

Agilent Energy and Chemical Solutions

# ENERGIZE RELIABILITY, SAFETY, AND QUALITY

The Measure of Confidence



Agilent Technologies

# The pressure to stay productive, profitable, and compliant is more intense than ever

Product quality and safety, regulatory requirements, price-driven efficiency improvements, and environmental stewardship impose tough demands on your industry – and your lab.



*“Each hour of off-spec product costs us tens of thousands of dollars. How can we get our QC results to operations faster so they can make process adjustments?”*



*“My lab staff has decreased by almost 50% in ten years. Where do I find the time and talent to implement the new tests my customers are demanding?”*



*“Our company is expanding into alternative fuels. How can we make sure we’re conforming to industry standards and government regulations?”*



*“Using less solvent will reduce our environmental footprint and protect our staff from hazardous chemicals. How can we do it without losing productivity and quality?”*

## Like you, Agilent is working to meet today's energy and chemical challenges – and evolving to prepare for what lies ahead

From crude oil, natural gas, and refining... to specialty chemicals and alternative fuels... Agilent is your *single-source* for instrumentation, applications, supplies, services, data handling, and workflow information management technologies such as:

- **Pre-configured analyzers** for rapid, specific identification and quantitation of refinery gas, natural gas, biodiesel, TOGA, oxygenates, and impurities
- **Analytical instruments** – such as GC, LC, MS, FTIR, Atomic Spectroscopy, NMR, Microscopy, and more – to suit your lab's unique demands and workload
- **Custom valve configurations**, specialized fittings, and application-specific hardware modifications
- **Novel data mining techniques** that allow you to discover more compounds and contaminants, faster – and with greater precision
- **High-performance autosamplers and integrated systems** that process more samples, faster
- **Agilent-engineered columns and supplies** that promote reproducible results and trouble-free instrument operation
- **OpenLAB Informatics software** improves your lab's productivity by making data readily accessible, shareable, organized, and secure

You also have access to Agilent's **Professional Services Organization**, a global leader in systems integration consulting, that has been serving the world's leading chemical analysis companies for decades.

No matter where you are in the energy and chemical supply chain Agilent can help you increase production efficiency, reduce scrap and rework, and enhance product quality.

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# GC and GC/MS Analyzers

## Factory-configured and tested GC and GC/MS Analyzers let you start your analysis on day one

Bringing an application online can stretch your lab to the limit – particularly when your resources are not up to full strength. Agilent solves this problem with our extensive portfolio of pre-tested, pre-configured **analyzers** designed especially for energy and chemical applications such as refinery gas, natural gas, TOGA, standard and alternative fuels.

These analyzers include a distinct combination of application-ready tools and Agilent expertise, including:

### Factory

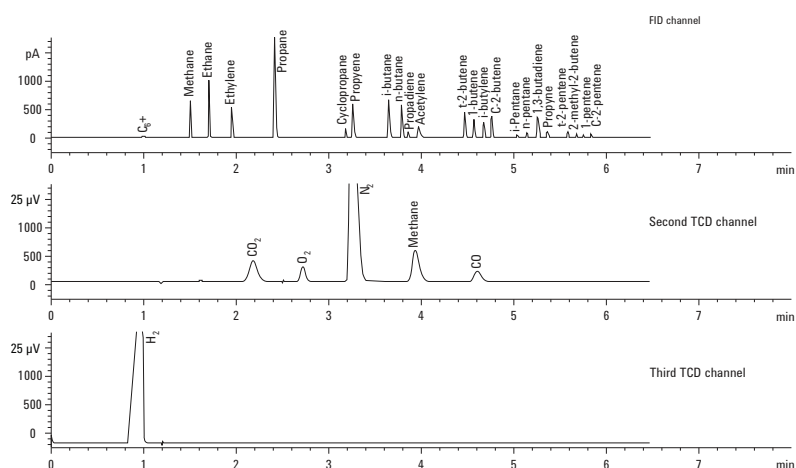
- GC instrument checkout performed (or checkout samples supplied)
- System setup and leak testing
- Installation of high-performance, application-certified column, liner, and septa
- Installation of all necessary auxiliary hardware, such as automated sample handlers, Capillary Flow Technology modules, and specialized fittings
- Factory-run checkout method using application checkout mix

### Delivery

- Operation manual, Application Note, and instructions for running the checkout method
- Powerful, easy-to-use software for out-of-the-box operation
- All method-required consumables included – plus easy reordering information

### Installation

- Performance verification
- Optional operator training
- Duplicate factory checkout with standard mix on-site
- Expert ongoing service and support



**Refinery gas calibration standards analysis:** Here, an Agilent 7890A GC, configured with three parallel channels and simultaneous detection, provided a comprehensive, high-resolution analysis of refinery gas in just 6 minutes. [5989-7438EN Parallel GC for Complete RGA Analysis.]



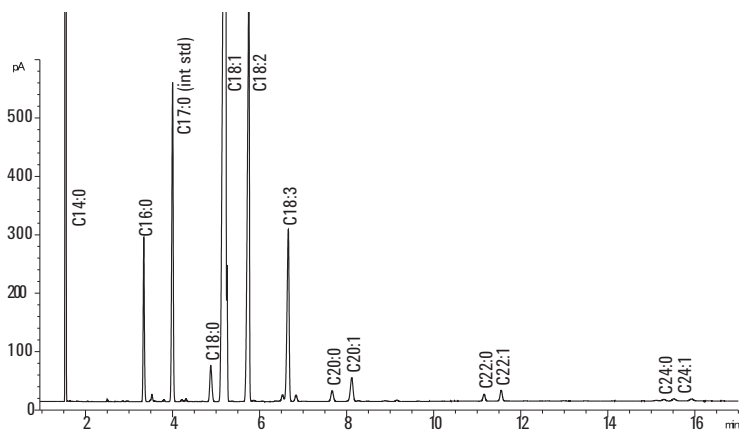
### Agilent innovation spotlight

**1973:** Hewlett-Packard (now Agilent) introduces the first commercially available GC with microprocessor control (the HP 5830). This system saves time, while keeping method parameters consistent for every operator.

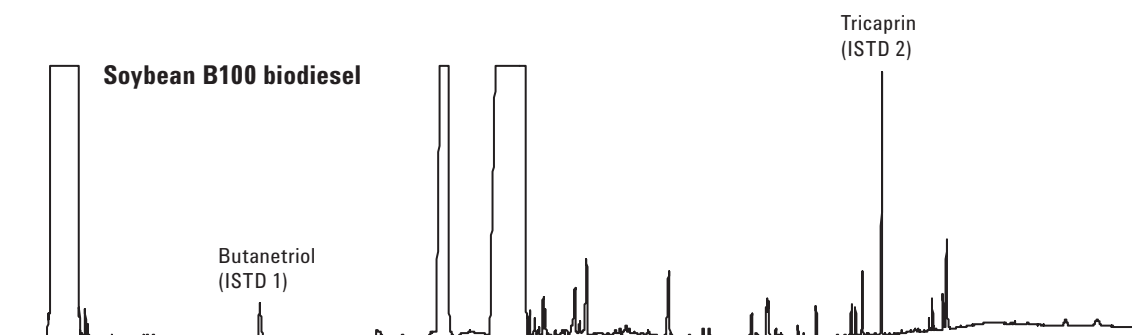
## More than 200 factory-tested analyzer choices pre-tested to run in accordance with industry standards

This analyzer family...	Configured per these industry standards
Natural Gas	ASTM D1945, ASTM D1946, ASTM D2597, ASTM D6228, GPA 2261, GPA 2177, GPA 2286, GPA 2186, GPA 2165, ISO 6974, ISO 7941, UOP 539, EN 27941, IP 405
Sulfur	ASTM D5504, ASTM D5623, ASTM D6228, UOP 791
Non-Condensable Gases	ASTM D2504
Simulated Distillation	ASTM D2887, ASTM D7213, ASTM D6352
Refinery Gas	ASTM D1945, ASTM D1946, ASTM D2163, ASTM D2712, UOP 539, ISO 7941, ISO 6974, DIN 51666, GPA 2261
Gasoline	ASTM D3606, ASTM D4815, ASTM D5580, EN 13132, EN 12177
Liquefied Petroleum Gas (LPG)	ASTM D2163, ASTM D2593, ASTM D2712, ASTM D4424, ISO 7941, EN 27941, IP 405
Biodiesel	ASTM D6584 EN 14103, EN 14106, EN 14110, EN 14105
Greenhouse Gases	ASTM D1946
Transformer Oil Gas	ASTM D3612-A,C

**Real-world flexibility:** Agilent gives you a choice of biodiesel analyzers that comply with official methods around the globe. Two examples are shown below.



Chromatogram of FAMES in rapeseed B100 biodiesel according to EN 14103.



Analysis of a soybean B100 biodiesel sample prepared according to ASTM D6584. [5990-3781EN Automated Standard and Sample Preparation for Multiple Gas Chromatographic Analyses of Biodiesel.]

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# Inspired by customer needs, our popular custom analyzers deliver reliable results for highly specialized analyses

Agilent's custom solutions reflect our extensive industry knowledge and our close working relationship with energy and chemical customers. Together with our business partners, Agilent can provide turnkey solutions – including detectors, hardware, and software – to meet your most challenging analytical requirements and timeframes.

## Natural gas analyzers (NGA)

Based on our 7890A GC and 490 Micro GC, **Agilent NGAs** are excellent for determining the composition and calorific value of natural gas in BTUs or Joules/mol.

## Fast refinery gas analyzers (RGA)

Like Agilent NGAs, our RGAs are based on the 7890A and 490 Micro GCs. The **7890A RGA** can be configured to run *three parallel channels* for improved hydrogen detection and linearity. In addition, all three detectors (FID/TCD/TCD) collect data simultaneously – allowing you to perform a complete analysis of inert gases and hydrocarbons (to n-C<sub>6</sub>).

Our **490 Micro Custom RGA** is based on the Agilent 490 Micro GC, and arrives ready to go with proven hardware and software, pre-loaded analysis method, and documentation for a total cycle analysis time of less than three minutes.

