NUCLEODUR® C18 PAH

Analysis of polycyclic aromatic hydrocarbons (PAHs) by HPLC

Polycyclic aromatic hydrocarbons (PAHs) are chemical compounds that consist of fused aromatic rings and do not contain heteroatoms or carry substituents. As a pollutant, they are of concern because some compounds have been identified as carcinogenic, mutagenic, and teratogenic. PAHs are natural components of coal or gas. They are delivered to our environment by pyrolysis (incomplete burning) of organic materials like coal, oil, fuel, wood, and tabacco; hence it can found globally. Today most PAHs accrue from anthropogenic processes – but also natural origins such as forest fire. In the past the production of coke and gas from black coal had a considerable impact on environmental pollution. Waste products (e.g., tar) from coking or gas plants are often the origin of serious ground water pollutions.

Since a number of PAHs (e.g., benzo[a]pyrene, 3-methylcholanthrene and benzanthracene) have been proven to be carcinogenic. Therefore control of the PAH content in food, water, and soil is an important task for routine analysis. For choice and limiting values of the polycyclics we refer to the governmental regulations, which exist in many countries (e.g., EPA method 610 of the United States Environmental Protection Agency).

PAHs can be determined by different chromatographic techniques (TLC, GC, HPLC). Thus the 6 PAHs according to German drinking water specification (TVO) can, e.g., be analyzed by TLC (see German Standard DIN 38 409), while a much larger number of polycyclic aromatics can be determined by GC or HPLC.

Key features

- Special octadecyl phase for PAH analysis
- Base material high purity NUCLEODUR® silica

Technical data

- Special octadecyl phase with polymerically coated base material; endcapped
- Pore size 110 Å, particle sizes 1.8 µm and 3 µm

Recommended applications

- USP listing L1
- Allows efficient gradient separation of the 16 PAHs according to EPA

Analysis of 16 EPA PAHs with or without acetonitrile

MN Appl. Nos. 123820 / 123830

Separation with acetonitrile

Column: 100 x 4 mm NUCLEODUR® C18 PAH, 3 µm

Eluent: A) methanol – water (80:20, v/v) B) acetonitrile 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)

Separation without acetonitrile

Column: 125 x 4 mm NUCLEODUR® C18 PAH, 3 µm

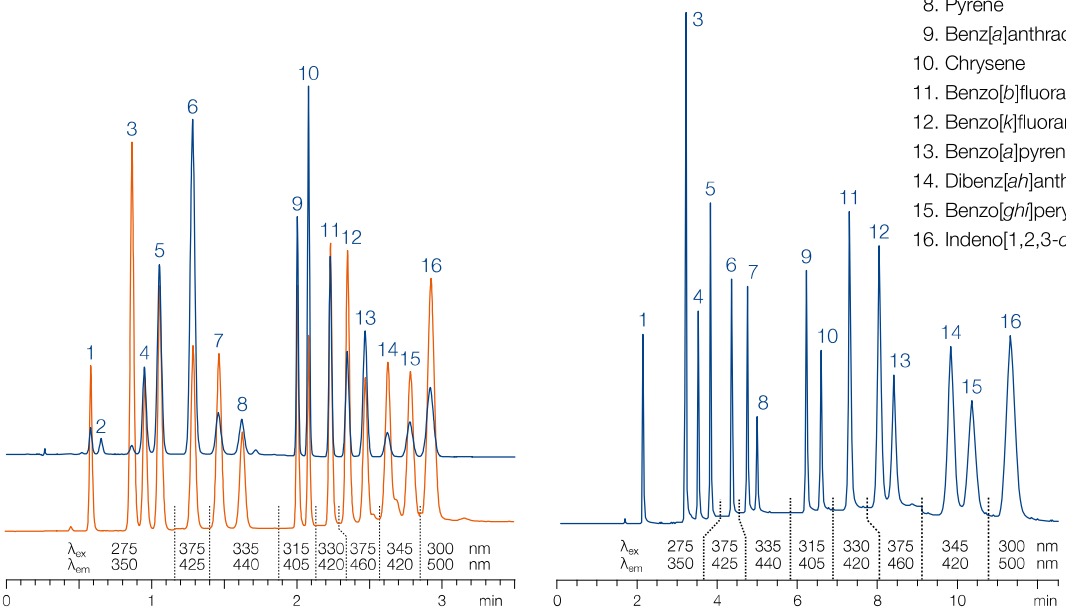
Eluent: A) water B) methanol 65–97 % B in 6 min, 97 % B for 5 min, 97–65 % B in 0.5 min

Flow rate: 2 mL/min, temperature 35 °C

Detection: fluorescence (see chromatogram)

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



Detection of separated PAHs with UV (250–280 nm), diode array or fluorescence detection at different wavelengths for excitation and emission (acenaphthylene cannot be analyzed with fluorescence detection).

