HPLC columns for environmental analyses

Chromatography

NUCLEODUR® C_{18} PAH — special octadecyl phase for PAH analyses

- base material NUCLEODUR® silica, particle size 3 µm, pore size 110 Å; polymeric coating · USP **L1**
- eluent in column acetonitrile / water 70:30
- allows efficient gradient separation of the 16 PAH according to EPA
- detection of the separated PAH by UV (250 to 280 nm), with diode array or with fluorescence detection at different wavelengths for excitation and emission (acenaphthylene cannot be analysed with fluorescence detection)

✔ **Fastest separation of 16 EPA-PAHs in less than 3 min**

✔ **Distinct resolution due to high sterical selectivity**

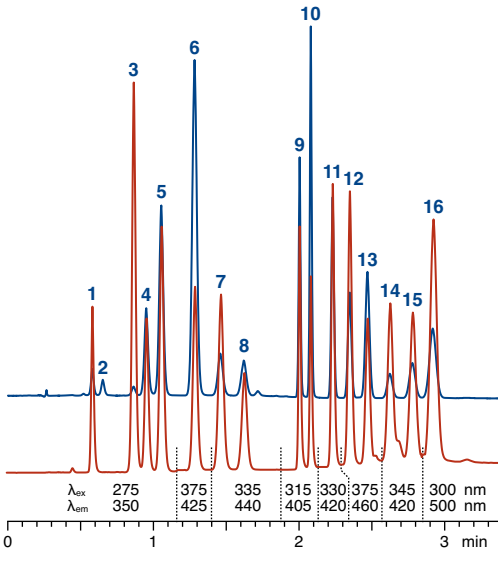
✔ **Highest stability and reproducibility**

✔ **Cost, time and solvent efficiency**

Analysis of 16 EPA PAHs with or without acetonitrile

Separation with acetonitrile

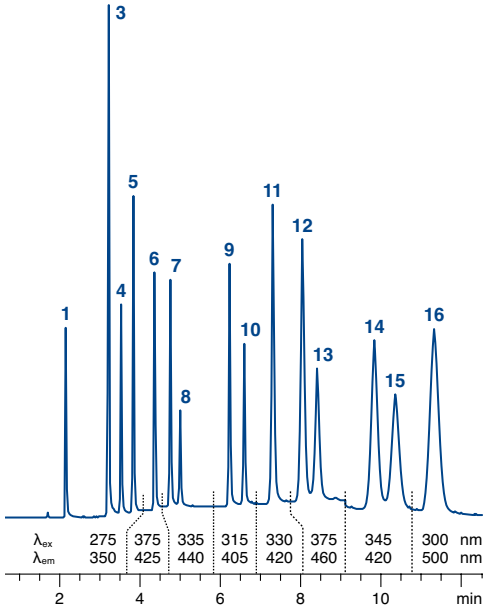
Colum: 100 x 4 mm NUCLEODUR® C_{18} PAH, 3 µm
Eluents: A) methanol – water (80:20, v/v)
B) acetonitrile
Gradient: 2 – 20 % B in 1.2 min, 20 – 100 % B in 0.5 min, 100 % B for 2.5 min, 100 – 2 % B in 0.4 min
Flow rate: 2.5 ml/min
Temperature: 35 °C
Detection: UV, 254 nm
fluorescence (see chromatogram)



MN Appl. No. 123820

Separation without acetonitrile

Colum: 125 x 4 mm NUCLEODUR® C_{18} PAH, 3 µm
Eluents: A) water
B) methanol
Gradient: 65 – 97 % B in 6 min, 97 % B for 5 min, 97 – 65 % B in 0.5 min
Flow rate: 2 ml/min
Temperature: 35 °C
Detection: fluorescence (see chromatogram)



MN Appl. No. 123830

Peaks:

1. Naphthalene
2. Acenaphthylene (not detectable by fluorescence)
3. Acenaphthene
4. Fluorene
5. Phenantrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Dibenz[ah]anthracene
15. Benzo[ghi]perylene
16. Indeno[1,2,3-cd]pyrene