## Analyzers for oxygenates and aromatics in motor fuels

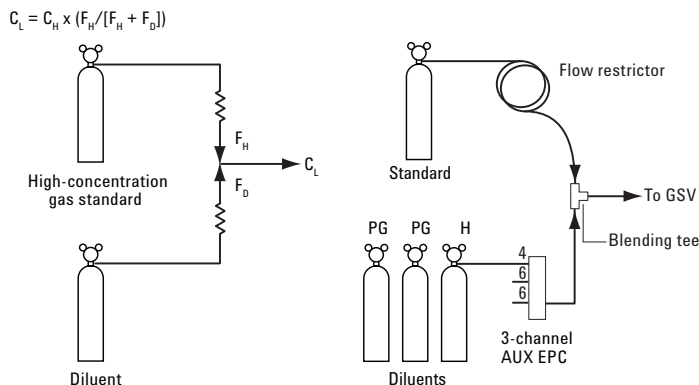
Agilent's full range of GC analyzers for oxygenates and aromatics in motor fuels cover ASTM and EN methods.

## Unified aromatics analyzers

By configuring an Agilent GC with a split/splitless inlet and FID, we consolidated *ten separate ASTM methods* into one easy-to-use GC method.

## PIONA/reformulyzer

This Agilent partner method is best for samples that contain high amounts of C<sub>7</sub>-C<sub>8</sub> olefins or naphthenes.



**Automatically create calibration gases:** Dynamic blending uses the Agilent 7890A 3-Channel AUX EPC module to automate the precise preparation of multilevel gas phase calibration standards. The AUX EPC module delivers variable diluent gas flows to change the final concentration of the standard. Different gas diluents can also be used to observe matrix effects, which is useful when measuring trace levels of active compounds that would be unstable in pre-prepared mixtures.

## Agilent and ASTM: More than 40 years of collaboration on industry standards and methods

- Applications chemists from both Agilent and our business partners actively participate in new ASTM method development
- Many ASTM methods are created on Agilent instruments
- Agilent chemists have chaired – and continue to chair – ASTM committees and subcommittees
- We can bring ASTM solutions and experience to all our customers worldwide
- Agilent scientists actively monitor emerging requirements and trends to bring needed industry applications to ASTM

### Simulated distillation analyzers

These complete systems conform to the three most popular ASTM simulated distillation methods: D2887, D2887 extended, and high-temperature D6352. Other systems for international standard methods are available through Agilent's business partners.

### Monomer and polymer analyzers

For polymer manufacturing in particular, the purity of ethylene and propylene monomer feedstocks is a high priority. Agilent monomer and polymer GC/MS analyzers ensure the lowest possible trace impurity levels, and are backed by the application-specific knowledge of Agilent and our business partners.

### A complete portfolio for trace sulfur analysis

The Agilent 7890A GC can be equipped with our enhanced FPD – as well as our highly sensitive and selective 355 Sulfur Chemiluminescence Detector – to generate reliable results in a wide range of matrices.

### Detailed Hydrocarbon Analysis (DHA)

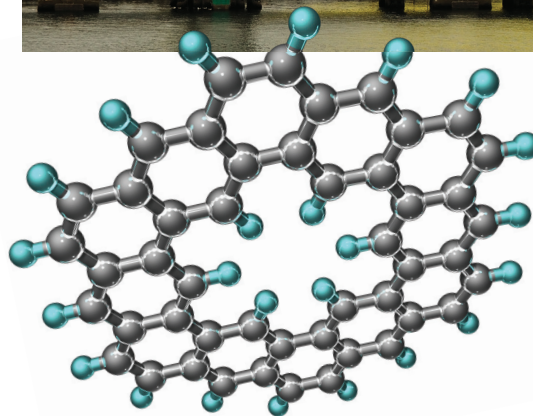
Choose this Agilent partner method when you need detailed information at the compound level.

### Ready-to-go biodiesel analyzers

Factory configured and chemically tested comprehensive solutions for biodiesel analysis configured per ASTM and CEN standards deliver the mission-critical results you need while saving you precious start-up time.

### Biogas analysis

Count on **Agilent 490 Micro GC Biogas Analyzers** for immediate gas analysis. They are factory tuned and come with final test data, analytical method parameters, user's manual, and check-out sample.



Agilent 490 Micro GC and 490-PRO Micro GC

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# GC and GC/MS Systems

## Agilent's 7890A GC takes your lab to a higher level of reliability, productivity, and confidence

If your lab still uses an "old workhorse" just because it gives you "acceptable results," perhaps it's time to consider the transformative business advantages of Agilent's state-of-the-art 7890A Gas Chromatograph.

The **Agilent 7890A GC** continues our tradition of performance while setting a new standard in technological innovation. It goes beyond "acceptable results" to give you increased productivity, safety, cost effectiveness, and environmental friendliness – all with greater precision and reliability than instruments past their prime.

- **Superior performance and reliability:** 5th-generation electronic pneumatics control (EPC) and digital electronics set a new benchmark for retention time locking (RTL) precision to facilitate chromatogram review and method transfer between instruments.

- **Higher productivity:** Faster oven cool down, robust backflush capability, advanced automation features and faster oven ramps let you get more done in less time, at the lowest cost per sample – all easily incorporated into your existing method.
- **Expanded chromatographic capabilities:** Capillary Flow Technology devices shorten analysis times and extend column life. An optional 3rd detector (TCD) can speed up complex gas analyses and allow more types of analyses to be run on a single GC.
- **Easier operation:** Powerful, chromatographer-friendly software simplifies method setup and system operation and minimizes training time. Practical, timesaving design features speed up and simplify routine maintenance.



### Agilent innovation spotlight

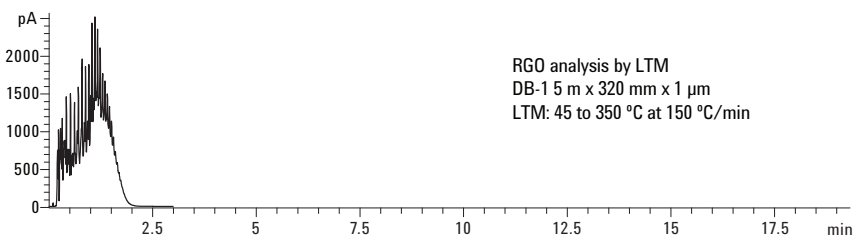
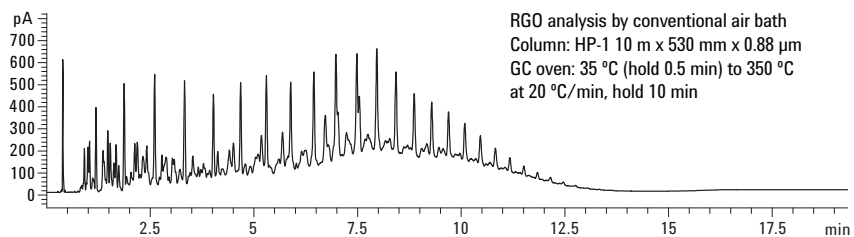
**1976:** Hewlett-Packard (now Agilent) introduces the world's first benchtop GC/MS (the HP 5992A), allowing mass spectrometry to be used as a routine GC detector.



*The Agilent 7890A GC equipped with the LTM Series II technology heats and cools the column very efficiently for significantly shorter analytical cycle times as compared to conventional air-bath GC oven techniques.*



## NGA, RGA analysis under 6 min, > 3 times faster



*The simulated distillation chromatograms for reference gas oil (RGO). The run time using LTM technology is about six times faster than conventional ASTM D2887 procedures while maintaining excellent agreement. [5990-3174EN Fast Hydrocarbon and Sulfur Simulated Distillation Using the Agilent Low Thermal Mass (LTM) System on the 7890A GC and 355 Sulfur Chemiluminescence Detector.]*



Agilent 6850 Series II GC

### Need a rugged system with a smaller footprint? Agilent's 6850 Series II GC is a confident choice

The **Agilent 6850 Series II GC** is an excellent single-channel workhorse for labs where bench space, ease-of-use, and independent channel flexibility are paramount. It features:

- **The proven capabilities** of Agilent's 6890N GC and 6890N inlets and detectors for outstanding routine performance
- **More configurations** to suit more of your analytical needs
- **Half the footprint** of a standard dual-channel GC, to conserve valuable bench space
- **Fast oven heat-up and cool-down** for reduced cycle times



Agilent 7820 GC

### Agilent's 7820 GC is an excellent value – and a robust choice for QA/QC analysis

Our user-friendly **7820 GC** is ideal for small- and medium-sized labs that are primarily concerned with routine analyses using standard GC methods. It provides a high return on your investment with features such as:

- **Electronic pneumatics control** and digital electronics
- **The proven capabilities** of Agilent inlets and detectors
- **Support** for a wide range of Agilent OpenLAB GC software
- **Fast access** to sequence information, instrument conditions, and run status
- **A simplified keypad** that minimizes operator error

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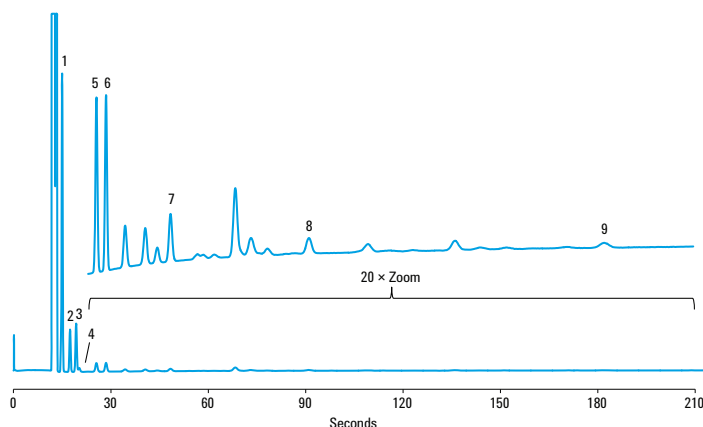
## Count on Agilent's 490 Micro GC for lab-quality results in the field

If you want the ability to measure anywhere and obtain the results you need quickly, the **Agilent 490 Micro GC** is your ideal choice. With its rugged, compact gas analysis platform, the 490 Micro GC generates more data in less time for faster, better decisions. Advantages include:

- **Maximum flexibility:** A full palette of options is at your disposal, including optimized sample conditioning, up to two sample inlets, and up to two carrier gases.
- **Easy operation:** With available autonomous operation, engineers and analysts can generate measurement results without special training or skills.
- **Ready to go on day one:** The 490 Micro GC is pre-configured and factory-tested for your specific analysis needs.
- **Modular construction:** Quickly reconfigure the instrument for new applications right in the field.