NUCLEODUR® C18 PAH

Separation of 18 PAHs on NUCLEODUR® C18 PAH

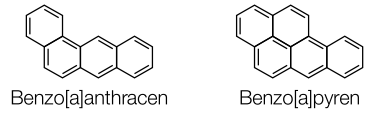
MN Appl. No. 123840

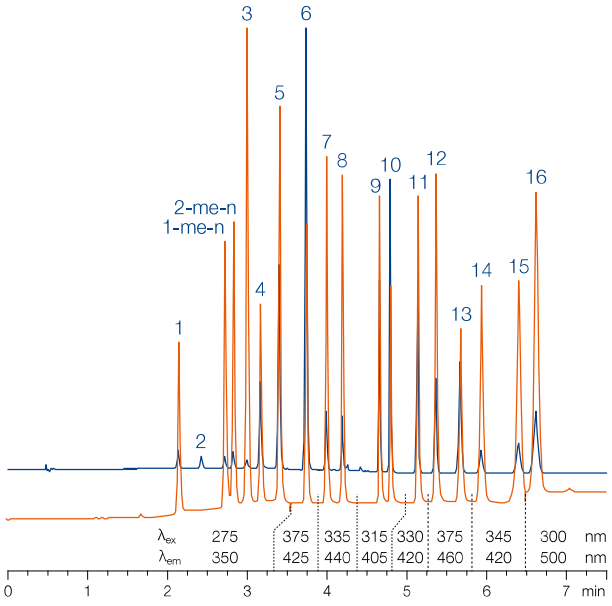
Column:	125 x 4 mm NUCLEODUR® C18 PAH, 3 µm
Eluent:	A) methanol – water (70:30, v/v); B) acetonitrile 0–20 % B in 1.5 min, 20–50 % B in 1.5 min, 50–100 % B in 1.0 min, 100 % B for 3 min, 100–0 % B in 0.5 min
Flow rate:	1.5 mL/min
Temperature:	35 °C
Injection:	UV: 1 µL,
Fluorescence:	0.5 µL
Detection:	UV, 254 nm fluorescence (see chromatogram)

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

1-me-n: 1-methylnaphthalene
2-me-n: 2-methylnaphthalene





NUCLEODUR® C18 PAH

HPLC columns for PAH analysis

For PAH analyses we have developed a specially modified C_{18} phase based on NUCLEODUR® which allows efficient gradient separation of 16 PAHs according to EPA regulations. Detection of the separated PAHs can be achieved by UV (250–280 nm), with diode array or with fluorescence detection at different wavelengths for excitation and emission. Acenaphthylene cannot be analyzed with fluorescence detection. For cost-effective routine PAH analysis we recommend applications using methanol instead of acetonitrile as the eluent. For rapid analysis NUCLEODUR® C18 PAH (3 µm) in short columns (100 mm) provides excellent results at high flow rates. Hereby separation of 16 PAHs according to EPA can be achieved in less than 3 min.

Tightened regulations require determination of 2 additional PAHs (1- and 2-methylnaphthalene) – so we developed highly efficient methods for 18 PAHs on the NUCLEODUR® C18 PAH.

Ordering information

NUCLEODUR® C18 PAH

Analytical EC columns NUCLEODUR® C18 PAH (pack of 1)

Length (mm)	ID (mm)	Particle size (µm)	REF	Guard columns*
250	4	3	760786.40	761971.30
250	3	3	760786.30	761971.30
150	3	3	760785.30	761971.30
125	4	3	760784.40	761971.30
125	3	3	760784.30	761971.30
100	3	3	760783.30	761971.30
100	4	1.8	760773.40	761970.30
100	3	1.8	760773.30	761970.30
100	2	1.8	760773.20	761970.20

* Pack of 3, EC guard columns require column protection system REF 718966. For more information, see page 90.

For more products and information
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