using a modulation valve with two loops, which are alternately filled and emptied. While one loop is filled with the effluent from the first dimension column, the contents of the second loop are analyzed on the second dimension column with ultrafast gradients of 20 to 30 seconds – or even faster!



Analysis of a herbal extract from *Taxus brevifolia* – The chromatogram of the extract exemplifies the challenge of separating a complex matrix. Although mixtures of standards can be separated using a single dimension, sample extracts require 2D-LC to overcome interference with the matrix.

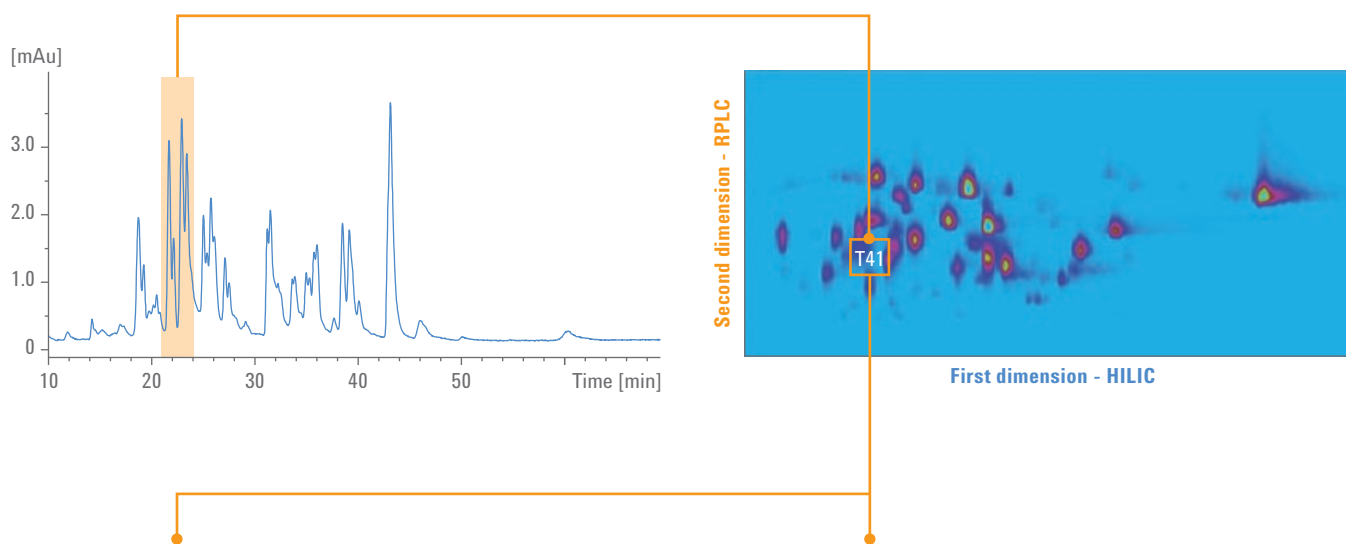
COMPREHENSIVE 2D-LC WITH MASS-SELECTIVE DETECTION

Raise comprehensive 2D-LC to even higher performance levels through mass-selective detection and gain an extra level of confidence in your results by resolving peaks based on their mass-to-charge ratios.

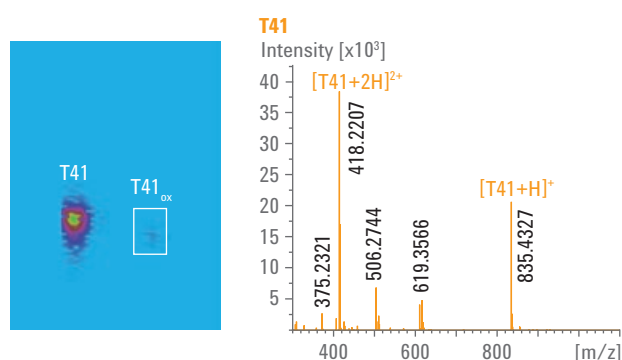
An extra level of confidence

Coupling comprehensive 2D-LC with mass-selective detection is the technique of choice for solving separation challenges of the highest complexity when it is required to separate the