*When time is short – and determining the composition of gas mixtures is critical – Agilent's fifth-generation Micro GC delivers every time.*



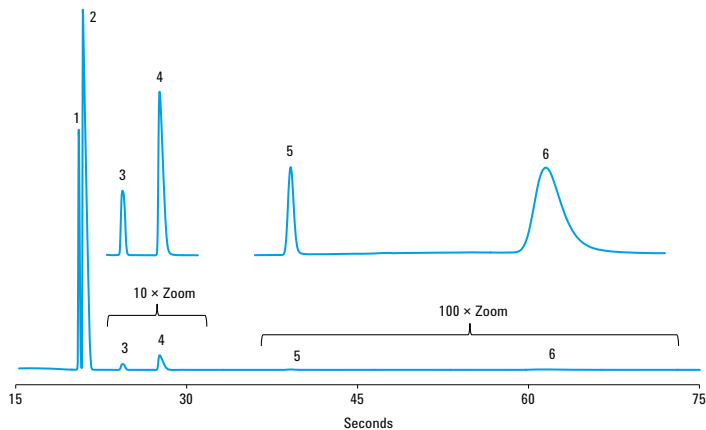
### Conditions

Column temperature 70 °C  
Carrier gas helium, 150 kPa  
Injection time 40 ms

### Peak identification

1. propane  
2. i-butane  
3. n-butane  
4. neo-pentane  
5. i-pentane  
6. n-pentane  
7. n-hexane  
8. n-heptane  
9. n-octane

*This chromatogram was generated on an Agilent 6-meter CP-Sil 5 CB column. Note that n-hexane eluted in less than 60 seconds, while n-octane eluted in just under 3 minutes. [5991-0275EN Fast Analysis of Natural Gas Using the Agilent 490 Micro GC Natural Gas Analyzer.]*



### Conditions

Column temperature 60 °C  
Carrier gas helium, 175 kPa  
Injection time 40 ms  
Backflush time 17 s

### Peak identification

1. composite air peak  
2. methane  
3. carbon dioxide  
4. ethane  
5. hydrogen sulfide  
6. propane

*Natural gas analysis using an Agilent PoraPLOT U column; the total analysis time was approximately 60 seconds. [5991-0275EN Fast Analysis of Natural Gas Using the Agilent 490 Micro GC Natural Gas Analyzer.]*

From lab work to field work...

## Fresh answers for challenging applications

### Capillary flow Deans Switch enhances selectivity for 2-D gas chromatography

A Deans Switch is a practical, cost-effective way to allow precise, 2-dimensional GC analysis.

Here's how it works: Peaks of interest from one column are "cut" onto a second column with a different stationary phase. Compounds that might co-elute with analyte on the first column are separated from analyte on the second column.

Agilent has improved the performance of a Deans Switch pathway using cutting-edge Capillary Flow technologies:

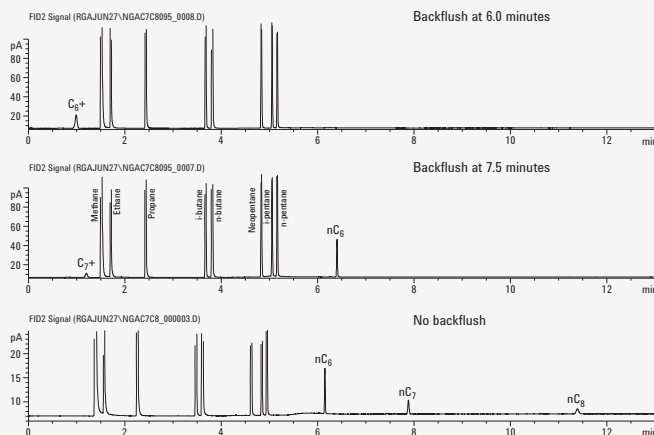
- Optimized plumbing for capillary chromatography
- Low thermal mass tracks and fast oven temperature programs
- New column connectors with leak-free metal ferrules
- Precise electronic pressure controls and flow calculation software

### Shorten run time and reduce the need for column changes through backflush

Backflushing (reversing column flow immediately after the last compound of interest has eluted) eliminates the need for long, high-temperature bake-outs. Instead, retained sample components are swept backwards through the column and out the split vent – keeping the column cleaner, while reducing the time and expense of frequent column changes.

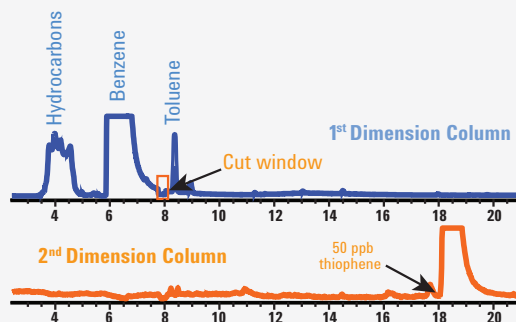


### Comparison of three light hydrocarbon chromatograms (on FID channel) with different backflush times



*Varying the backflush time allows you to shorten run times by selecting only the hydrocarbons of interest, while sweeping out heavier compounds beyond your selected range. [5989-7437EN Parallel GC for Complete Refinery Gas Analysis.]*

### FID analysis for trace Thiophene in Benzene using heart-cutting 2-D chromatography



*Outstanding analytical precision: Here, FID analysis completely resolved the peak for quantitation at ppb levels.*

## The Agilent 5975C Series GC/MSD: Maximum performance for routine and sophisticated analysis

This new generation of the world's most popular GC/MS combines productivity-boosting design features with advanced analytical capabilities to help you achieve better results, faster.

- **Inert ion source:** Delivers enhanced response for active compounds and late eluters. Programmable up to 350 °C.
- **Synchronous SIM/Scan mode:** Selectively monitor for ions of interest at high sensitivity SIM while simultaneously acquiring spectra at scan rates up to 12,500 u/sec.
- **Trace Ion Detection:** This unique noise reduction algorithm delivers the lowest limits of detection (LOD) and improved spectral matches.

*For speed and transportability, choose the  
**Agilent 5975T LTM GC/MSD***

This transportable system delivers lab-quality GC/MS performance wherever you need it. It features LTM technology for rapid heating and cooling, consumes less power, and supports ALS, HS, TD, P&T, TSP and CTS samplers.

## Simplify and accelerate your R&D processes

*Our most powerful trace analysis system  
**Agilent 7000B Triple Quadrupole GC/MS***

You can rely on **Agilent's 7000B Triple Quadrupole GC/MS system** for extraordinary sensitivity and selectivity with day-after-day reliability. What's more, its inert ion source and Triple Axis Detector allow you to achieve femtogram-level detection limits.



*Agilent's 5975C Series GC/MSD is perfect for measuring trace-level contaminants or high-concentration components in complex samples.*



*Agilent 5975T LTM GC/MSD*



*Agilent 7000B Triple Quadrupole GC/MS*



### Agilent innovation spotlight

**1979:** Fused-silica capillary columns combine flexibility and chemical inertness, allowing high-resolution capillary GC to evolve into a mainstream technique.

### Flexible, sensitive, and affordable EI, CI, and MS/MS Agilent 240 Ion Trap GC/MS

Choose from a range of advanced ionization and scanning techniques to enhance selectivity and detection limits – keeping you in complete control of your analysis.

**240 Ion Trap GC/MS** puts the power of EI, CI, and MS/MS behind your analysis with unmatched full scan sensitivity. These compelling ionization and scanning techniques can be conveniently accessed even during the same run.



*More choices, more conclusive compound identification. Agilent's 240 Ion Trap GC/MS systems give you excellent sensitivity, a wide linear range, and reliable qualitative and quantitative results.*

### Minimize false positives and confidently analyze targets and unknowns

**Agilent 7200 Q-TOF GC/MS** redraws the boundaries of GC/TOF technology by combining the separation power of Agilent's 7890A GC with the high resolution and accurate mass performance of a Q-TOF mass spectrometer. The 7200 allows you to confidently meet your toughest analytical challenges.



Agilent 7200 Q-TOF GC/MS

### Four levels of H<sub>2</sub> safety features are built into the Agilent 5975C Series GC/MSD

GC/MS systems operating in hydrogen mode are often faster – and provide greater resolution – than those operating in helium mode. More important than speed, however, is *safety*, which is why we designed the following features into our 5975C Series GC/MSD:

<b>Safety Shutdown</b>	Shuts off the inlet valve and oven heater when the set point is not met within a reasonable amount of time. This prevents explosions caused by column breakage near the inlet.
<b>Flow-limiting Frit</b>	Limits the inlet flow if the valve fails while in an open position.
<b>Oven ON/OFF Sequence</b>	OFF sequence holds the cooling flap half open while a circulating fan purges four oven volumes of air before turning on the heater. This extra level of protection prevents an explosion if the previous safety features fail.
<b>Explosion Test</b>	Eliminate flying parts in the highly unlikely event that an explosion does occur.

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## Beyond the box:

# A full portfolio of columns and supplies from the world GC leader

As the world's leader in gas chromatography, Agilent is uniquely positioned to offer the widest selection of industry leading GC columns, supplies, and sample prep tools. All are engineered or selected by our experienced design teams, manufactured to our demanding specifications and tested under a variety of strict conditions. So Agilent's entire consumable portfolio ensures a lifetime of peak performance for your instrument and maximum productivity in your lab.

