Agilent LTM System for GC and GC/MS

Faster analytical cycle times, higher productivity.

Direct, rapid heating and cooling for faster, more productive GC and GC/MS

Agilent Low Thermal Mass (LTM) technology meets the demand for faster GC analyses and higher sample throughput. By providing dramatically faster temperature ramp rates, as well as independent temperature control of up to four column modules on a single GC, LTM technology shortens GC cycle times and makes it easier to deal with more difficult analytical challenges. Integration with Agilent Capillary Flow Technology can greatly reduce column maintenance and provide significant new capabilities in multi-dimensional and comprehensive GC analyses. And as an added benefit, the LTM system consumes far less power than a conventional GC platform.

LTM techniques are ideal for high throughput GC or GC/MS applications and for labs requiring the fastest possible sample turn-around. LTM technology's benefits extend across a wide range of industries and applications, including:

- Environmental
- Food Safety
- Forensics
- Chemical and Petroleum Processing
- Flavors and Fragrances
- Pharmaceutical

Our measure is your success.

Basic Principles: How LTM provides faster analytical cycle times

LTM technology combines standard, fused silica capillary GC columns with separate heating, temperature sensing and insulating elements to form a modular gas chromatographic system. Without the thermal mass of GC oven walls and door, the LTM system heats and cools the column extremely efficiently, much faster than a conventional air-bath GC oven.

Direct heating of a capillary column allows ramp rates of up to 1800˚C/min; achievable rates depend on column mass, configuration and column void times. Fast cooling—less than one minute for some configurations—further accelerates analytical cycle times.

Because the system provides precise, uniform heating, retention time repeatability is comparable to conventional GC.

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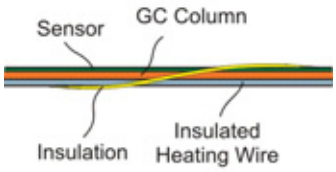
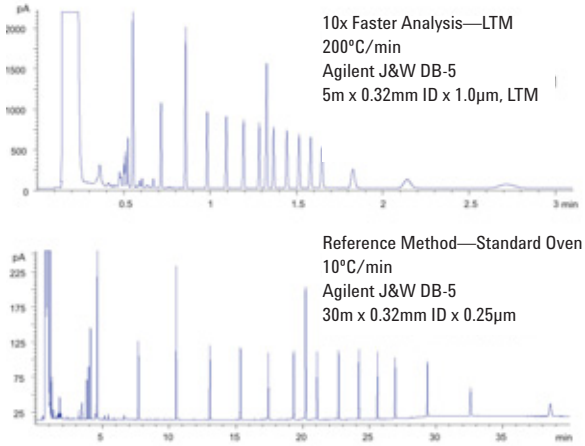
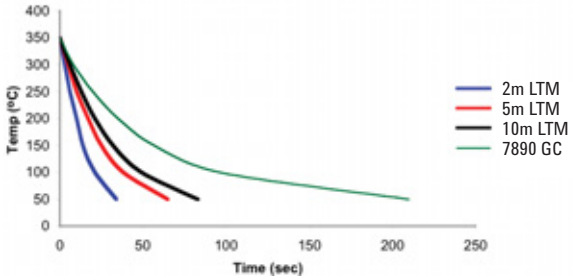


The key to LTM technology: *weaving direct heating and temperature sensing components around standard fused-silica capillary column (up to 30 meters) for rapid heating and cooling.*



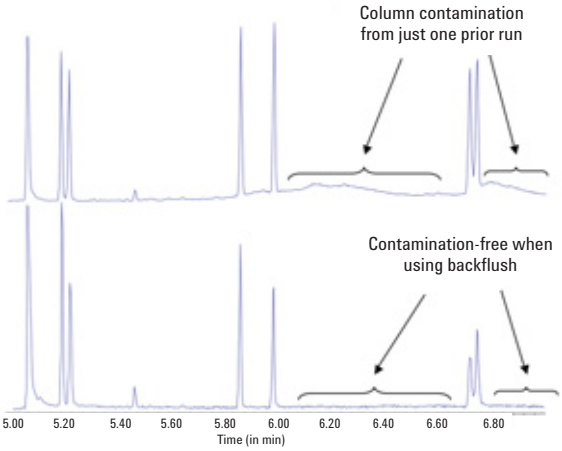
LTM vs. conventional GC*—Traditional run time for typical alkane standard of 40 minutes is reduced to less than 3 minutes utilizing the LTM system's accelerated ramp rates (200˚C/min) and a shorter column.*



