



The Agilent 6470 Triple Quadrupole LC/MS System

# ROCK SOLID PERFORMANCE FOR CONFIDENT QUANTITATION

The Measure  of Confidence



**Agilent Technologies**

## **INSTRUMENT RELIABILITY AND PERFORMANCE: THE KEY TO A GOOD DAY IN THE LAB**



Whether you work in food testing or environmental analysis, drug development or clinical research, you need to meet the requirements for stringent quantification in the face of challenges such as time-consuming sample preparation, limited amounts of sample, complex matrices, and the need for efficient throughput.

The Agilent 6470 Triple Quadrupole LC/MS system provides improved sensitivity, precision, and scan speed, allowing you to streamline analytical workflows. Dilute or use less sample and still have complete confidence in the accuracy of your results. The system's proven robustness and reliability mean less maintenance and more uninterrupted laboratory productivity.



## ANALYTICAL CHALLENGE

More to do, fewer people to do it  
Complex matrices challenge analysis

Increased demands on instruments

Ensure instrumentation can meet  
future analytical needs

## AGILENT 6470 SYSTEM

Design innovations increase performance, for high sensitivity and simpler workflows while allowing for less maintenance and increased instrument uptime

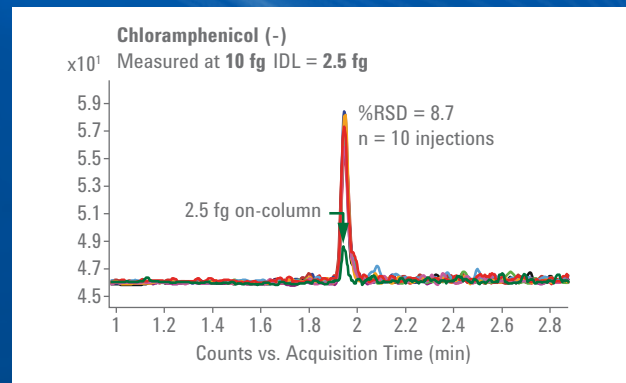
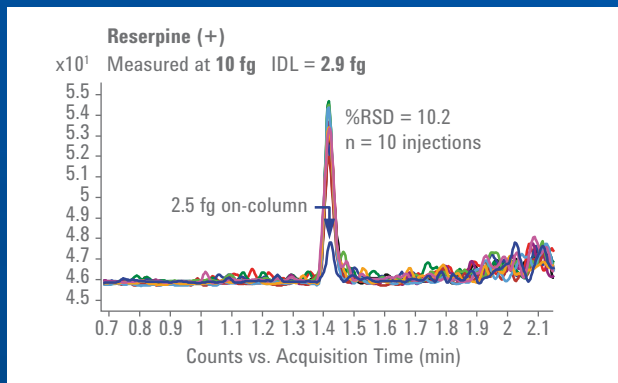
Reliable and consistent performance enables the analysis of large sample batches over longer periods of time

The broadest range of ion sources; the flexibility to upgrade to advanced iFunnel technology

### The accuracy of the Instrument Detection Limit

Today's high-performance LC/MS detection demands a more accurate, rigorous, and statistically based performance standard than classic signal-to-noise ratios. The Instrument Detection Limit (IDL) follows guidelines established by the International Union of Pure and Applied Chemistry, the U.S.

Environmental Protection Agency, and other organizations. IDL is measured at realistically low analytical levels and is a practical indicator of sensitivity for your quantitative assays. For more information about IDL, see Agilent publication 5991-4089EN.



## WHAT IS ROBUST LC/MS?

At Agilent, we put instrument reliability and robustness at the forefront of our R&D efforts.