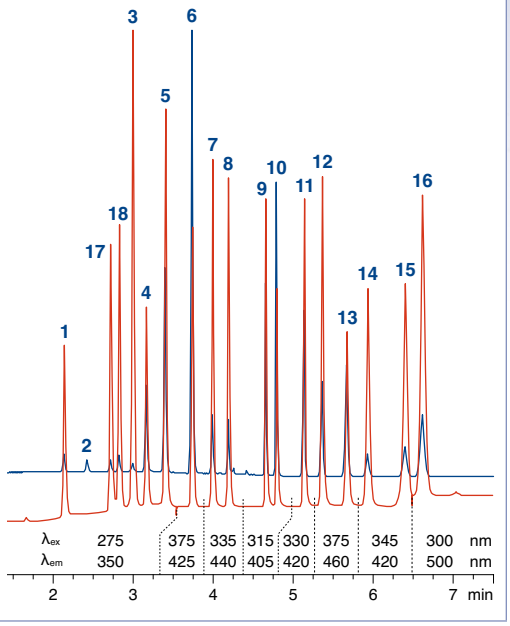
HPLC columns for environmental analyses

Separation of 18 PAHs on NUCLEODUR® C_{18} PAH

Colum: 125 x 4 mm NUCLEODUR® C_{18} PAH, 3 µm
Eluents: A) methanol – water (70:30, v/v)
B) acetonitrile
Gradient: 0 – 20 % B in 1.5 min,
20 – 50 % B in 1.5 min,
50 – 100 % B in 1.0 min,
100 % B for 3 min,
100 – 0 % B in 0.5 min
Flow rate: 1.5 ml/min
Temperature: 35 °C
Inj. volumes: UV: 1 µl,
fluorescence: 0.5 µl
Detection: UV, 254 nm
fluorescence
(see chromatogram)

Peaks:
(concentrations 10 ng/µl per compound)
1. – 16. see opposite page
17. 1-methylnaphthalene
18. 2-methylnaphthalene

MN Appl. No. 123840

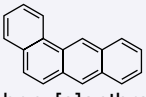


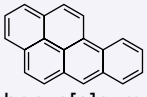
More application examples at *www.mn-net.com/apps*

Background: Analysis of polycyclic aromatic hydrocarbons (PAHs) by HPLC

Polycyclic aromatic hydrocarbons (PAHs)

- **fused aromatic rings without heteroatoms or substituents**
- **(suspected) carcinogenic, mutagenic and teratogenic pollutants**
- **natural components of coal or gas – delivered to environment by pyrolysis (incomplete burning) of organic materials like coal, oil, fuel, wood, tabaco, … mostly by from anthropogenic processes**
- **found in food, water and soil**
- **past pollutions by production of coke and gas from black coal often origin of serious ground water pollutions**
- **governmental regulations in many countries (e.g. EPA method 610 of the United States Environmental Protection Agency; or German drinking water specification (TVO) / German Standard DIN 38 409)**
- **determination by different chromatographic techniques possible (TLC, GC, HPLC)**


benz[a]anthracene


benzo[a]pyrene

HPLC columns for PAH analysis

For analyses of PAHs we have developed a specially modified C_{18} phase based on NUCLEODUR® which allows efficient gradient separation of 16 PAHs according to EPA. Detection of the separated PAHs can be achieved by UV (250 to 280 nm), with diode array or with fluorescence detection at different wavelengths for excitation and emission. (*Please note*: acenaphthylene cannot be analysed with fluorescence detection.) For cost-effective routine PAH analysis we recommend applications using methanol instead of acetonitrile as eluent. For rapid analysis NUCLEODUR® C_{18} PAH (3 µm) in short columns provides excellent results at high flow rates. Hereby separation of 16 PAHs according to EPA can be achieved in less than 3 minutes.

New regulations require determination of 2 additional PAHs (1- and 2-Methylnaphthalene) – so we developed highly efficient methods for 18 PAHs on the new NUCLEODUR® C_{18} PAH.

References

Determination of PASH in Diesel fuel by HPLC and photodiode-array detection; J. Bunot, W. Herbel, H. Steinhart, J. High Res. Chrom. 15 (1992) 682 – 685
GIT Spezial Chromat. 2 (1992) 80 – 85

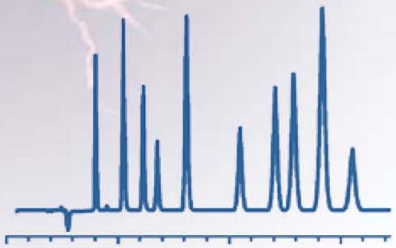
Ordering information

	Length →	100 mm	125 mm	150 mm	250 mm	Guard columns
NUCLEODUR® C_{18} PAH, 3 µm						
EC columns						
	3 mm ID	**760783.30**	**760784.30**	**760785.30**	**760786.30**	**761780.30**
	4 mm ID	**760783.40**	**760784.40**	**760785.40**	**760786.40**	**761780.40**
PAH standard according to EPA for HPLC						
PAH standard for HPLC		16 PAH according to EPA method 610 in acetonitrile (1mL) for composition see chromatograms				**722393**

As guard columns for EC columns use ChromCart® guard column cartridges with guard column adaptor EC (REF 721359).
8 mm ChromCart® guard column cartridges in packs of 3, EC columns in packs of 1.





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