

### Analysis of Priority Pollutant: Polycyclic Aromatic Hydrocarbons

Polycyclic Aromatic Hydrocarbons (PAHs) are large organic compounds produced during combustion. Many of these compounds are carcinogenic and are often found in water, air (eg. PAHs absorbed on airborne particulates) and other environmental locations. Thus, monitoring of PAHs is very crucial for maintaining a healthy environment.

The US EPA has designated sixteen PAHs as Priority Pollutants (Figure 1). For example, EPA Methods 610 and 550 describe the measurement of PAHs in waste water. These EPA methods specify the reversed phase High Performance Liquid Chromatography (HPLC) for the measurement of PAHs.

The major problem in the HPLC analysis of PAHs arises from their structural similarity. For example, it is not unusual to find more than two isomers in a sample of PAHs. Standard bonded phases are unable to fully resolve these isomers either isocratically or with the use of gradient elution.

SMT-PAH I columns, such as the one featured in this application note, have been specifically designed for separation and quantitation of the priority pollutant PAHs listed in US EPA Method 610 (Figure 1). SMT utilizes proprietary bonding schemes that result in controllable density of alkyl ligands of high density and a highly cross-linked polysiloxane underlayer necessary for shape recognition and strong resistance to hydrolysis. SMT-PAH columns have shown superior performance in other applications including the separation of phenols, triazines, phthalate esters and pesticides.

#### Priority Pollutant PAHs

1. naphthalene
2. acenaphthylene
3. acenaphthene
4. fluorene
5. phenanthrene
6. anthracene
7. fluoranthene
8. Pyrene
9. benzo(a)anthracene
10. chrysene
11. benzo(b)fluoranthene
12. benzo(k)fluoranthene
13. benzo(a)pyrene
14. dibenzo(a,h)anthracene
15. benzo(ghi)perylene
16. indeno(1,2,3,cd)pyrene

#### Chromatographic Conditions

Column: SMT-PAH I\*  
Mobile Phase: 5 min hold at 40% ACN,  
Linear gradient from 40-100% ACN in 25 min.  
Flow: 1.5mL/min  
Detector: UV, 254nm  
\*available in bulk packing for large-scale separation.

#### Column Specifications:

Particle: Spherical silica, 5  $\mu$ m  
Pore Size: Proprietary  
Surface Area: 350 m<sup>2</sup>/g  
% Carbon: 24%  
pH range: 1-12

### SEPARATION METHODS TECHNOLOGIES

