



Priority PAHs

Polycyclic aromatic hydrocarbons (PAHs) occur in oil, coal, and tar deposits, and are found as pollution in air, water and soil. Amongst the PAHs are some of the most toxic compounds known. Some of the PAHs are known to be carcinogenic, mutagenic, and teratogenic (linked to birth defects). Because of their wide distribution, it is therefore important to monitor these compounds.^{1,2}

PAHs are by-products of fuel from burning, both fossil fuel and biomass. Incomplete combustion that leads to formation of PAHs might also happen in industrial processes, cooking on barbecues, in fires, and in cigarette smoke. PAHs are also present in food. The highest intake is shown to come from cereals, oils, and fats. Smaller amounts come from vegetables and cooked meat.^{1,2}



The toxicity of the PAHs is highly structurally dependent, and isomers may therefore vary from being nontoxic to very toxic. One PAH compound, benzo[*a*]pyrene is notable for being the first chemical carcinogen to be discovered (and is one of many carcinogens found in cigarette smoke).

PAH compounds of particular toxicological and environmental concern are monitored using internationally recognized methods. The list of priority PAHs varies in different countries. In the United States, the EPA (Environmental Protection Agency) has listed 16 priority PAHs. All of these are available from Chiron as solutions and neat material, in addition to deuterated and fluorinated internal standards.

16 EPA PAHs: EPA Methods 550.1/610/8100/8270C/8310

Available from Chiron:

Chiron No.	Name	CAS
0711.10	Naphthalene	[91-20-3]
0002.10	Acenaphthylene	[208-96-8]
0732.12	Acenaphthene	[83-32-9]
0217.13	Fluorene	[86-73-7]
0816.14	Phenanthrene	[85-01-8]
1049.14	Anthracene	[120-12-7]
0260.16	Fluoranthene	[206-44-0]
0235.16	Pyrene	[129-00-0]
0201.18	Benz[<i>a</i>]anthracene	[56-55-3]
0212.18	Chrysene	[218-01-9]
0263.20	Benzo[<i>b</i>]fluoranthene	[205-99-2]
0265.20	Benzo[<i>k</i>]fluoranthene	[207-08-9]
0239.20	Benzo[<i>a</i>]pyrene	[50-32-8]
0203.22	Dibenz[<i>a,h</i>]anthracene	[215-58-7]
0222.22	Benzo[<i>ghi</i>]perylene	[191-24-2]
0277.22	Indeno[<i>1,2,3-cd</i>]pyrene	[193-39-5]

Available as 10 mg neat or as solution. Different concentrations and solvents are available, please inquire for details.

EPA-PAH kit, one of each of the 16 priority PAHs, solutions or neat compounds: 1708.16-KIT (1000µg/mL each in isoctane) or 1959.16-KIT (10 mg neat of each)

Internal Standards available from Chiron

Deuterated 16 EPA PAH Internal Standards:

Chiron No.	Compound	CAS
0978.10	Naphthalene-d8	[1146-65-2]
1336.12	Acenaphthylene-d8	[93951-97-4]
1524.12	Acenaphthene-d10	[15067-26-2]
1530.13	Fluorene-d10	[81103-79-9]
0389.14	Phenanthrene-d10	[1517-22-2]
0390.14	Anthracene-d10	[1719-06-8]
1337.16	Fluoranthene-d10	[93951-69-0]
0329.16	Pyrene-d10	[1718-52-1]
1087.18	Benz[<i>a</i>]anthracene-d12	[1718-53-2]
1024.18	Chrysene-d12	[1719-03-5]
1348.20	Benzo[<i>b</i>]fluoranthene-d12	[205-99-2]
1349.20	Benzo[<i>k</i>]fluoranthene-d12	[93591-98-5]
1088.20	Benzo[<i>a</i>]pyrene-d12	[63466-71-7]
1089.22	Benzo[<i>ghi</i>]perylene-d12	[93951-66-7]
1531.22	Indeno[1,2,3- <i>cd</i>]pyrene-d12	[203578-33-0]
1330.22	Dibenz[<i>a,h</i>]anthracene-d14	[13250-98-1]

Available as 10 mg neat or as solution. Different concentrations and solvents are available, please inquire for details.