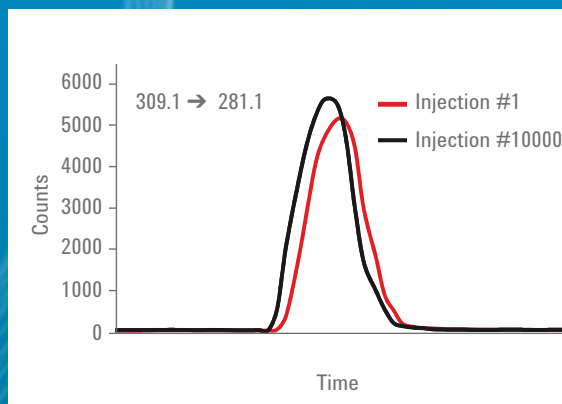
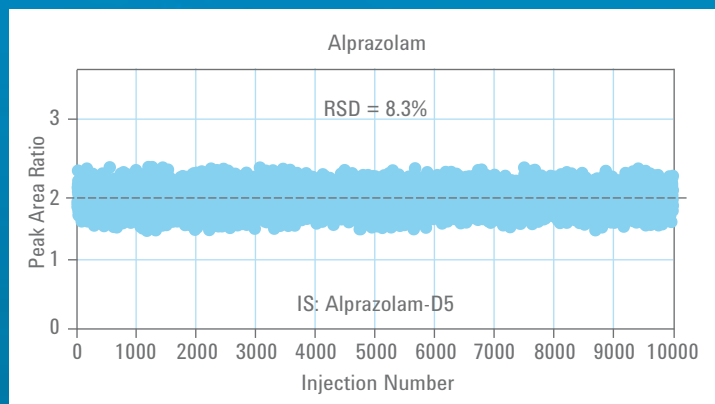
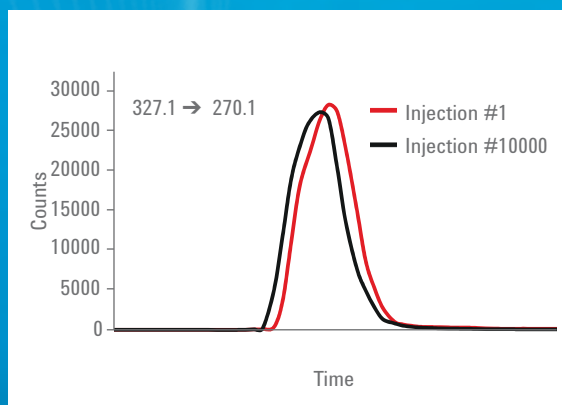
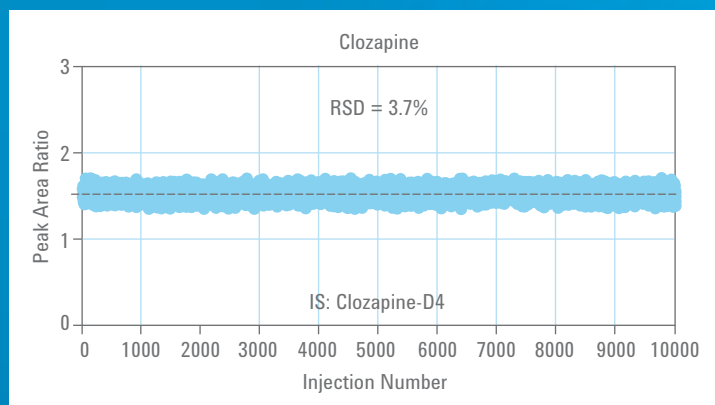
If you've ever tried an Agilent LC or LC/MS instrument, you've experienced the results of that focus. But even if you know what to expect, the 6470 may surprise you.

*"Agilent's instruments are rocks in terms of reliability—very robust."*

**- GREG MCINTIRE, PH.D.,**  
DIRECTOR OF R&D, AMERITOX

### The 6470 with RapidFire

Robustness test data with 10,000 injections



## RELIABLE, SECURE, AND TRUSTED SEPARATION



Agilent 1290 Infinity II and Agilent 1260 Infinity LC System

All around the world, more than a million Agilent LCs are hard at work, delivering unmatched performance, productivity, and reliability.

