IMPROVE ANALYTICAL PERFORMANCE FOR POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

The Measure of Confidence

Agilent Enhanced PAH Analyzers with Self-Cleaning Ion Source

Polycyclic Aromatic Hydrocarbons (PAHs) are toxic, and possibly carcinogenic; therefore, they must be closely monitored at trace levels. While not active or subject to degradation, PAHs readily adhere to surfaces because of their "sticky" nature. They are also difficult to analyze, because they span a wide range of molecular weights and boiling point ranges. In addition, peak tailing is common with late-eluting PAHs – leading to time-consuming manual peak integration.

Confidently test for PAHs to help ensure the safety of food, water, and soil

Pre-configured and chemically tested for PAH analysis in environmental and food samples, **Agilent GC/MS and GC/MS/MS Enhanced PAH Analyzers** reduce method development, start-up, and analytical cycle time. That means your team can focus on method validation and real-world results immediately after installation.

Each Analyzer features a patented **Self-Cleaning Ion Source**, which uses a specially engineered flow control to introduce a small amount of hydrogen directly into the MS source concurrent with data acquisition. This reduces PAH desublimation, keeping the source clean from run-to-run – and giving you the benefits of improved peak shape for late-eluting compounds, better calibration curve linearity, and consistent internal standard response.

Agilent Enhanced PAH Analyzers include patented, innovative technology and reflect our stringent quality control process. Systems include:

Factory

- System configuration and leak testing
- Instrument checkout
- Installation of appropriate column
- Factory-run chemical checkout using application specific checkout mix

Delivery

- Instrument manual for running the method
- CD-ROM with method parameters and data files for easy out-of-the-box operation
- Application-related consumables included – no separate ordering required
- Easy consumables re-ordering information

Installation

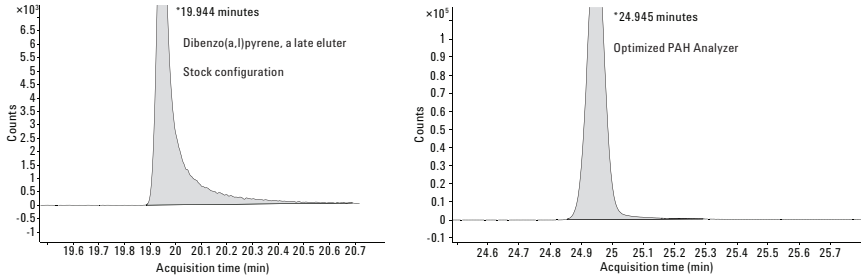
- Duplicate factory checkout with checkout sample onsite by factory-trained support engineer
- Optional application startup assistance

Agilent Technologies

Better analytical performance yields more stable results

Excellent peak shape

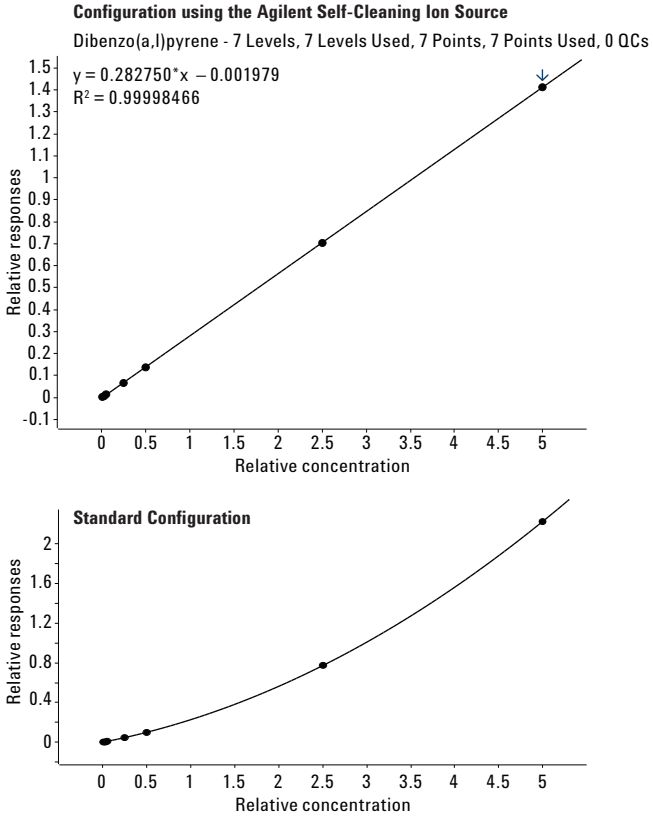
Peak tailing increases the need for manual data processing, leading to longer analysis times and reduced sample throughput. Agilent Enhanced PAH Analyzers with Self-Cleaning Ion Source deliver excellent peak shape for better integration, quantitation, and reproducibility.



PAH analysis performed on a stock configuration vs. an Enhanced PAH Analyzer with Self-Cleaning Ion Source. Note the improvement in peak shape for Dibenzo (a,l) pyrene – a late-eluting PAH.