### Agilent J&W GC columns for the energy and chemical industry

- **Agilent J&W Packed GC columns** are designed and manufactured to offer excellent and reproducible performance for all sample types associated with packed column separations, most important in the hydrocarbon processing industry. Column-to-column reproducibility and efficiency is ensured, while UltiMetal treated stainless steel tubing improves inertness and peak shape performance.
- **Agilent J&W Select Low Sulfur columns** address the particular needs of petrochemical chemists who require lower detection limits for the analysis of hydrogen sulfide (H<sub>2</sub>S), carbonyl sulfide (COS), and methyl mercaptan in light hydrocarbon streams such as propylene and natural gas.
- **Agilent J&W PLOT PT GC columns** are the only columns with particle trapping technology on *both ends* – enabling worry free operation, even when using backflush applications or GC/MS.
- **Agilent J&W DB-624 UI** is the column of choice for industrial solvent analysis. These columns are optimized for fast analysis of volatile compounds, and are ideal for chemical samples with unknown components. Our unique deactivation process enhances peak shape, improving signal-to-noise levels and increasing sensitivity for qualitative and quantitative analysis.
- **Agilent J&W HP-PONA and CP-Sil PONA CB** provide high resolution analysis of paraffins, olefins, naphthalenes and aromatics in complex hydrocarbon mixtures. These columns are engineered for detailed hydrocarbon analysis according to ASTM.

### Agilent supplies and accessories for your gas chromatography needs

- **Consistent, high quality gold seals** ensure a smooth, reproducible surface, eliminating leaks from machining grooves than can result in column bleed
- **Premium non-stick septa** are plasma coated to eliminate chemical bleed and contamination from foreign substances
- **Vespel/graphite ferrules** provide leak free connection between column and injector
- **A wide assortment of inlet liners** made to strict dimension specifications for optimal inlet performance
- **Gas clean filter systems** that ensure the highest quality gas while keeping gas lines clean and leak free

### The best data begins with the best sample prep

**Bond Elut silica and polymeric SPE sample preparation products** allow you to *efficiently and quantitatively* extract the analytes you're looking for from any sample matrix. So you can ensure accurate, reproducible results right from the start.



## The Agilent 7693A Series Automatic Liquid Sampler: A powerful combination of productivity and flexibility

How did we improve on the most popular GC sample introduction system ever? We started with what we've learned throughout our nearly 40 years of GC leadership – and built from there.

**Agilent's 7693A Automatic Liquid Sampler (ALS)** is a complete redesign of our 7683B ALS, the long-time industry leader. The system takes advantage of today's latest technology to deliver even greater reliability, performance, and flexibility.

- **Dual simultaneous injection** saves time by doubling your sample throughput
- **Fast-injection technology** minimizes needle discrimination and sample degradation, while ensuring the best possible peak shape

- **Modular design** works seamlessly with all currently available benchtops
- **Self-aligning "plug and play" injector** mounts in seconds, and can easily be moved from one inlet to another – or transferred between GCs when workloads change
- **Greater solvent capacity** (>20 mL), plus the ability to load up to 150 samples, means longer unattended operation

Whether you have hundreds of samples, or just a few, the 7693A system gives you sample handling and injection capabilities that are best-in-class.



*The Agilent 7693A Series ALS builds on the proven Agilent autosampler technologies that have worked reliably for the energy and chemical industry in the past, including dual simultaneous fast injection.*



### Agilent innovation spotlight

**1984:** Electronic pneumatics control (EPC) revolutionizes gas chromatography, making it easy for analysts to set pressures and flows, keep setpoints constant from run to run, and achieve excellent retention time reproducibility.

To learn more about Agilent energy and chemical technologies and applications, visit [www.agilent.com/chem/energy](http://www.agilent.com/chem/energy)

# LC and LC/MS Systems

## Agilent 1200 Infinity Series LC Systems: *Infinitely better separation power, resolution, and sensitivity*

Whether you need a “workhorse” LC system for routine analysis or a sophisticated, high-resolution LC/MS system, the Agilent 1200 Infinity Series has what you’re looking for. This comprehensive portfolio of configurable systems fits your demands for uncompromising chromatographic performance – while also fitting the demands of your budget.

### 1220 Infinity LC: *Infinitely more affordable*

This high-quality, integrated system is well suited for routine HPLC and advanced UHPLC analysis, giving you maximum return on your R&D investment.

- Agilent quality at a highly affordable price
- HPLC and UHPLC compatible
- 600 bar and high-speed 80 Hz detector
- Integrated design with 1260/1290 technology

### 1260 Infinity LC: *Infinitely more confident*

The **Agilent 1260 Infinity LC** raises the standard of analytical HPLC with new levels of productivity, data quality, and robustness.

- 600 bar and high-speed 80 Hz detector
- Up to 10x higher sensitivity
- 100% compatible with HPLC and UHPLC
- UHPLC performance at an HPLC price

### 1290 Infinity LC: *Infinitely more powerful*

With its speed, resolution, and sensitivity, **Agilent’s 1290 Infinity LC** is the last word in chromatographic performance for R&D applications. It is also our most flexible system.

- Emulates other HPLC and UHPLC systems
- Connects to most non-Agilent software
- Broad power range – up to 1200 bar



Agilent 1290  
Infinity LC

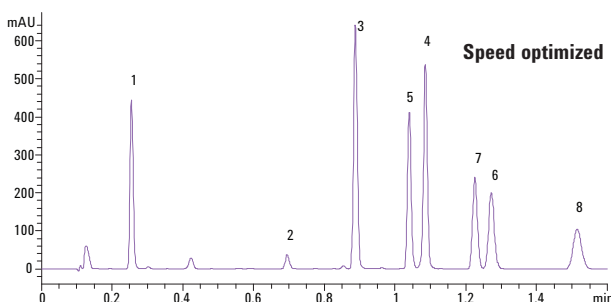
Agilent 1260  
Infinity LC

Agilent 1220  
Infinity LC

### Fast, specific additive analysis in polymer samples

Polymer additives must be introduced in precisely the right amounts; too little will cause the polymer to perform poorly, while too much will cause your profitability to suffer. Agilent’s 1260 Infinity LC lets you rapidly monitor process lines to ensure proper feed rates – or to gather intelligence on additives used in competitive products.

### Separation of antioxidants in smaller particle size columns with recalculated methods



**In less than 2 minutes, the Agilent 1260 Infinity LC performed this analysis of eight typical polymer additives.** [5989-5849EN Fast Analysis of Phenolic Antioxidants and Erucamide Slip Additives in Polypropylene Homopolymer Formulations Using 1200 Rapid Resolution Liquid Chromatography (RRLC) with Rapid Resolution High Throughput (RRHT) Columns and Method Translator.]

Compound	Conditions
1 Tinuvin P	Sample: Standard mixture, 200 µg/mL in isopropanol
2 Erucamide	Mobile phase: A: water; B: ACN
3 Irganox 3114	Temperature: 50 °C
5 Vitamin E	Wavelength: 200 nm
4 Irganox 1010	Injection volume: 6.7 µL
7 Irganox 1076	Column: ZORBAX Eclipse XDB-C8 3.0 mm x 100 mm, 3.5 µm
6 Ox Irgafos 168	Mode: Speed optimized
8 Irgafos 168	Flow rate: 4.00 mL/min
	Pressure: 460 bar
	Gradient slope: 3.1%
	Analysis time: 1.6 min



## The Agilent 6100 Series Quadrupole LC/MS: Better sensitivity, selectivity, and spectral information

From routine QC to research and development, **Agilent's 6100 Series Single Quadrupole LC/MS systems** deliver unmatched analytical performance and proven reliability.

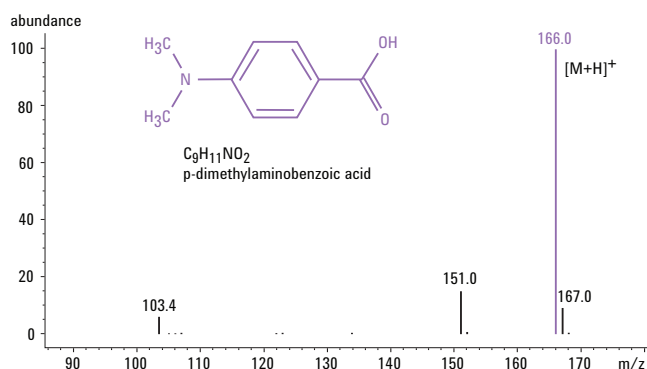
- **High acquisition speeds** let you take full advantage of today's high-throughput fast chromatography
- **Ultrafast ion polarity switching** lets you obtain both positive and negative spectra, so you can derive maximum information from a single injection
- **Faster injection-to-injection cycle time** – less than 10 seconds – lets you run more samples per hour
- **Variable-energy, in-source, collision-induced dissociation (CID)** provides valuable structural information
- **Multi-signal capability** lets you analyze more compounds per run
- **Comprehensive automation features** allow multi-user, "walk-up" sample submission and unattended operation

In addition, Agilent 6100 Series LC/MS systems can easily be upgraded to keep pace with your future requirements.



**Faster answers, maximum confidence.** The 6100 LC/MS platform allows you to rapidly screen compounds, confirm molecular weights, purify and quantitate target compounds in complex mixtures, and identify impurities.

### Fast scanning improves impurity detection with fast chromatography



*This analysis of octyl-dimethyl-p-aminobenzoic acid (OD-PABA) on an Agilent 1200 Rapid Resolution LC and Agilent 6150 Single Quadrupole LC/MS found many possible impurities and degradants using 5400 u/s scanning. However, p-dimethylbenzoic acid, a known degradant of OD-PABA, was only seen clearly at 10,000 u/s. [5989-7871EN Agilent 6100 Series Single Quadrupole LC/MS Systems.]*

### Protect the quality of your data with Agilent column technologies for high-throughput LC and LC/MS

Agilent's ZORBAX Rapid Resolution High Definition (RRHD), Rapid Resolution HT (RRHT), and Poroshell 120 columns give you a variety of Fast LC choices to suit your application.