“It just never fails.”

That’s how users perceive our top-selling LCs. Every system is packed with the highest quality parts for the highest uptime and longest maintenance

intervals. What’s more, our built-in diagnostics and maintenance tools ensure reliable and secure operation.

The 1260 Infinity LC systems give you UHPLC capabilities at the price of an HPLC system. What’s more, you get outstanding sensitivity and 100 percent compatibility

with all your HPLC methods, ensuring risk-free replacement of existing instruments.

The 1290 Infinity II LC sets new standards in analytical and laboratory efficiency. Whatever your application, from research to quality control, the 1290 Infinity II delivers the performance, flexibility, and reliability you need.

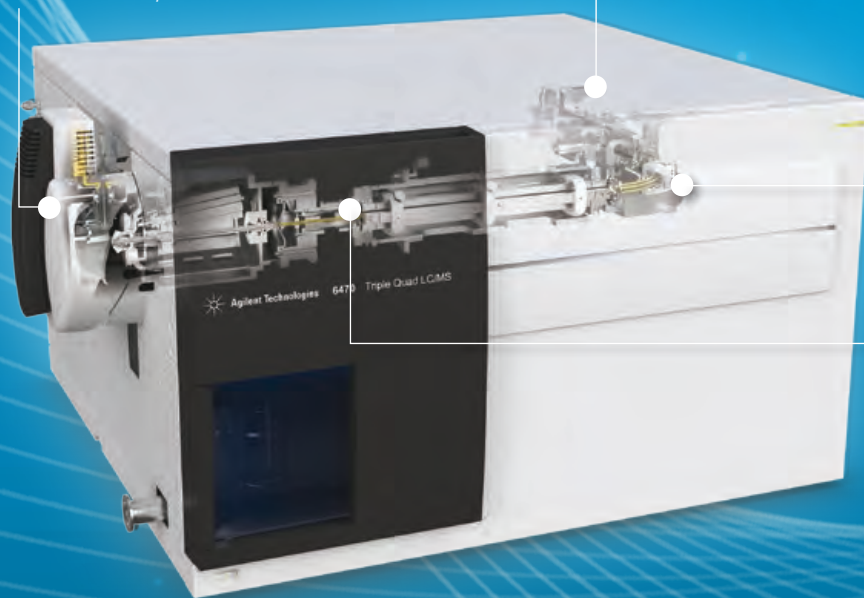
## ENHANCED PERFORMANCE IN A SMALL PACKAGE

### Agilent 6470 Triple Quadrupole LC/MS system

The 6470's innovative design incorporates a curved collision cell, giving the system a small benchtop footprint. The 6470 is, in fact, 30% smaller than the 6460. But the really exciting part is that the new 6470 delivers unmatched performance in its class.

The design innovations incorporated in the 6470 work in concert to deliver sensitive, precise, robust, and reliable quantitation over a wide linear dynamic range and at enhanced acquisition speed.

Built-in **Jet Stream** technology delivers 5x the sensitivity of traditional ESI.



An ion detector with a **high-energy conversion dynode and low noise characteristics** enables more efficient positive and negative ion detection across a wide  $m/z$  range.

A curved and tapered **hexapole collision cell** enables effective collection and transmission of ions.

**Enhanced Q1 ion optics** with optimized prefilter geometry increases ion transmission while minimizing contamination.

**Upgradeability!** Add our exclusive **iFunnel technology**, effectively transforming your 6470 into a top-of-the-line 6495 with unprecedented sensitivity—without having to buy a whole new system.

