

Fast, Efficient HPLC Analysis for Polynuclear Aromatic Hydrocarbons

Using Pinnacle II™ PAH Columns and New Restek Reference Materials

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- ✓ Pinnacle II™ PAH columns quickly and effectively resolve PAHs.
- ✓ All reference materials needed for US EPA Method 8310, 550.1, or 610.
- ✓ New calibration and quality control check mixes include 1- and 2-methylnaphthalene.

Polynuclear aromatic hydrocarbons (PAHs) are multiple ring structures found in fossil fuel products or as products of coal or oil combustion. Known mutagens and carcinogens, these compounds are monitored worldwide in drinking water, wastewater, soil, and hazardous waste. Methods for identifying and quantifying PAHs include GC with flame ionization detection and HPLC with ultraviolet or fluorescence detection. GC is the more sensitive technique, but interferences from other carbonaceous materials are a concern. HPLC combines suitable sensitivity with higher specificity.

The US Environmental Protection Agency (EPA) developed Method 8310, a reversed phase HPLC approach, for determining concentrations of target PAHs in groundwater and wastes. The method provides conditions for detecting PAHs at parts-per-billion levels. Water samples are extracted at neutral pH, using methylene chloride. Alternatively, aqueous samples may be extracted by a liquid-solid extraction technique, using cartridges or disks coated with a chemically bonded C18 organic phase. Solid waste samples are extracted using Soxhlet extraction (EPA Method 3540) or sonication extraction (EPA Method

3550). The extract is concentrated to 1mL and the solvent is exchanged to acetonitrile. For the analysis, EPA Method 8310 recommends a reversed phase HPLC column, making it consistent with EPA methods 550.1 and 610.

For some time, Restek has offered reference mixes of 16 target PAHs in several alternative combinations of solvent and analyte concentration. We now have a calibration mix and a quality control check mix of 18 PAHs that can be used with EPA Method 8310—or with EPA Method 550.1 or EPA Method 610. In addition to the 16 PAHs listed in these methods, we include 1-methylnaphthalene and 2-methylnaphthalene in the two new mixes: many of our customers must resolve these two additional compounds, and they are included in Florida PAH methodology. We prepare these mixes in acetonitrile, an appropriate solvent for HPLC analysis for PAHs. Solubility of some of the target PAHs is limited in acetonitrile, so we prepare the stock calibration solution at 500µg/mL, the highest concentration possible using acetonitrile as the diluent. We also offer decafluorobiphenyl as a surrogate, as recommended in EPA Method 8310. (Continued on pg. 8.)

Figure 1 Baseline resolution of 18 PAHs in less than 18 minutes, using a Pinnacle II™ PAH column.

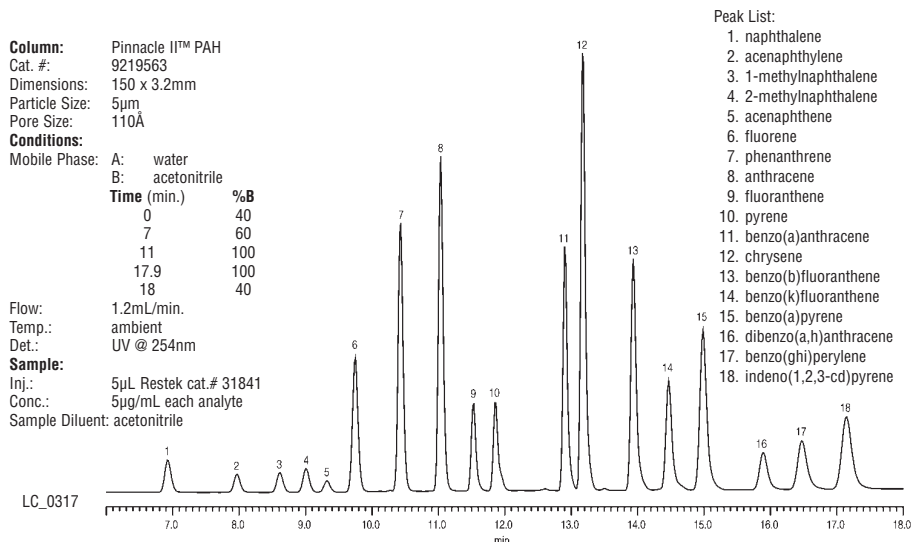
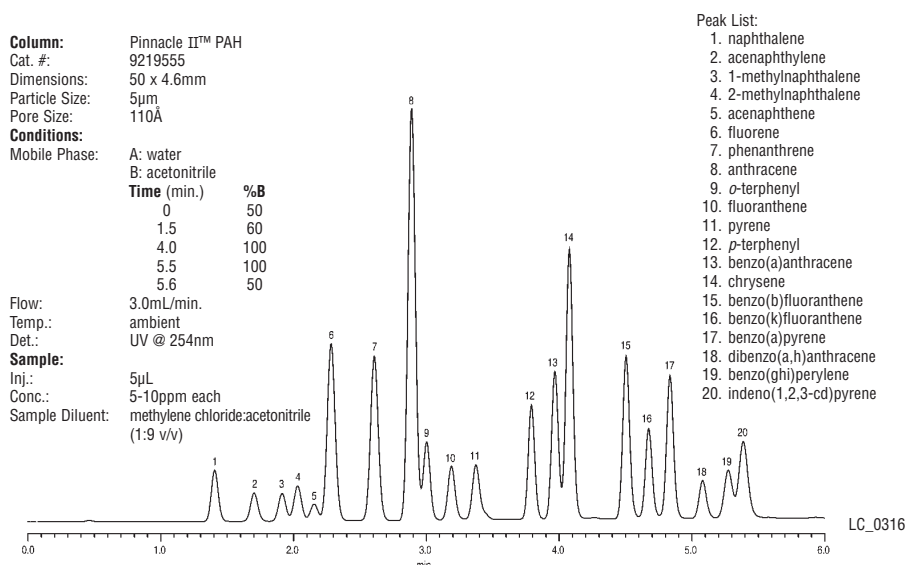