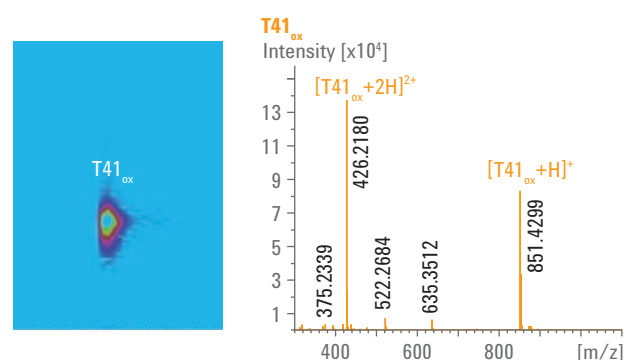
analytes from each other as well as from the matrix. For additional selectivity, combine a single or triple quadrupole, or a time-of-flight (TOF) or quadrupole time-of-flight (Q-TOF) mass spectrometer with your 2D-LC.



non-stressed (EIC T41 and T41_{ox})



Oxidation (EIC T41 and T41_{ox})



The analysis of monoclonal antibodies is a typical biopharmaceutical application. Comprehensive 2D-LC facilitates separation of the manifold analytes from each other, and also from the matrix. As a result, the quadrupole time-of-flight mass-selective detector does not suffer from ion suppression and works as an ideal identification and

quantification tool for determination of the manifold peptides. Even in the most complex analyte areas it is possible to distinguish between stressed and non-stressed monoclonal antibodies.

PRECONFIGURED OR CUSTOM FOR UTMOST FLEXIBILITY

The Agilent 1290 Infinity 2D-LC solution is available preconfigured for easy matching of separation performance with sample complexity. For utmost application flexibility, configure a custom system from Agilent's extensive range of LC instrumentation.

Three preconfigured systems all utilize the unique performance of the 1290 Infinity Binary LC for the second dimension separation. This system's pump guarantees lowest delay volume for ultrafast 2D gradients. The diode array detector delivers data of the highest quality for ultimate reproducibility.



Most powerful

For comprehensive 2D-LC of the highest accuracy and precision, a 1290 Infinity Binary LC runs the first dimension separation. The high data rate of the 1290 Infinity Diode Array Detector handles with ease the ultrafast gradients used in both dimensions.



Most flexible

For highest flexibility, a 1290 Infinity Quaternary LC is the system of choice for the first dimension. This system gives you the flexibility of quaternary solvent delivery combined with binary-like pump performance.



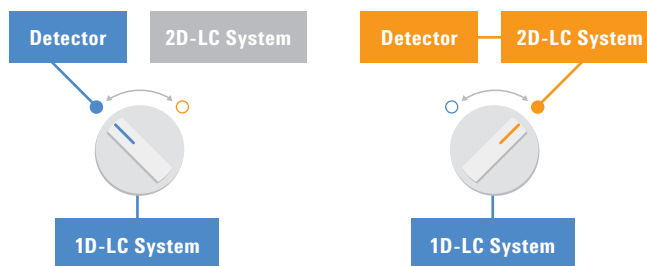
Most affordable

Enter the world of 2D-LC with the affordable 1260 Infinity Binary LC for the first dimension. The 1260 Infinity Diode Array Detector delivers quality data for sensitive and reproducible 2D-LC.

Benefit from the flexibility of configuring a 2D-LC system to meet your specific needs for separation performance. Get higher returns on your investment with one system for both 1D-LC and 2D-LC, and upgrade seamlessly from your current Agilent instrument.

Easy switching between 1D-LC and 2D-LC

Use your instrumentation more efficiently and enjoy the flexibility of switching between 1D-LC and 2D-LC. On one system you can perform single-dimension UHPLC as well as analyze your most complex samples with multiple heart-cutting or comprehensive 2D-LC.



At the flip of a switch you can select between single-dimension UHPLC and the ultimate chromatographic power of 2D-LC.

Easy configuration and easy upgrade

For the first dimension, simply choose a separation system capable of achieving the performance you need. A 1290 Infinity Binary Pump with a specially-designed Agilent switching valve – and a column of your choice – are all you need to complete your 2D-LC solution. The Agilent approach to 2D-LC gives you the flexibility to use this system for one-dimensional UHPLC when required, giving you higher returns on our investment. You can also use your current Agilent LC for even more savings.