# A FASTER ROUTE TO INSIGHT

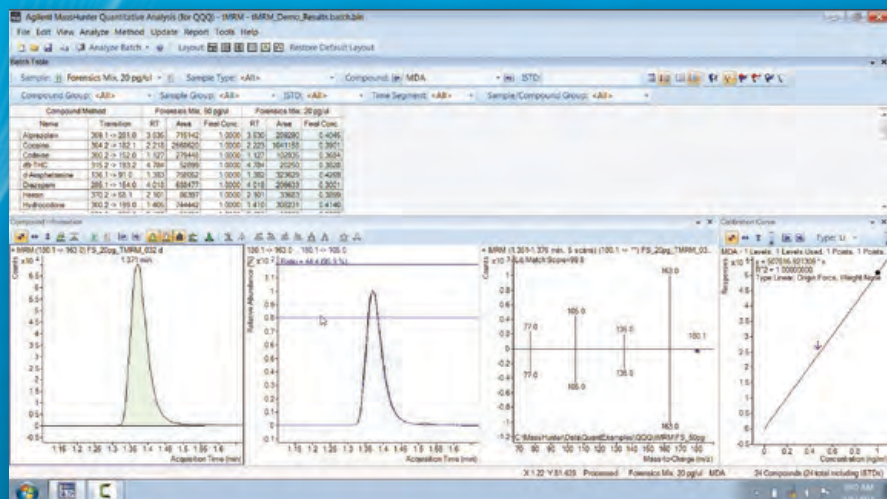
## MassHunter software

Agilent MassHunter Workstation software simplifies sample management, MS method optimization, data processing, and data reporting for quantitative analyses. Powerful tools support pharmaceutical and other regulated lab environments:

- Dynamic MRM (dMRM) ensures the best possible quantitative results for multianalyte assays compatible with fast UHPLC separation, by specifying cycle times and allowing the software to determine the maximum dwell time for each MRM transition.
- Triggered MRM (tMRM) databases and applications kits simplify your assay development and minimize the need for tedious manual adjustments. With tMRM kits, you get chemical standards, pretested methods, tMRM database and library, and all the information you need to setup screening methods.

*"The extra information that triggered MRM provides is a huge benefit when it comes to compound identification because it increases our confidence. We cannot make avoidable mistakes."*

**- KATE MASTOVSKA, PH.D.,**  
ASSOCIATE SCIENTIFIC DIRECTOR,  
NUTRITIONAL CHEMISTRY  
AND FOOD SAFETY



Here MassHunter acquisition software triggers the collection of a third and fourth transition because the primary transition signal was greater than the threshold set in the tMRM protocol.

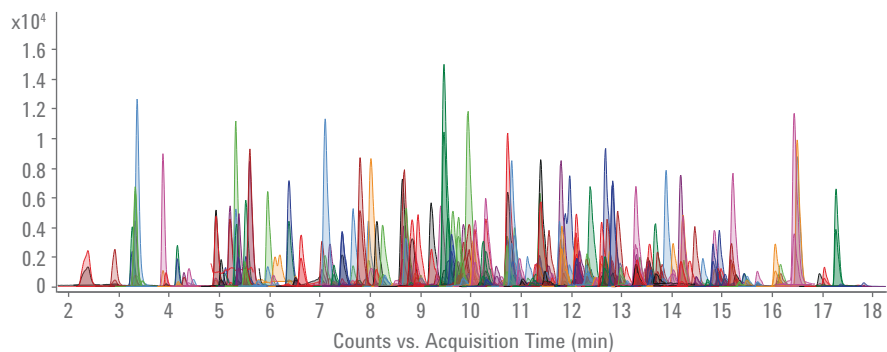
# STREAMLINE YOUR WORKFLOW FOR FOOD-SAFETY TESTING

## Complex multi-residue pesticide analysis

The sensitivity of the Agilent 6470 enables a higher degree of sample dilution while still achieving the maximum residue levels (MRLs) stipulated by the European Union. High speed acquisition is also possible without compromising sensitivity, enabling one multi-residue analysis to handle hundreds of super-sharp peaks delivered through 1290 UHPLC.

The 6470 also supports triggered MRM (tMRM) spectral acquisition which can provide the extra confidence many labs now seek when assessing detections from a multi-residue screen.