F-PAHs® Internal Standards:

Chiron No.	Compound	CAS
1313.10	1-Fluoronaphthalene	[321-38-0]
1314.12*	5-Fluoroacenaphthylene	[17521-01-6]
1315.13	2-Fluorofluorene	[343-43-1]
1328.14	2-Fluorophenanthrene	[532-41-1]
1316.14	3-Fluorophenanthrene	[440-40-4]
8891.14	4-Fluorophenanthrene	[521-66-4]
1319.16	3-Fluorofluoranthene	[1691-66-3]
1318.16	1-Fluopyrene	[1691-65-2]
1900.18	1-Fluorochrysene	-
1317.18	3-Fluorochrysene	[36288-22-9]
1322.20*	9-Fluorobenzo[<i>k</i>]fluoranthene	[113600-15-0]

Available as 10 mg neat or as solution. Different concentrations and solvents are available, please inquire for details.

* Only as solution.

In addition to the single solutions, Chiron also offers convenient EPA PAH all-in-one mixtures, both for native and labelled standards:

Chiron No.	Name	
S-4063-100-5T	16 Priority EPA PAHs, Cocktail 1	100µg/mL each, 5mL in toluene
S-4064-10-5CY	16 Priority EPA PAHs, Cocktail 2	10µg/mL each, 5mL in cyclohexane
S-4065-10-5AN	16 Priority EPA PAHs, Cocktail 3	10µg/mL each, 5mL in acetonitrile
S-4560-100-10DC	16 Priority EPA PAHs, Cocktail 4	100µg/mL each, 10mL in dichloromethane
S-4513-100-T	Perdeuterated Internal Standard	100µg/mL each, 1mL in toluene
S-4114-ASS-5AN	16 Priority EPA PAHs control mix	Assorted concentrations, 5mL in acetonitrile



15 EU PAHs and 15+1 EU PAHs (2005/108 Rec. + 2006: Reg.1881 Recommendation, PAHs in certain foods)

Available from Chiron:

Chiron No.	Component	CAS
0201.18	Benz[a]anthracene	[56-55-3]
0212.18	Chrysene	[218-01-9]
0035.18	Cyclopenta[cd]pyrene	[27208-37-3]
0263.20	Benzo[b]fluoranthene	[205-99-2]
0264.20	Benzo[j]fluoranthene	[205-82-3]
0265.20	Benzo[k]fluoranthene	[207-08-9]
0239.20	Benzo[a]pyrene	[50-32-8]
0203.22	Dibenz[a,h]anthracene	[215-58-7]
0222.22	Benzo[ghi]perylene	[191-24-2]
0277.22	Indeno[1,2,3-cd]pyrene	[193-39-5]
0244.24	Dibenzo[a,e]pyrene	[192-65-4]
0242.24	Dibenzo[a,h]pyrene	[189-64-0]
0241.24	Dibenzo[a,i]pyrene	[189-55-9]
0243.24	Dibenzo[a,l]pyrene	[191-30-0]
0296.19	5-Methylchrysene	[3697-24-3]
0309.17	Benzo[c]fluorene	[205-12-9]

Available as 10 mg neat or as solution. Different concentrations and solvents are available, please inquire for details.

Single 15 EU-PAH Kit (3958.15-KIT) one of each of the 15 priority PAHs, 200µg/mL each in toluene or neat.

Single 15+1 EU PAH Kit (9311.15-KIT) one of each of the 15+1 priority PAHs, 200µg/mL each in toluene or neat.