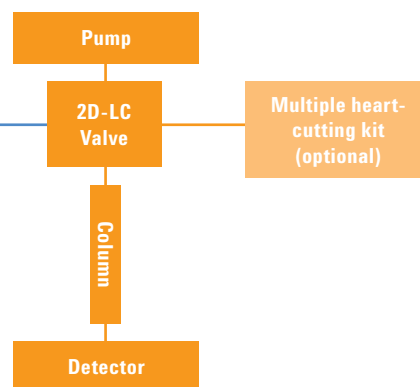
Extend your 2D-LC capabilities

- Choose from Agilent's wide range of detection techniques, including fluorescence, evaporative light scattering or mass-selective detectors
- Monitor the first-dimensional analysis during heart-cutting with an additional detector
- Increase your capacity easily with our ready-to-go multiple heart-cutting module

First dimension



Second dimension



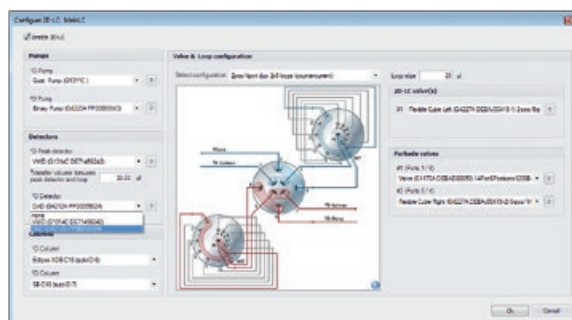
The modularity of Agilent's LC portfolio allows you to tailor a system that meets your specific needs for separation performance.

A NEW DIMENSION OF EASE-OF-USE

Agilent's intuitive software takes the complexity out of the separation of complex samples. Straightforward method setup for heart-cutting, multiple heart-cutting or comprehensive 2D-LC brings a new dimension of ease-of-use to your laboratory.

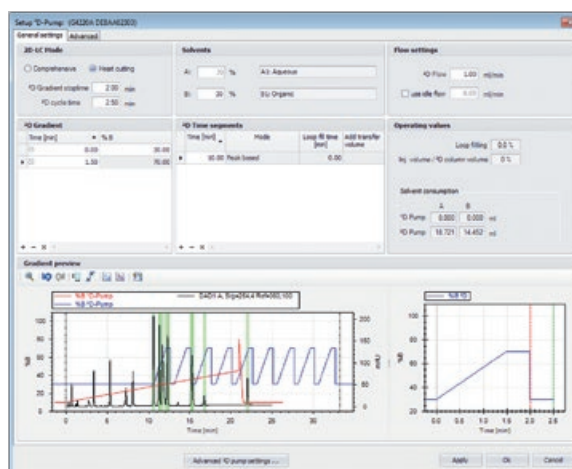
Easy configuration

An easy-to-use software tool guides you through system configuration, including choice of valves and loops. Each configuration is illustrated clearly for an overview of the valve and loop connections.



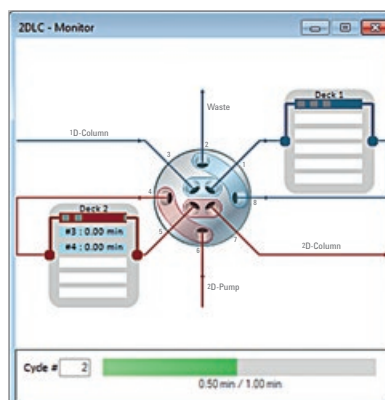
Interactive method setup

Load a reference signal to identify at-a-glance which peaks you want to heart-cut. Choose between time-based and peak-based mode for optimum heart-cutting. Second-dimension gradient setup is straightforward and method modification is done by simple drag-and-drop actions.



Online monitoring of multiple heart-cutting

View the current filling and analyzing status of your multiple heart-cutting system during storage and analysis of heart-cut peaks.



Smart data analysis through heart-cut viewer

Innovative data analysis enables you to scan your heart-cutting results fast and conveniently for highest productivity.



Easy startup

Agilent's quick-start kit gets you up-and-running fast. Delivered with a complete set of columns, analytes and methods, this kit makes easy work of initial instrument startup and method setup.



Comprehensive data analysis and reporting

LC Image software is an industry-leading solution for visualizing, analyzing, and reporting on data from comprehensive 2D-LC chromatography (LCxLC) systems. This software is available from Agilent partner GC Image, LLC, Lincoln, Nebraska.

Find out more: www.gcimage.com



Two-Dimensional Liquid Chromatography – A Primer

Learn more about the fundamentals and practical applications of 2D-LC. Written by Prof. Pete Carr, University of Minnesota, and Prof. Dwight Stoll, Gustavus Adolphus College, this valuable publication is ideal for both beginners and experts.



Order your copy today!

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