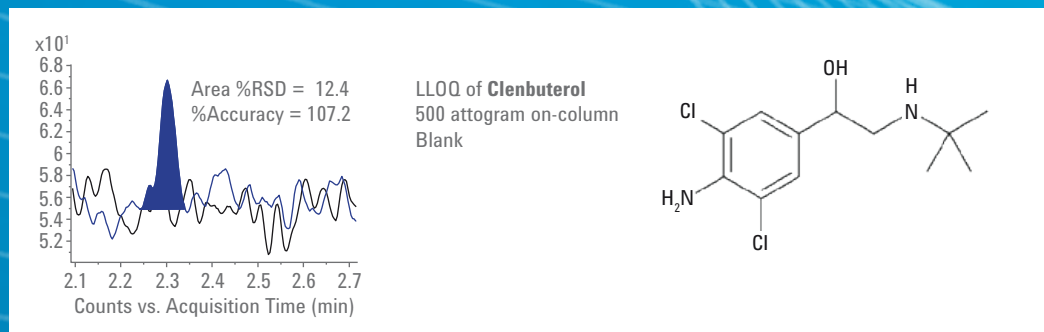
The 6470 delivers this spectral acquisition at a much higher level of speed and sensitivity than alternative product ion scanning approaches, allowing pesticides (and other contaminants) to be confirmed at lower concentrations.



MRM chromatograms of 20-fold dilution of more than 250 pesticides spiked into black tea at the MRL of 10 µg/kg

Pesticides	LLQ (µg/mL)	IDL (µg/mL)
Dimethoate	10	2.76
Oxaml	2	0.94
Carbendazim	10	3.70
Methomyl	10	4.11
Carbaryl	20	12.02
Methamidophos	5	2.71
Pirimicarb	2	0.77

### Performance Spotlight: Improved Sensitivity and Precision Yield Attogram Level Lower Limits of Detection and Quantitation



500 attograms of clenbuterol is detected clearly

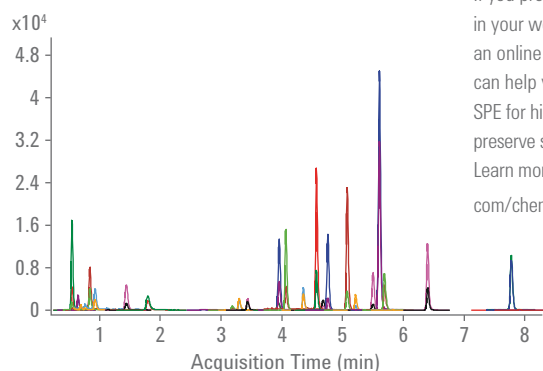


# SIMPLIFY SAMPLE PREPARATION FOR ENVIRONMENTAL ANALYSIS

## Direct analysis of pharmaceuticals in drinking water

Time-consuming sample enrichment by solid phase extraction (SPE) is often required before LC/MS analysis. The Agilent 6470 streamlines analysis, enabling you to accurately quantify pharmaceuticals and personal care products (PPCPs) at sub-ng/L levels with excellent assay precision, reproducibility, and robustness, with direct injection.

### Reproducible Performance at High Speed



Overlaid MRM chromatograms of PPCPs spiked in water at 10 ng/L.

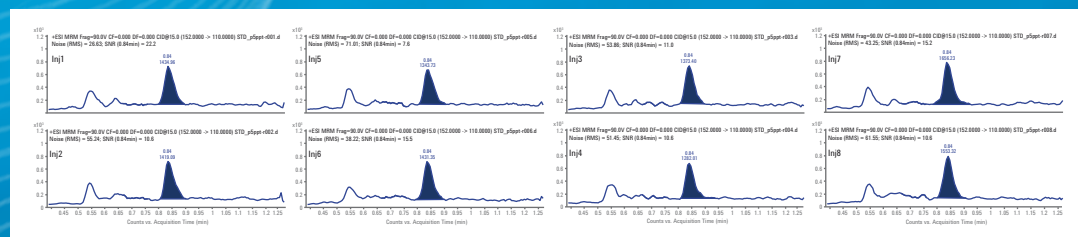
### Automated SPE

If you prefer to include SPE in your workflow, Agilent has an online SPE solution that can help you automate your SPE for higher throughput, and preserve sample for analysis. Learn more at [www.agilent.com/chem/onlineSPE](http://www.agilent.com/chem/onlineSPE)