Typical cooling times *for standard (5-inch) LTM column modules of typical lengths are significantly faster than a conventional GC oven.*

Maximizing column life

When analyzing samples such as extracts of food or soil, an LTM column module can be easily protected by backflushing high boiling sample contaminants using a purged Capillary Flow Technology device. The easy-to-implement backflushing technique delivers multiple benefits for LTM analyses—including reduced potential for carryover and longer column life, as well as shorter analysis times.



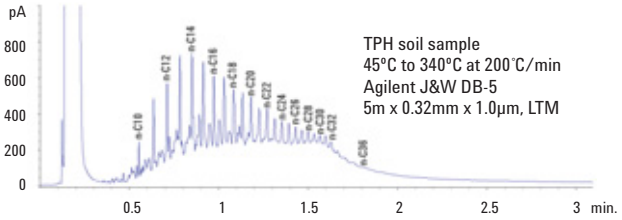
Backflushing. *In this polynuclear aromatic hydrocarbons (PAH) analysis by LTM/GC/MS, the upper chromatogram shows that even after one run, soil extracts can contaminate the column, causing baseline increases that affect subsequent runs.*

In the bottom chromatogram, backflushing helps to keep the column contamination-free. In addition, run times are reduced by avoiding the bake-out times normally required to remove these contaminants that elute after the last peak of interest.

For a more in-depth look at the Agilent LTM System, visit agilent.com/chem/LTM

Environmental, Food Safety and Forensics

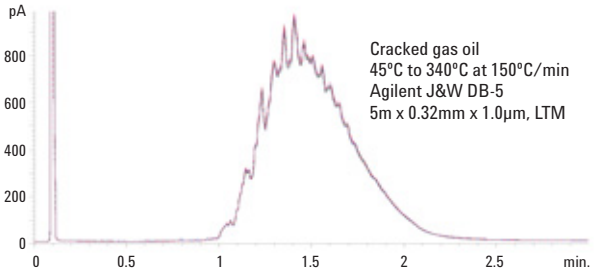
The rapid thermal cycling of LTM technology is ideal for labs where faster cycle times can reduce the cost per analysis. And where rapid response is critical—in food safety and forensic applications, for example—LTM technology ensures the fastest analytical turnaround times.



Total petroleum hydrocarbon (TPH) soil sample, ~1000µg/mL. *Run time for this environmental analysis of 40 minutes is reduced by 10x to less than 3 minutes—with resolution and quantitation comparable to traditional methods. (1)*

Petroleum and Chemical Processing

Certain QA analyses—Simulated Distillation, for example—lend themselves to batch analysis. LTM's shorter analytical cycle times allow more samples per shift and allow critical process decisions to be made in a more timely manner.

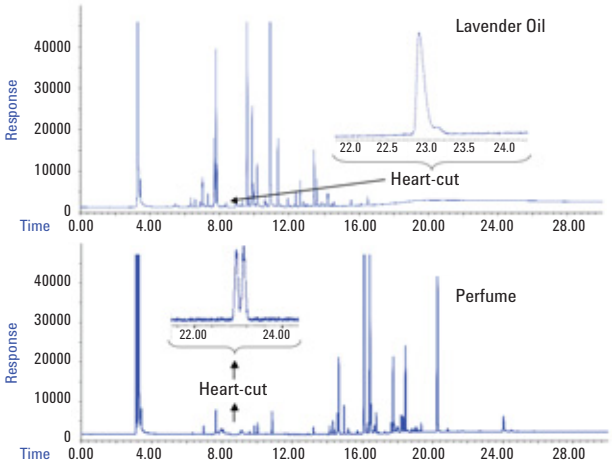


Fast simulated distillation of cracked gas oil in less than 3 minutes *— 6x faster than conventional ASTM D2887 GC procedure—using a temperature ramp of 150°C/min. Chromatographic overlay of 10 runs shows outstanding repeatability. (2)*

2D multi-dimensional analyses using LTM and Capillary Flow Technologies

The Agilent LTM system, when coupled with Agilent's Capillary Flow Technology Deans Switch or Flow Modulator, opens the door to significant new capabilities in multi-dimensional GC or GC x GC, respectively.