Calibration curve linearity

With operating parameters optimized for PAH applications, GC/MS and GC/MS/MS analyzers configured with the Agilent Self-Cleaning Ion Source improve the linearity of your calibration curves.

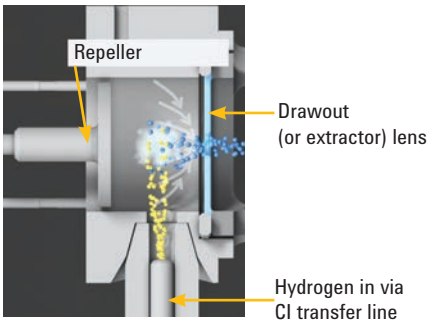


	Initial data R^2	CCM R^2
Naphthlene	0.9982	0.9999
1-Methyl naphthalene	0.9981	1.0000
2-Methyl naphthalene	0.9977	1.0000
1,2-Dimethyl naphthalene	0.9974	1.0000
1,6-Dimethyl naphthalene	0.9976	1.0000
Acenaphthylene	0.9975	0.9999
Acenaphthene	0.9983	1.0000
Fluorene	0.9976	1.0000
Phenanthrene	0.9972	0.9999
Anthracene	0.9959	0.9999
2-Methyl phenanthrene	0.9846	0.9999
2-Methyl anthracene	0.9846	0.9999
1-Methyl phenanthrene	0.9969	1.0000
3,6-Dimethyl phenanthrene	0.9851	1.0000
2,3-Dimethyl anthracene	0.9648	0.9999
Fluoranthene	0.9978	0.9999
9,10 Dimethyl anthracene	0.9726	1.0000
Pyrene	0.9846	1.0000
1-Methyl pyrene	0.9927	0.9997
Benz (a) anthracene	0.9976	0.9998
Chrysene	0.9976	0.9999
6-Methyl chrysene	0.9690	0.9998
Benzo (k) fluoranthene	0.9954	1.0000
Benzo (a) pyrene	0.9576	1.0000
Dibenz (a,h) anthracene	0.9581	0.9999
Indeno (1,2,3-c,d) pyrene	0.9642	0.9999
Benzo (g,h,i) perylene	0.9965	1.0000
Dibenzo (a,l) pyrene	0.9788	1.0000

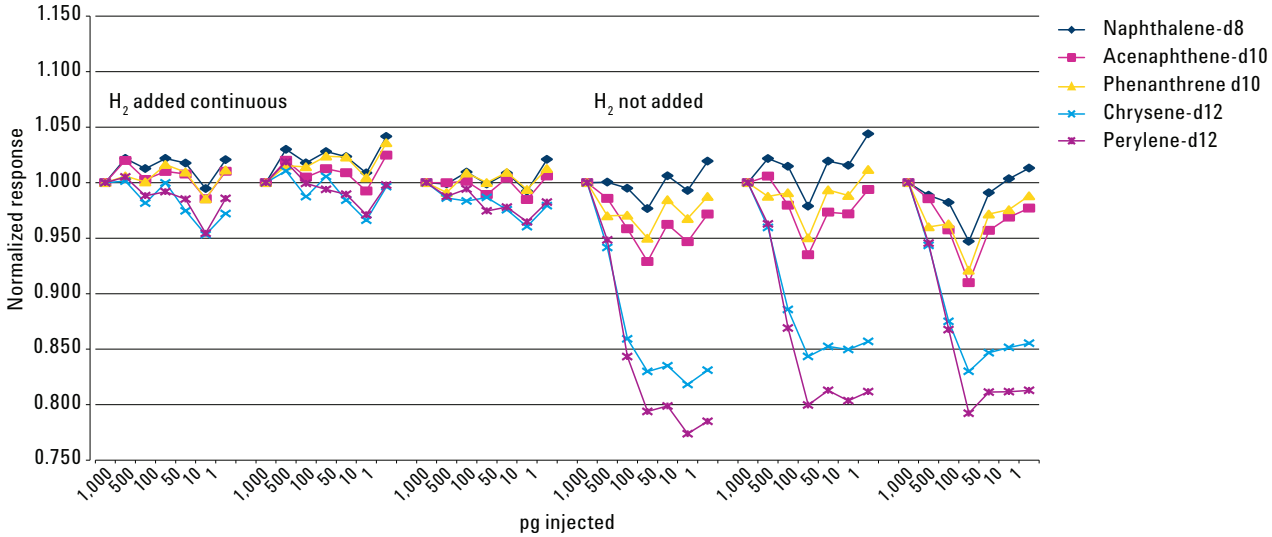
7-level calibration curve comparison for the latest-eluting PAH analyzed by GC/MS/MS. The Self-Cleaning Ion Source improved linearity for the calibration curve of Dibenzo (a,l) pyrene to R^2=0.99998. Correlation coefficients ranged from R^2=0.9997-1.0000 for all PAHs analyzed by the Enhanced PAH GC/MS/MS Analyzer.