A wide range of ZORBAX selectivities supports high-performance LC/MS, and the ability to scale readily between column families helps you optimize every instrument in your workflow – from lab-to-lab, and around the world.



To learn more about Agilent energy and chemical technologies and applications, visit [www.agilent.com/chem/energy](http://www.agilent.com/chem/energy)



## OpenLAB

CAPTURE • ANALYZE • SHARE

*From collection and analysis... to interpretation and management*

## Agilent informatics support each step in your data's lifecycle

Data management tools have become an absolute necessity for managing the increasing complexity and volume of data produced by laboratory instruments. This is especially true when analyzing petrochemicals, alternative fuels, natural gas, or other chemical assays, because you must turn raw data into actionable information quickly.

Agilent's OpenLAB Software Suite helps your lab capture, analyze, and share results, while preserving and archiving intellectual property.

- **Agilent OpenLAB CDS (Chromatography Data System)** lets you control Agilent LC, GC, CE, CE/MS, and LC/MS instruments – along with chromatographic modules from more than 25 different manufacturers.
- **Agilent OpenLAB ELN (Electronic Lab Notebook)** is a web-based, electronic lab notebook that automates data capture, organizes results, and improves your ability to search and share scientific results – without jeopardizing intellectual property assets.
- **Agilent OpenLAB ECM (Enterprise Content Manager)** helps you manage scientific data, and provides a secure central repository for storing and organizing your lab's electronic data files.
- **The Agilent Professional Services Organization** is a global leader in systems integration consulting with decades of experience helping some of the world's leading Chemical Analysis companies.



### Agilent innovation spotlight

**2004:** Agilent's Capillary Flow Technology makes GC in-oven flow manipulation routine by simplifying setup, lowering dead volume, and preventing leaks – even at high temperatures.

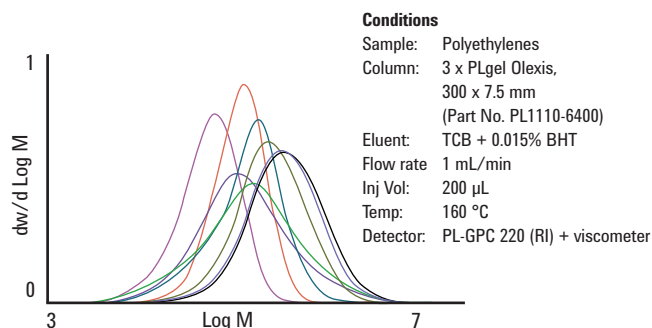
# GPC/SEC tools for generating reliable data on polymer molecular weight distribution

*Agilent PL-GPC 220 integrated GPC/SEC system*  
**Provides molecular weight distribution data to guide your product development**

Molecular weight distribution plays a large role in determining a polymer's physical and rheological properties. Generally, higher molecular weight leads to better performance, while a higher distribution width (polydispersity) lowers performance, but simplifies processing.

**Agilent's PL-GPC 220 GPC/SEC** system is designed to run almost all polymer, solvent and temperature combinations, ensuring excellent chromatographic performance across a wide operational temperature range (30 °C to 220 °C).

## Molecular Weight Distributions of Polyolefins



*Here, Agilent's PL-GPC 220 (with PLgel Olexis columns) reveals true molecular weight distribution modalities across a range of polyolefins. Molecular weight distribution lets you see the differences in the polymers that you are producing, so you can select the right combination of performance and processability. [5990-6971EN Analysis of Polyolefins by GPC/SEC.]*



Agilent PL-GPC 220  
High Temperature GPC/SEC System

Agilent PL-SP 260VS  
Sample Preparation System

## Agilent PL-SP 260VS Sample Preparation System A wide range of temperatures and speeds for difficult polymer samples

Polyolefin sample preparation is time consuming, because of the high temperatures and heating times required to dissolve the sample. **The Agilent PL-SP 260VS**, designed for the manual dissolution and filtration of samples prior to GPC analysis, overcomes these challenges. The unit is user-selectable from speeds of between 85-230 rpm to avoid shear, and combines controlled heating across a temperature range of 30 °C to 260 °C with gentle agitation.



### Agilent innovation spotlight

**2005:** Agilent combines GC separation capabilities with the high sensitivity and selectivity of our 7500 Series ICP-MS. For the first time, it becomes possible to separate and quantitate ultra-trace levels of organometallic compounds.

To learn more about Agilent energy and chemical technologies and applications, visit [www.agilent.com/chem/energy](http://www.agilent.com/chem/energy)

# Sample Prep Automation

## Maintain the consistency of your samples and standards

*The Agilent 7696A Sample Prep WorkBench:*  
**A stand-alone instrument that automates your most tedious sample preparation steps**

Manual sample prep is time-consuming and inherently variable. Such inconsistency can lead to time-consuming rework, wasted supplies, and the lingering uncertainty that your samples are not prepared the way your protocols – or regulatory requirements – dictate.

**Agilent's 7696A Sample Prep WorkBench** eases these frustrations, giving you greater confidence in your sample prep by:

- Decreasing sample carryover
- Minimizing variability between analysts
- Reducing the need for costly rework
- Lowering health and safety risks

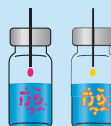


*The Agilent 7696A Sample Prep WorkBench is suitable for the most common HPLC, GC, LC/MS, and GC/MS applications.*

**Sophisticated automation** ensures that your sample prep meets the standards of your high-quality workflow.



**Dilution, aliquoting, and reconstitution**



**Reagent and standard addition**



**Spin-vortex mixing**



**Liquid/liquid extraction**



**Bar code reading**



**Flexible sample tray heating and Peltier cooling**

## CASE STUDY: How advanced automation capabilities minimized analyst-to-analyst variability, accelerated sample prep, and reduced rework for biodiesel analyses

### The problem:

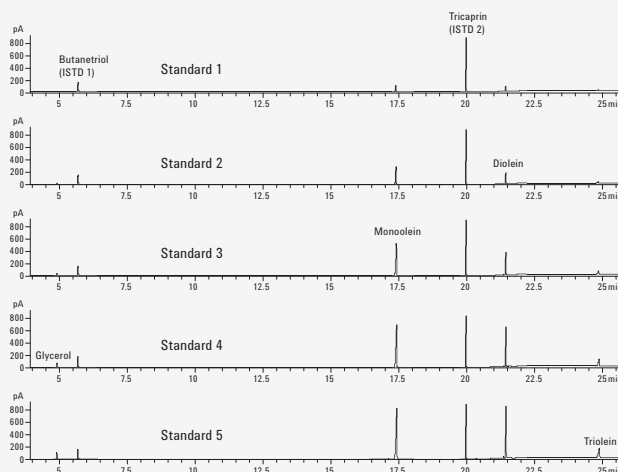
Analyzing free and total glycerin in biodiesel involves complicated, time-consuming sample preparation – *plus* five multi-component calibration solutions, two internal standards, and a derivatization step. Person-to-person variability is also a concern, because several bench chemists must run this analysis.

### One lab's solution:

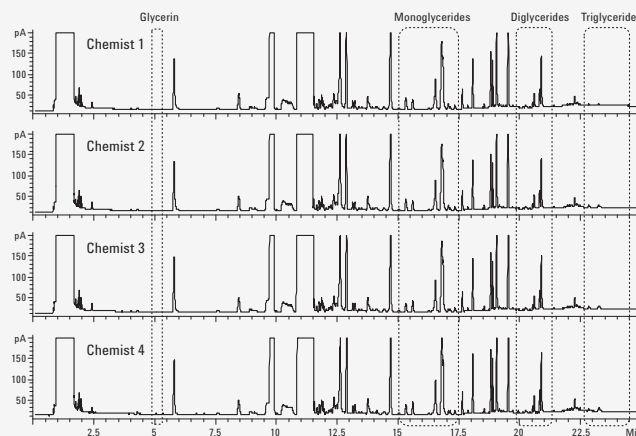
The lab team used the built-in capabilities of **Agilent's 7696A Sample Prep WorkBench** to automate the preparation of calibration standards, standards addition, derivatization, and sample injection.

The benefits were immediate and dramatic: Elimination of analyst-to-analyst variability, shorter analysis times, and a *90% reduction* in solvent and waste costs. Operator exposure to harmful reagents was also minimized, and rework became a thing of the past.

In addition, the automated standard preparation resulted in a 5-level calibration for glycerol, monoolein, diolein and triolein with two internal standards, as you can see in the chromatograms on the right.



*This five-level ASTM D6584 calibration was automatically prepared using the Agilent 7696A Sample Prep WorkBench, and run on the Agilent 7890A Biodiesel GC. [5990-3781EN Automated Standard and Sample Preparation for Multiple Gas Chromatographic Analyses of Biodiesel.]*



**Consistent, precise results from technician to technician:** Here you see the excellent reproducibility obtained by four different chemists with no prior biodiesel experience. [5990-7525EN Automation of a Complex, Multi-Step Sample Preparation using the Standalone Agilent 7696A WorkBench.]