Single Internal Standards:

Chiron No.	Compound	CAS
1087.18	Benz[a]anthracene-d12	[1718-53-2]
1024.18	Chrysene-d12	[1719-03-5]
1348.20	Benzo[k]fluoranthene-d12	[93951-98-5]
1088.20	Benzo[a]pyrene-d12	[63466-71-7]
1330.22	Dibenz[a,h]anthracene-d14	[13250-98-1]
1089.22	Benzo[ghi]perylene-d12	[93951-66-7]
1531.22	Indeno[1,2,3-cd]pyrene-d12	[203578-33-0]
1529.24	Dibenzo[a,i]pyrene-d14	[158776-07-9]

Available as 10 mg neat or as solution. Different concentrations and solvents are available, please inquire for details.

In addition to the single solutions, Chiron also offers convenient EU PAH all-in-one mixtures, both for native and labelled standards:

Chiron No.	Name	
S-4452-100-T	15 EU PAH Cocktail, 15 Analytes	100µg/mL each, 1mL in toluene
S-4512-100-T	EU Deuterated PAH Cocktail, 8 Analytes	100µg/mL each, 1mL in toluene
S-4589-100-T	15+1 EU PAH Coctail, 16 Analytes	100µg/mL each, 1mL in toluene



ISO methods:**ISO 7981.1 and 7981.2: WHO PAHs in drinking water**

6 priority PAHs in acetonitrile: S-4062-ASS-5AN

Chiron No.	Compound	CAS	Concentration
0260.16	Fluoranthrene	[206-44-0]	10µg/mL
0277.22	Indeno[1,2,3-cd]pyrene	[193-39-5]	2µg/mL
0263.20	Benzo[b]fluoranthene	[205-99-2]	2µg/mL
0265.20	Benzo[k]fluoranthene	[207-08-9]	2µg/mL
0239.20	Benzo[a]pyrene	[50-32-8]	2µg/mL
0222.22	Benzo[ghi]perylene	[191-24-2]	2µg/mL

ISO 17993: Water quality – 15 PAHs by GC

The PAHs analyzed in this method are identical to the 16 EPA PAHs, but without Acenaphthylene (Product No. 0002.12); 6-Methylchrysene may optionally be included.

S-4473-10-AN: ISO 17993 Multiple Compound Stock Solution
15 analytes, each 10µg/mL in acetonitrile

Additional and optional compound:

0297.19-10-AN 6-Methylchrysene [1705-85-7]
1 analyte, 10µg/mL in acetonitrile

ISO 15753: PAHs in animal and vegetable fats and oils

The PAHs analyzed in this method are identical to the 16 EPA PAHs but without Acenaphthylene (Product No. 0002.12):

S-4469-100-T: ISO 15751 Multiple Compound Standard Solution

Other relevant methods:

ASTM D 5186-03	SFC-method
ASTM D 5580-02	Gasoline
ASTM D 5739-06	Oil spill
ASTM D 5769-04	Aromatics in gasoline
ASTM D 6370-04	Aviation fuels
ASTM D 6591-06	Middle distillates
ISO 7981-1: 2005	Water quality, TLC
ISO 7981-2: 2005	Water quality, HPLC
ISO 15753: 2006	Animal and vegetable fats and oils
ISO 17993: 2002	Water quality, 15 PAHs by HPLC
EPA 525.2	Drinking water by GC-MS
EPA 550.0/550.1	Drinking water by HPLC
EPA 610	Waste water by HPLC and GC
EPA 8100	Ground/waste water and solid waste by GC-FID
EPA 8270C	Semivolatile compounds by GC-MS
EPA 8275A	Ground water and solid waste by GC-MS
EPA 8310	Ground water and solid waste by HPLC
NS 9815	Water and air analysis by GC

For standard mixtures for these methods, please consult www.chiron.no or sales@chiron.no

Literature:

- http://ec.europa.eu/food/fs/sc/scf/out154_en.pdf
- <http://www.atsdr.cdc.gov/tfacts69.html#bookmark02>