PPCPs	LLQO (ng/L)	IDL (ng/L)	PPCPs	LLQO (ng/L)	IDL (ng/L)
Acetaminophen	0.5	0.120	Erythromycin	1.0	0.140
Atenolol	1.0	0.450	Fluridone	0.1	0.012
Atrazine	0.5	0.280	Gabapentin	5.0	1.050
Bupropion	0.2	0.044	Lamotrigine	2.0	0.940
Caffeine	1.0	0.250	Metoprolol	1.0	0.290
Carbamazepine	0.5	0.082	Propranolol	1.0	0.091
Clarithromycin	5.0	1.140	Sucralose	20.0	3.560
Cotinine	0.5	0.068	Sulfamethoxazole	1.0	0.410
DEET	0.2	0.022	Trimethoprim	1.0	0.390
Dextrophan	1.0	0.150	Venlafaxine	0.5	0.076
Diazinon	0.5	0.071	2,4-D	20.0	8.690
Diltiazem	0.2	0.030	Gemfibrozil	20.0	11.500
Diphenhydramine	0.2	0.052	Triclopyr	50.0	16.300
Diuron	1.0	0.280	Triclosan	20.0	5.320

### Performance Spotlight: Excellent precision and reproducibility at the lowest levels

Acetaminophen amount measured	Replicates	%RSD	t(99%)	Acetaminophen
0.5 pg/mL (LLQO)	8	8.3	2.998	0.12 ng/L
IDL = t x (%RSD/100) x Amount = 2.998 x (8.3/100) x 0.5 pg/mL = 0.12 pg/mL				

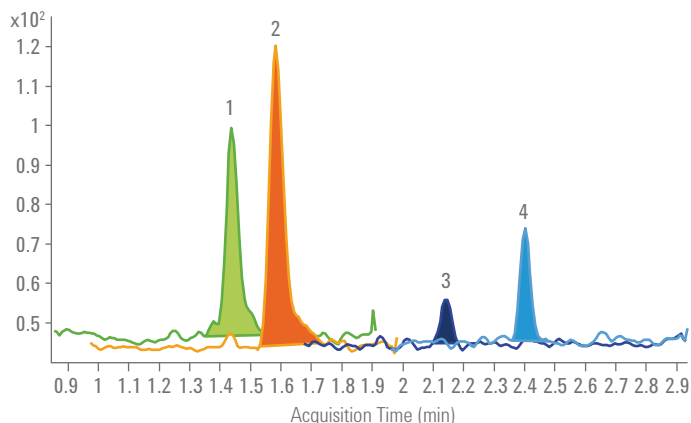


Sample LLQO level chromatograms (8 replicates) demonstrate the excellent peak area %RSD and reproducibility.

# QUANTIFY DRUGS AND METABOLITES MORE QUICKLY AND RELIABLY

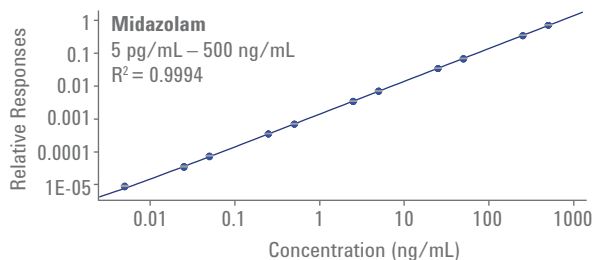
## Increased sensitivity and robustness make it happen

The Agilent 6470 enables you to reliably detect drugs and metabolites at the picoMolar (pM) level in human plasma while achieving wide linear dynamic range. With the use of a low-carryover, high-capacity Agilent 1290 Infinity II LC system, the robust performance of the 6470 ensures that you can analyze thousands of biological samples with unattended operation.