# Molecular Spectroscopy

## Innovative, easy-to-use technologies for real-world challenges

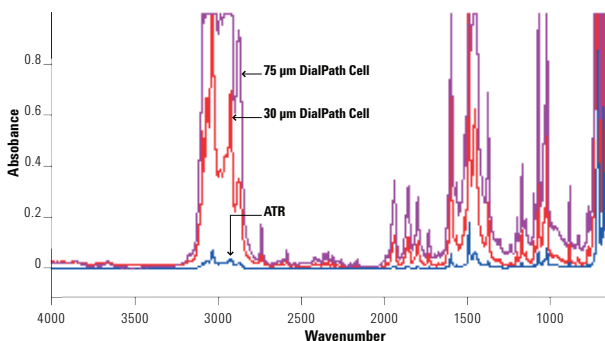
Fourier-Transform Infrared spectroscopy (FTIR) is the preferred technique for identifying unknown materials coming into the lab, because of its ability to analyze functional groups and produce a unique spectroscopic “fingerprint.” This workhorse technique has many QA/QC applications, including:

- Controlling additive and co-monomer content during production
- Multi-component product analysis of FAMEs (fatty acid methyl esters) in biodiesel
- Materials verification for QA/QC
- Reverse engineering of competitive products
- Identification of unknown materials and contaminants
- Determination of oil in water using ASTM methods

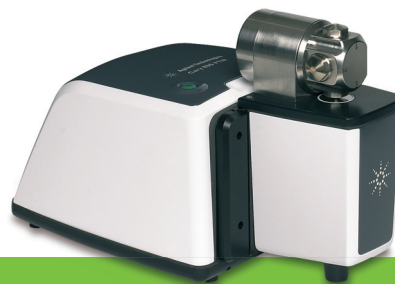
### Agilent Cary 630 FTIR

#### Quality answers – when you need them

With its wide range of sample interfaces and high-performing optics, the compact Agilent Cary 630 FTIR gives you accurate results, *fast*. Its innovative, intuitive, and reliable spectrometer provides superior quantitative and qualitative information for routine analysis of solids, liquids, and gases.



**Chemical analysis made fast and easy:** Spectra of toluene measured on the Agilent Cary 630 FTIR using the diamond ATR and DialPath at 30 and 75 µm shows the range of sensitivity available for a broad range of applications. [5990-8570EN Agilent Cary 630 FTIR Spectrometer.]



Agilent Cary 630 FTIR

### Three steps to analysis with the DialPath

**1** Ensure the crystal is clean



**2** Place your sample on the window



**3** Turn the DialPath to your required pathlength to analyze



**Agilent's 5500 Series FTIR:**  
**Robust performance in a compact design**

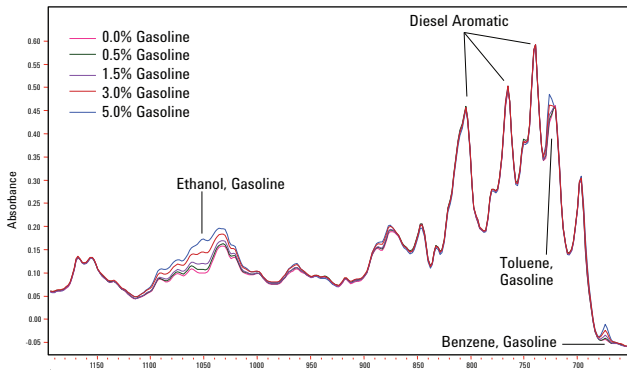
From clear, sharp optics... to innovative sampling interfaces... to intuitive software... the **Agilent 5500 Series FTIR Spectrometers** are designed to provide great results on liquid and solid samples faster and more easily than ever before.



Agilent's 5500 Series FTIR equipped with TumbIR liquid sample analysis technology

**Rapid measurement of gasoline in diesel fuel**

Gasoline contamination in diesel fuel is a growing problem as diesel and alternative biodiesel blends increase in popularity. The Agilent 5500t FTIR Spectrometer has been shown to accurately measure gasoline in diesel fuel from 0.025-100%.



A comparison between the infrared spectra of gasoline and diesel, highlighting the ethanol and aromatics in gasoline.

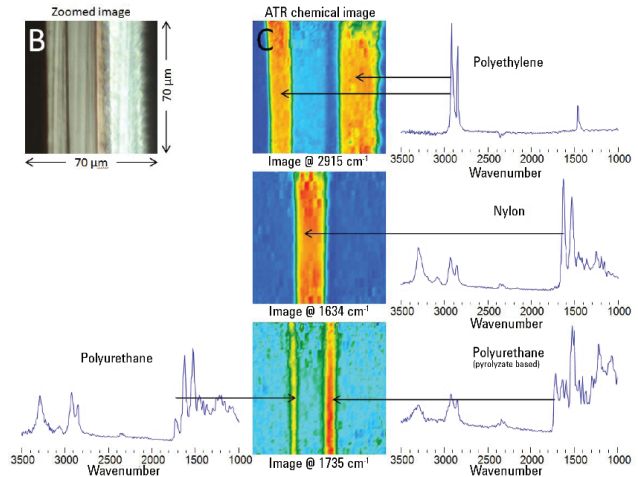


Agilent's Cary 600 Series FTIR

**Agilent's Cary 600 Series FTIR:**  
**Versatile and precise for routine and research applications**

The **Agilent Cary 600 Series FTIR** gives you enhanced source throughput, beamsplitter and detector efficiencies, and reduced instrument noise. The result is up to *four times greater* sensitivity than any other research FTIR.

The spectrometers can be coupled to single point and mapping microscope systems as well as complete chemical imaging systems based on IR Focal Plane Array (FPA) detectors for the ultimate in chemical spatial distribution measurements.



**Micro ATR chemical imaging of a polymeric laminate using the Agilent Cary 620 FTIR chemical imaging system.** Note how the three main layers are clearly identified: a 16-micron thick layer of nylon sandwiched between two layers of polyethylene, 11 (20 microns in thickness). Polyurethane tie (adhesive) layers as thin as 2 microns were also identified. [5990-7999EN A New Approach To Sample Preparation Free Micro ATR FTIR Chemical Imaging Of Polymer Laminates.]



**Agilent innovation spotlight**

**2007:** Agilent launches the 7890A GC platform. Its unique design reliably manipulates the capillary flow inside the GC oven, increasing productivity and enabling new applications.

To learn more about Agilent energy and chemical technologies and applications, visit [www.agilent.com/chem/energy](http://www.agilent.com/chem/energy)

## Lab-quality FTIR – to go

### Agilent 4500 Series Portable FTIR Spectrometers Reliable answers at the sample site

These lightweight, portable analyzers support your site analysis of incoming materials and outgoing finished products. Their optics are designed for reliability in non-lab environments, while their innovative sampling interfaces and fit-for-purpose software give you reliable data for liquid and solid samples.



Agilent 4500 Series Portable FTIR Spectrometer

### Agilent 4100 ExoScan FTIR Your 3.2 kg powerhouse

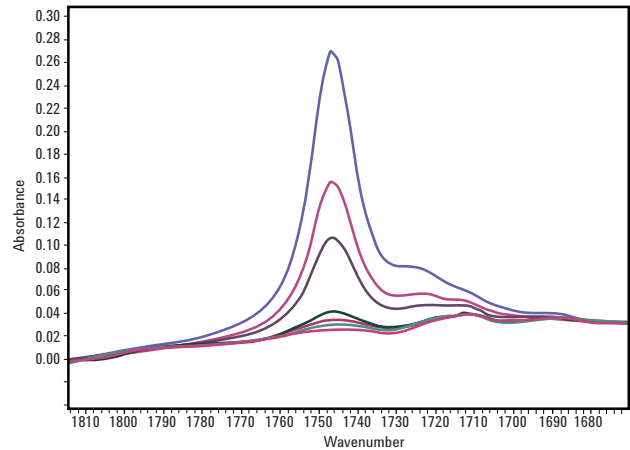
Whether you're taking your samples to the lab for FTIR analysis or taking the analyzer to your samples, **Agilent's 4100 ExoScan FTIR** lets you perform non-destructive analysis of solids and liquids. Its rugged, miniature interferometer with large diameter optics and short internal optical path produces results that are as good – or better – than conventional FTIR spectrometers.



Agilent 4100 ExoScan FTIR

### Agilent 4200 FlexScan FTIR FTIR in the palm of your hand

Now you can conquer a host of previously impossible field-based FTIR applications. **The 4200 FlexScan FTIR** splits essential functions into two modules: the optics module (interferometer and sampling interface) fits comfortably in your hand, while the power module (battery and system electronics) is hooked to your belt or suspended from a shoulder strap. This makes it more comfortable to analyze objects that are either complex in shape, or that require numerous measurements over a large area.



Both blending and contamination of biodiesel in diesel fuel is a growing concern; portable methods are required to certify diesel fuel at remote locations. Agilent's 4500t portable FTIR spectrometer provides detection of biodiesel down to 0.025%, 2x lower than the closest IR based method. Shown here are absorbance spectra of 0%, 0.025%, 0.05%, 0.1%, 0.5%, 0.8% and 1.5% (v/v) biodiesel in diesel focusing on the characteristic absorbance at 1745 cm<sup>-1</sup>.



## Produce superior spectral data with the renowned line of Cary spectrophotometers

UV-Vis and UV-Vis-NIR spectroscopy are widely used in today's research and QA/QC laboratories, due to their powerful quantitation capacity and broad sampling flexibility, which can accommodate solids, liquids, and gases.

### Agilent Cary 6000i UV-Vis-NIR (175-1800 nm)

With high-sensitivity, narrow-band InGaAs detection for improved linearity, the **Cary 6000i** is the ultimate tool for samples that vary in signal intensity across the wavelength range.

### Agilent Cary 5000 UV-Vis-NIR (175-3300 nm)

The **Cary 5000** combines PbSmart technology with unparalleled optical design and performance to extend its NIR range to 3300.

### Agilent Cary 4000 UV-Vis-NIR (175-900 nm)

This precise, consistent spectrometer sets a high standard for photometric noise, range, and linearity, providing excellent resolution across the UV-Visible spectrum.

### Agilent Cary 300 UV-Vis-NIR (190-900 nm)

The **Cary 300 double-beam UV-Vis**, has a working range past 6.0 Abs and resolution better than 0.24 nm. It is a research-grade instrument with a pre-monochromator, making it ideal for analyzing highly absorbing solids.

### Agilent Cary 100 UV-Vis-NIR (190-900 nm)

This double-beam UV-Vis, with a working range past 4.0 Abs, is suitable for routine and research laboratory work.