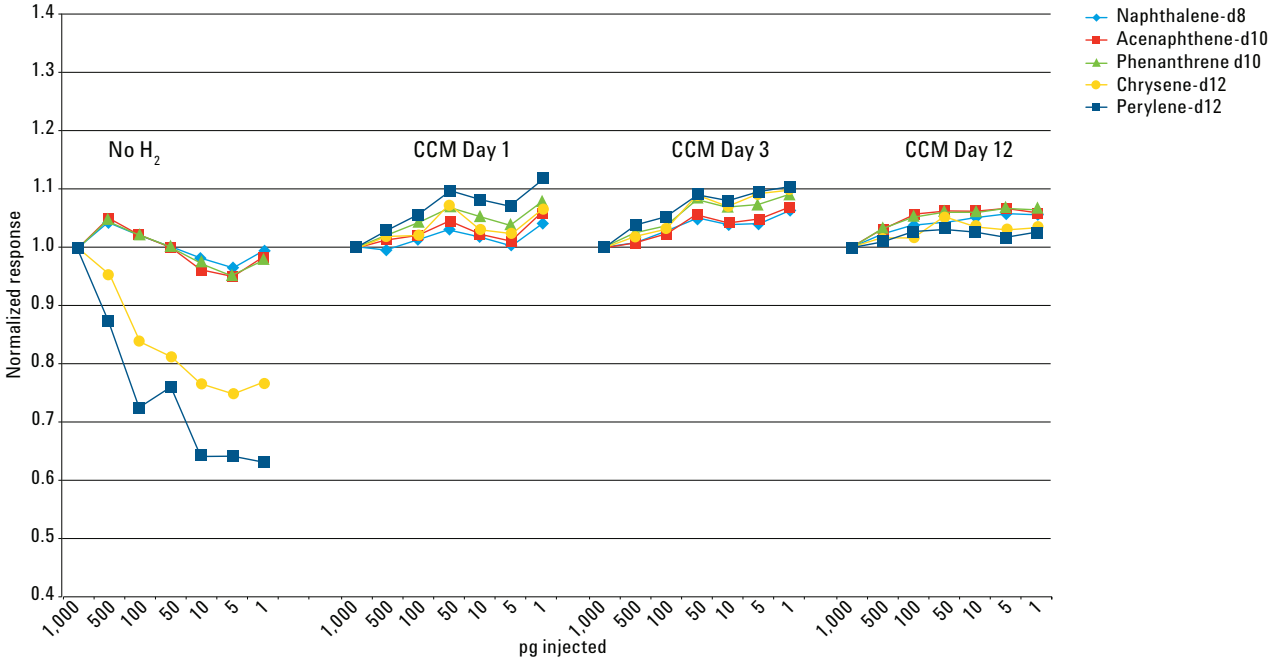
Stability of internal standard response factors

Inconsistent ISTD response across the calibration range makes accurate quantitation both difficult and dependent on the amount of other analytes in the sample. It can also lead to linearity that falls short of performance criteria for regulatory methods. GC/MS and GC/MS/MS systems optimized for PAH analysis – and equipped with the Self-Cleaning Ion Source – demonstrate substantial improvement in the consistency of ISTD response.



Normalized plot (highest to lowest) of ISTD response across a seven-level calibration of a 30 PAH mix with five ISTDs





With hydrogen addition to the source, ISTD responses for the GC/MS analysis improved from ±25% to within 5%. For GC/MS/MS analysis of PAHs, the addition of hydrogen improved ISTD RF from ±35% to within 8% – well within method reporting requirements.

Leverage these technological advances and start performing sensitive PAH analysis immediately after installation

Pre-configured analytical method, retention time locked with Capillary Flow Technology (CFT) backflush. CFT backflush promotes shorter analysis times, lower chemical background, longer column life, and less frequent source cleaning to improve uptime.

Self-Cleaning Ion Source introduces a low hydrogen flow continuously during data acquisition. This keeps the source clean from run to run, improving analytical results with:

- Greater dynamic range: on-column sensitivity ensures reproducible and linear calibration from 1-1000 pg
- Excellent calibration linearity with r^2 values of 0.999 – 1.0000 (compound specific)

Multimode inlet (MMI) lets you choose from several injection options, such as large-volume injection or cold splitless injection (for thermally labile compounds).

Productivity tools help you make the most of every analysis: Agilent Autotune, Batch-at-a-Glance data review, and parameter-less integrator streamline your data review and processing.

Ordering information:

- G3445B#421: Enhanced PAH Analyzer with Const. Flow; Post Col. BF Method by GC/MS/MS
- G3445B#456: Enhanced PAH Analyzer by GC/MS

Put your lab on the analytical fast track

Contact your local Agilent Representative or Agilent Authorized Distributor at **agilent.com/chem/contactus**

Or call **800-227-9770** (in the U.S. or Canada)

Visit **agilent.com/chem/appkits** for a description of available Analyzers and Application Kits

Printed in U.S.A., January 9, 2014
5991-3831EN

Agilent Technologies