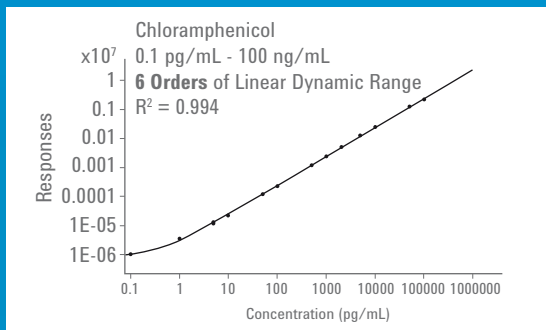


Overlaid MRM chromatograms of benzodiazepines and metabolites spiked in human plasma at 5 ppt. At right, results over five orders of linear dynamic range.

ID	Analyte	LLQ (pg/mL)	%RSD (n = 7)	IDL (pg/mL)
1	alpha-Hydroxymidazolam	5	6.90	1.08
2	Midazolam	5	5.32	0.84
3	alpha-Hydroxyalprazolam	5	9.87	1.55
4	Alprazolam	5	7.98	1.18



### Performance Spotlight: More Information from Every Experiment



This calibration curve demonstrates the rigorousness of the data collected over six orders of linear dynamic range.

Levels	% RSD (n = 5)	% Accuracy
0.1 pg/mL	12.10	98.7
1 pg/mL	8.90	114.5
5 pg/mL	7.50	94.4
10 pg/mL	4.50	92.4
50 pg/mL	1.40	98.9
100 pg/mL	1.00	93.3
0.5 pg/mL	0.91	100.8
1 ng/mL	0.46	96.5
2 ng/mL	0.23	105.5
5 ng/mL	0.95	107.9
10 ng/mL	0.39	103.9
50 ng/mL	0.89	102.4
100 ng/mL	0.74	90.8

## THE ION SOURCE TECHNOLOGY LEADER

Agilent instruments offer the widest selection of alternate sources—all compatible with your 6470 system—to meet the needs of your varying analyses. Most Agilent sources have a novel low maintenance orthogonal spray geometry, which reduces contamination in the inlet and contributes to instrument robustness.



### Jet Stream

Standard on all 6470 instruments, with 5x the sensitivity of ESI.



### Electrospray (ESI)

Softest ionization available, suitable for wide range of polarities and sizes of analytes.



### Multimode

An APCI and ESI source in one! Choose between one mode or simultaneous ionization by both techniques.



### ChipCube

Minimize the hassle of making low-flow capillary connections. Wide variety of application-specific and custom chips available.



### Nano-ESI

Use your own nanoflow columns with a flexible source that has three spray positions.



### APCI

Ideal for ionizing lower polarity compounds, less sensitive to solution chemistry than ESI, and allows for higher LC flow rates.



### APPI

Able to ionize nonpolar compounds with little dependency on solvent chemistry.

## Complete your analysis with Agilent Poroshell 120 columns

Poroshell 120 columns give you fast UHPLC separations, and are more forgiving for complex samples, enabling long column lifetimes. Available in scalable particle sizes and more than 12 chemistries including Poroshell HPH for high pH separations. More information at [www.agilent.com/chem/discoverporoshell](http://www.agilent.com/chem/discoverporoshell)



## The Agilent value promise: 10 years of guaranteed performance

In addition to our continually evolving products, Agilent offers the industry's only 10-year value guarantee. Agilent guarantees you at least 10 years of instrument use from your date of purchase, or we will credit you with the residual value of that system toward an upgraded model.

It's our way of assuring you of a safe purchase now, and protecting your investment into the future.

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