### Agilent Cary 60 UV-Vis-NIR (190-1100 nm)

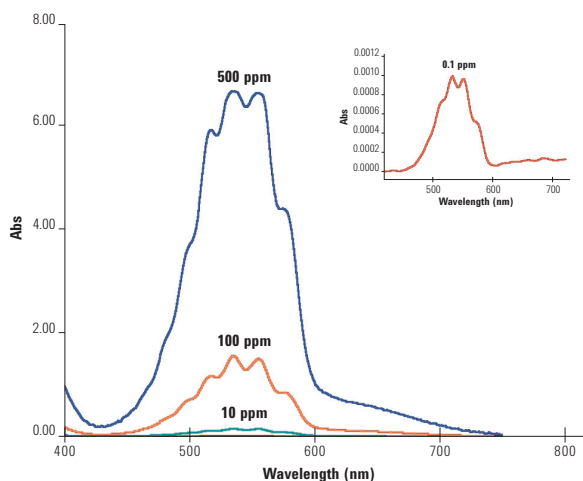
Take advantage of the benefits of Xenon flash lamp technology. The Cary 60 has a super concentrated beam making it ideal for fiber optic work, and its room light immunity means you can work with the sample compartment open.



Agilent Cary 5000 UV-Vis-NIR



Agilent Cary 300 UV-Vis-NIR



**Quantitative analysis of aqueous potassium permanganate, demonstrating excellent photometric accuracy and range. Measurement at 555 nm permits analysis from 0.1 to 500 ppm without dilution. [5990-7786EN Agilent Cary 4000/5000/6000i Series UV-VIS-NIR Spectrophotometers.]**



### Agilent innovation spotlight

**2008:** ExoScan, the world's first handheld FTIR system with lab-quality performance, is introduced, making a new range of applications amenable to FTIR analysis.

To learn more about Agilent energy and chemical technologies and applications, visit [www.agilent.com/chem/energy](http://www.agilent.com/chem/energy)

# Atomic Spectroscopy

## Setting a higher standard for quantitative elemental analysis

Agilent's atomic spectroscopy portfolio is productive, user-friendly and reliable, allowing you to extend your performance and output boundaries, for applications such as:

- Na and K in FAMES
- Pb and Mn in unleaded gasoline
- Wear metals in used oils
- Additives (such as Ba, Ca, Mn and Zn) in lubricating oils
- Major elements in polymers
- Ni, V, Fe and Na in crude oil
- Trace metals in engine oil

### *Agilent 55B AA Spectrometer*

#### **An entry-level system with advanced capabilities**

**Agilent's simple to operate 55B AA** is designed for corrosive environments. It features an integrated software interface, LCD screen, and dedicated keyboard for simple, stand-alone operation. And when your needs change, you can easily add an external PC and SpectrAA Worksheet software to upgrade to a PC-controlled system.

### *Agilent 240 AA Spectrometer*

#### **A rugged, reliable double-beam system**

**Agilent's true double-beam 240 AA** system features a high level of automation and multi-tasking software that allows you quickly develop new methods.

**Agilent's 240FS and 280FS** are the world's fastest, most productive flame AA systems, with fast sequential capabilities that ensure high performance and lower running costs. Fast sequential measurements for all elements in a single analysis means that you don't have to waste time repeatedly aspirating samples. This cuts analysis time in half, reduces sample waste and saves on labor and operating costs.



*Agilent 55B with SIPS accessory*



#### **Agilent innovation spotlight**

**2009:** The Agilent 1290 Infinity LC System enables faster performance with the industry's largest analytical power range to date.

*Agilent 240Z/280Z AA Zeeman Dedicated GFAA*  
**Productive and precise with accurate background correction**

Graphite furnace AA is ideal for ppb level determinations of heavy metals such as Pb and Cd. **Agilent's 240Z/280Z AA spectrometers** combine Constant Temperature Zone (CTZ) furnace design with full-wavelength Zeeman background correction to perform at ppb levels, along with high sensitivity, superior matrix handling capabilities, and freedom from interferences.

*Agilent 4100 MP-AES*

**Say goodbye to flammable, expensive gases**

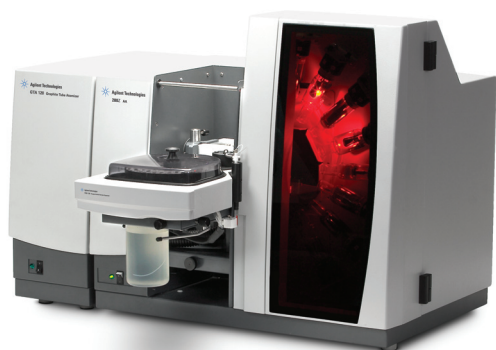
The **Agilent 4100 Microwave Plasma-Atomic Emission Spectrometer** is the most significant advance in atomic spectroscopy in decades. It runs on air, which means your lab can perform unattended, multi-element analyses while eliminating costly, dangerous gases and improving lab safety.

In addition, the External Gas Control Module (EGCM) accessory creates a robust plasma for analyzing a range of challenging organic samples such as gasoline, diesel, biodiesel, ethanol, and lubricating oils.

**Measured results versus certified values for NIST SRM 1085B run on the Agilent 4100 MP-AES**

Element & wavelength (nm)	Measured (mg/kg)	Certified (mg/kg)	Recovery (%)
Fe 259.940	314.7 ± 0.3	301.2 ± 5.0	104
Mn 259.372	289.9 ± 0.2	300.7 ± 2.0	96
Cd 226.502	290.9 ± 2.9	302.9 ± 5.1	96
Cr 276.653	305.2 ± 0.1	302.9 ± 3.9	101
Si 251.611	295.7 ± 1.9	300.2 ± 5.0	99
Ni 305.081	291.6 ± 0.1	295.9 ± 7.4	99
Cu 327.395	300.9 ± 0.1	295.6 ± 8.5	102
Ag 328.068	308 ± 0.2	304.6 ± 8.9	101
Pb 283.305	296.1 ± 0.1	297.7 ± 6.8	99
V 310.229	287.6 ± 0.1	297.8 ± 4.6	97
Ti 323.452	293.9 ± 0.1	301.1 ± 2.9	98
Sn 303.411	295.3 ± 0.3	299.4 ± 4.8	99
Mo 319.398	296.9 ± 0.1	300.6 ± 3.2	99
Al 396.152	291.7 ± 0.2	300.4 ± 9.3	97
Na 589.592	297.4 ± 0.1	305.2 ± 7.0	97

*Measured results versus certified values for NIST SRM 1085B run on the 4100 MP-AES. Note the excellent agreement between the MP-AES measured results and certified values. [5990-8753EN Analysis Of Wear Metals And Contaminants In Engine Oils Using 4100 MP-AES.]*



Agilent 280Z AA



Agilent 4100 MP-AES

To learn more about Agilent energy and chemical technologies and applications, visit [www.agilent.com/chem/energy](http://www.agilent.com/chem/energy)

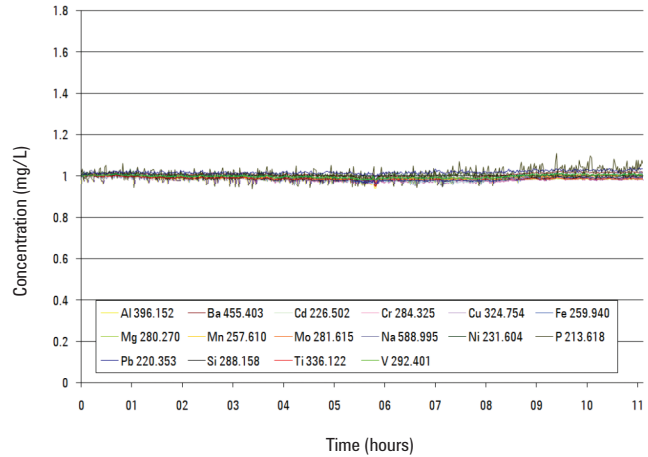
*Agilent 700 Series ICP-OES systems*  
**Single- to sub-ppb detection limits. Superior sample throughput and matrix tolerance.**

With over 6,000 ICP-OES systems worldwide, Agilent's 700 Series ICP-OES RF generator is field-proven, robust, and consistently provides stable and accurate results, even with the most challenging samples.

The CCD detector used in Agilent's 700 Series ICP-OES provides full wavelength coverage, giving you complete flexibility to measure the correct wavelength for an element – regardless of the concentration range or sample matrix complexity.

**Agilent's 700 Series ICP-OES systems** provide outstanding value with uncompromised performance for routine, high-throughput analyses. Powerful software features, such as Multical, provide the dynamic range you need to simultaneously and accurately determine major, minor, and trace elements in one sample.

**1 ppm spike in ShellSol run over 11 hrs**



*The Agilent 700 series ensure stable analytical results even with organic solvents such as ShellSol. [5990-8340EN Evaluation of a novel nebulizer using an inductively coupled plasma optical emission spectrometer.]*

*Agilent 7700 Series ICP-MS systems*  
**Advancing ICP-MS technology. Simplifying trace metals analysis.**

The robust **Agilent 7700x ICP-MS** is the “workhorse” instrument of choice for most applications. The 7700e is suitable for everyday applications where a high degree of automation is required; even novice operators will quickly produce consistent, reliable results using features such as Expert Pre-Set Methods and context-sensitive help.



*The Agilent 7700x ICP-MS provides unparalleled accuracy in high-matrix samples, redefining cell performance in Helium mode with a revolutionary 3rd generation cell design – the ORS<sup>3</sup>.*

*Agilent 8800 ICP-QQQ*  
**The world's first ICP Triple Quadrupole**

The **Agilent 8800 ICP-QQQ** is a unique instrument that provides applications capabilities and research opportunities never possible before. It maintains the proven capabilities of Agilent's 7700 Series ICP-MS, and also offers unrivaled performance with higher sensitivity, lower backgrounds, and flexibility with a range of unique and powerful modes of operation to deliver even higher performance for difficult applications.



*The Agilent 8800 ICP-QQQ*

# Magnetic Resonance

## Agilent 400-MR-DD2

### Sample-to-answer NMR for research and development

The **Agilent 400-MR-DD2 system** is your instrument of choice for fast, reliable NMR analyses in a compact footprint. Its push-button operations, straightforward processing, and data export capabilities, make the 400-MR your best option for compound detection, quantification, and structure confirmation.