Chiral separations, for example, are most effective at low temperatures. However, analysis of analytes in complex samples usually requires a broad temperature program to separate target compounds from background and to elute highly retained components. In addition to lower chiral selectivity, most chiral columns exhibit high bleed and decreased lifetimes at elevated temperatures. A traditional column (in the GC oven or an Agilent LTM column module) is used to separate target compounds from sample background and to heart-cut target compounds to a chiral column in an Agilent LTM module operating at a lower temperature. Optimal chiral separations are achieved while decreasing analysis cycle times and increasing chiral column lifetime.



Chiral analysis of linalool in fragrance samples. *The primary column (Agilent J&W HP-5ms 30m x 0.25mm x 0.25µm) was programmed from 70° to 250°C. A heartcut , utilizing an Agilent Capillary Flow Technology Deans Switch, of unresolved linalool was done at ~8 min (~150°C) to an Agilent J&W Cyclodex-B 30m x 0.25mm x 0.25µm column operating at 80°C. The top chromatogram inset is the chiral column signal from a natural lavender oil analysis; it shows basically one peak for linalool, indicating that it is from a natural source. The inset in the bottom chromatogram for the analysis of a perfume shows an equal amount of enantiomers (a racemic mixture)—indicating that it was from a synthetic source. (3)*

(1) 5990-3201EN: Ultra-Fast Total Petroleum Hydrocarbons (TPH) Analysis with Agilent Low Thermal Mass (LTM) GC and Simultaneous Dual-Tower Injection

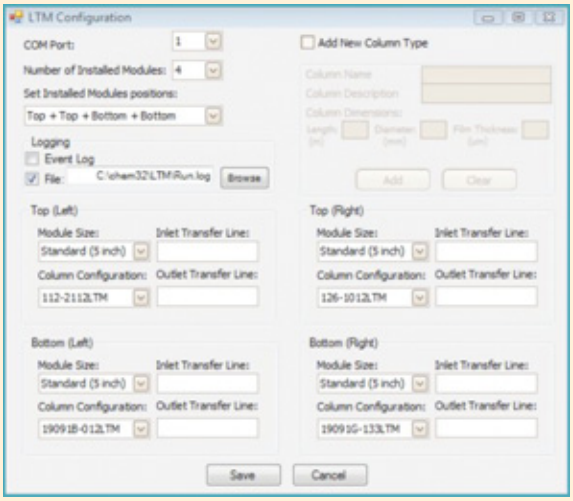
(2) 5990-3174EN: Fast Hydrocarbon and Sulfur Simulated Distillation Using the Agilent Low Thermal Mass (LTM) System on the 7890A GC and 355 Sulfur Chemiluminescence Detector

(3) 5990-3428EN: Independent Column Temperature Control Using an LTM Oven Module for Improved Multidimensional Separation of Chiral Compounds

Agilent LTM System for GC and GC/MS

The Agilent LTM System consists of a replacement door for your Agilent 7890A or 6890 GC. The system can include built-in electronics and slots for operating up to four LTM column modules, each of which can be independently temperature-programmed. You can continue to use your existing injectors and detectors and you can still use your GC in conventional mode without uninstalling the LTM door. Our industry-leading Agilent J&W column phases are available as LTM column modules including Wall Coated Open Tubular (WCOT) and Porous Layer Open Tubular (PLOT) columns.

The LTM system can be software-controlled, or it can be operated via an easy-to-use keypad control interface. Because it uses the same injectors, detectors, and fused silica capillary columns (up to 30m in length), LTM technology requires little change to your existing methods. And with Agilent's Method Translation Software, any changes will be easy to optimize.



***Agilent LTM Control software** integrates with specific Agilent software platforms, including GC and GC/MS ChemStation, and allows the user to enter control setpoints and save methods for one to four LTM column modules mounted on a given GC.*

For more information

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