Figure 2 Effective separation of 20 PAHs in 6 minutes on a 5µm Pinnacle II™ PAH column.



EPA Method 8310 Quality Control Check Mix

acenaphthene	100µg/mL	dibenzo(a,h)anthracene	10
acenaphthylene	100	fluoranthene	10
anthracene	100	fluorene	100
benzo(a)anthracene	10	indeno(1,2,3-cd)pyrene	10
benzo(a)pyrene	10	1-methylnaphthalene	100
benzo(b)fluoranthene	10	2-methylnaphthalene	100
benzo(ghi)perylene	10	naphthalene	100
benzo(k)fluoranthene	5	phenanthrene	100
chrysene	10	pyrene	10

In acetonitrile, 1mL/ampul

Each	5-pk.	10-pk.
31843	31843-510	—
w/data pack		
31843-500	31843-520	31943

EPA Method 8310 PAH Mixture

acenaphthene	dibenzo(a,h)anthracene
acenaphthylene	fluoranthene
anthracene	fluorene
benzo(a)anthracene	indeno(1,2,3-cd)pyrene
benzo(a)pyrene	1-methylnaphthalene
benzo(b)fluoranthene	2-methylnaphthalene
benzo(ghi)perylene	naphthalene
benzo(k)fluoranthene	phenanthrene
chrysene	pyrene

500µg/mL each in acetonitrile, 1mL/ampul

Each	5-pk.	10-pk.
31841	31841-510	—
w/data pack		
31841-500	31841-520	31941

HPLC columns and additional reference mixes listed on page 8.

(cont. from p. 6) Available exclusively from Restek, Pinnacle II™ HPLC columns are prepared with silica we manufacture in our own facilities, for better control of quality and reproducibility. Consequently, Pinnacle II™ columns offer excellent performance and high lot-to-lot consistency. Among the most recent additions to the Pinnacle II™ column line are Pinnacle II™ PAH columns. Available in several dimensions, Pinnacle II™

PAH columns are specifically designed for analysis of PAHs, based on molecular shape of the target compounds. Figure 1 (pg. 6) shows baseline resolution of 18 PAHs in less than 18 minutes, using a 150 x 3.2mm, 5µm Pinnacle II™ PAH column. If your sample load demands very rapid analyses, Figure 2 (pg. 6) shows you can resolve 20 PAHs in less than 6 minutes by using a 50 x 4.6mm, 5µm Pinnacle II™ PAH column!

A Pinnacle II™ PAH column will provide the resolution and short run times that you require for analyzing PAHs by HPLC. In addition, Restek can be your source for all reference materials for EPA Method 8310, EPA Method 550.1, or EPA Method 610. If you need a custom-prepared reference material for your analysis, we'll be happy to make it for you. Contact our Custom Reference Materials Group by Fax (814-355-2895) or through our web site (<http://www.restekcorp.com/solutions>), or contact your Restek representative.0

Pinnacle II™ PAH Columns

Physical Characteristics: particle size: 5µm, spherical; pore size: 110Å; temperature limit: 80°C; fully end-capped; pH range: 2.5 to 7.5

Length	2.1mm ID		3.2mm ID		4.6mm ID	
	cat.#		cat.#		cat.#	
5µm Columns						
50mm	9219552		9219553		9219555	
100mm	—		9219513		9219515	
150mm	—		9219563		9219565	
200mm	—		9219523		9219525	
250mm	9219572		9219573		9219575	

EPA Method 8310 Surrogate Standard

decafluorobiphenyl

1,000µg/mL in acetonitrile, 1mL/ampul

Each	5-pk.	10-pk.
31842	31842-510	—
w/data pack		
31842-500	31842-520	31942

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident™ Integral Inlet Fitting, add “-700” to the catalog number for the column. Example: 100mm x 4.6mm ID Ultra C18 column with Trident™ Integral Inlet Fitting: 9174315-700. Nominal additional charge