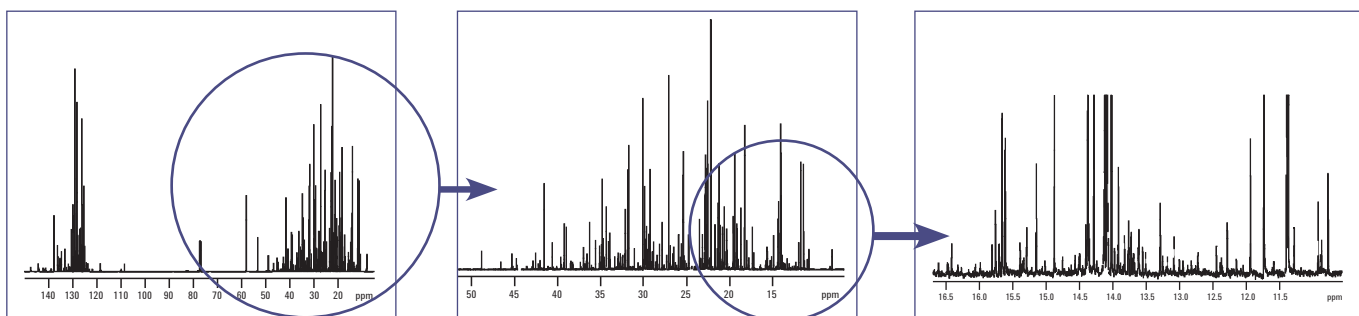
- **DirectDrive electronic architecture** precisely captures RF and gradient events, and provides total pulse programming control. Demanding data acquisition sequences with numerous selective excitation events (such as Hadamard NMR) can be achieved with push-button ease.
- **DirectDigital receiver system** makes quadrature detection obsolete by reproducibly delivering flat baselines and fewer artifacts *without extensive post-acquisition algorithms*. This unique receiver system also ensures reliable detection and quantitation of minor components in complex matrices with minimal sample preparation.
- **Advanced automation accessories**, including autosamplers and Agilent's proprietary OneNMR probe, enable you to take full advantage of the 400-MR's capabilities.

- **Easy-to-use VnmrJ 3 software** simplifies your compound detection, confirmation, and quantitation – including mixture analysis.

In addition, the Agilent 400-MR delivers outstanding cryogenic performance for longer stretches of uninterrupted uptime.



**Complete spectral analysis and interpretation.** The 400-MR gives you unmatched productivity for diverse applications by combining easy-to-use VnmrJ 3 software with the outstanding performance of DirectDrive 2 spectrometer architecture.



As compared to proton NMR, carbon spectra offer better spectral dispersion as each carbon is represented by a single, narrow line and the chemical shift range is large. This means that each carbon resonance is usually resolved, even in highly complex samples. The power of this technique is demonstrated in the figure above, showing the carbon NMR spectrum of gasoline. Inset is an expansion to show the detail that can be obtained.

To learn more about Agilent energy and chemical technologies and applications, visit [www.agilent.com/chem/energy](http://www.agilent.com/chem/energy)

# Specialty Instruments

## *Agilent SuperNova X-ray Diffractometer:* **Flexible, Dual-Source Single-Crystal X-ray Diffraction**

The **SuperNova** combines high flux Mo and Cu micro-focus X-ray sources with a high performance CCD detector in a self-contained, compact platform. Agilent's user-friendly CrysAlis<sup>Pro</sup> software will get the best from your data, with AutoChem automatically solving and refining structures in real time. From routine structure determination to specialist research applications, the SuperNova is the ideal multi-purpose system for chemical crystallography laboratories.



*Agilent SuperNova  
X-ray Diffractometer*

## *Agilent 5500 Atomic Force Microscope:* **Versatile, High-Resolution AFM**

The **Agilent 5500 AFM** is a powerful multi-user research system. In addition to atomic-scale resolution over a large scan range, its modular design makes it easy to add productivity-enhancing options. What's more, its intelligent design permits the simple integration of numerous imaging modes and easy-to-use, application-specific sample handling plates.



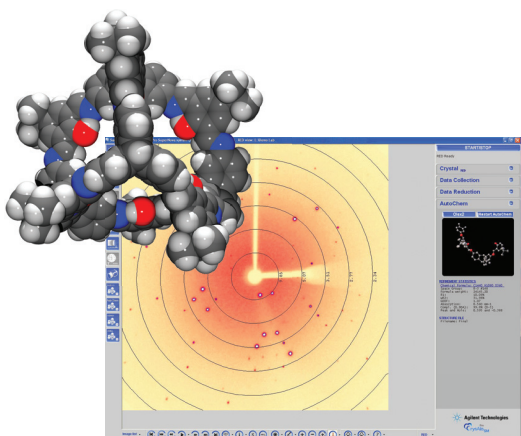
*Agilent 5500 AFM*

## *Agilent 8500 Field Emission Scanning Electron Microscope:* **Compact, Low Voltage, High Performance FE-SEM**

This innovative system is optimized for low-voltage imaging, extremely high surface contrast, and resolution typically found in a much larger, more expensive FE-SEM. About the size of a laser printer, the easy-to-install **8500** provides convenient plug-and-play performance. No dedicated facilities are required – only an AC power outlet.



*Agilent 8500 FE-SEM*



*Single crystal X-ray structure of an organic cage compound determined using an Agilent SuperNova. Large solvent voids and a particularly high surface area results in highly selective CO<sub>2</sub>/CH<sub>4</sub> adsorption.*



### **Agilent innovation spotlight**

**2010:** The acquisition of Varian – a company with more than 60 years of atomic spectroscopy innovation – expands Agilent's ICP-MS portfolio to include AA and ICP-OES instruments.

# Agilent Services

## Solve problems quickly, increase uptime, and optimize your resources

Whether you need support for a single instrument or a multi-lab, multi-vendor operation, Agilent helps ensure on-going lab performance while maximizing the value of your investment.

Our comprehensive **Service Plans** cover *both* Agilent and non-Agilent equipment, while our **Service Agreements** help you control costs, increase productivity, and access our global network of expert service professionals.

**Agilent Advantage Service and Support** – enables your lab to access the right level of expert maintenance needed to maximize the value of your Agilent equipment and meet your strategic objectives. Service levels include:

- **Agilent Advantage Gold** gives you the optimal mix of features to prevent downtime and secure the fastest response when on-site services are required.
- **Agilent Advantage Silver** provides the coverage you need to ensure reliable instrument performance and optimum workflow productivity.
- **Agilent Advantage Bronze** gives you the peace of mind that comes with knowing you are fully protected against costly repairs and extended instrument downtime.

**CrossLab Instrument Services** – help you manage the servicing of every instrument in your lab, *regardless of manufacturer*.

**CrossLab Enterprise Tools and Processes** – optimize working environments, manage instrument portfolios, and maximize productivity.



### Agilent Service Guarantee

If your Agilent instrument requires service while covered by an Agilent Service Agreement, we guarantee repair or we will replace your instrument for free. No other manufacturer or service provider offers this level of commitment to keeping your laboratory running at maximum productivity.

### The more you trust your instruments, the more you can trust your results

At Agilent, we believe that our customers define reliability with the products and services they put their trust into. That's why all Agilent instruments are designed and manufactured to meet or exceed international standards for dependability, ruggedness, long life – and safety

*“Reliability cannot be achieved by adhering to detailed specifications. Reliability cannot be achieved by formula or by analysis. Some of these may help to some extent, but there is only one road to reliability. Build it, test it, and fix the things that go wrong. Repeat the process until the desired reliability is achieved. It is a feedback process and there is no other way.”*

– David Packard, 1972

To learn more about Agilent energy and chemical technologies and applications, visit [www.agilent.com/chem/energy](http://www.agilent.com/chem/energy)

# Agilent's quality control process ensures that every Agilent product works – and keeps working

For starters, a typical Agilent chemical analysis product goes through 3,600 hours of quality testing and 26,000 hours of life testing during development.

But we don't stop there. Our products must also pass over 150 quality production inspections. And they are shipped with a specially designed checkout sample so performance can be verified after installation.

In addition, all Agilent products designed must pass 58 rigorous safety tests that cover electrical, fire, mechanical, chemical, fluid pressure, acoustic, and explosive hazards – including:

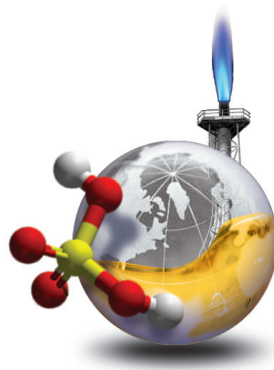
- Environmental tests under extreme conditions such as:
  - 0 °C to 50 °C operating temperature; -40 °C and 70 °C storage temperature
  - 5% to 95% RH non-condensing humidity
  - 0 to 15,000 feet (4.6 km) altitude
- Transportation and vibration tests – including a 50 g six face drop test

- Powerline tests that simulate conditions such as brownouts, voltage spikes, and surges
- Radio frequency immunity and emissions testing
- Magnetic immunity and emissions testing

All tests are conducted at Agilent's Hardware Test Center network, which supports our design and manufacturing sites throughout the world. So no matter where your instrument was built, you can be certain it was designed with reliability, performance – and safety – in mind.

## Agilent Value Promise

We guarantee you at least 10 years of instrument use from your date of purchase, or we will credit you with the residual value of the system toward an upgraded model.



## For more information

To learn more about Agilent Energy and Chemical Solutions, visit us online at [www.agilent.com/chem/energy](http://www.agilent.com/chem/energy)

In the U.S. and Canada, call toll free: **1-800-227-9770, option 3, then option 3 again**

In other countries, please call your local Agilent Representative or Agilent Authorized Distributor – visit [www.agilent.com/chem/contactus](http://www.agilent.com/chem/contactus)

This information is subject to change without notice.

