

APPLICATIONS

Fast Analysis of 24 Regulated PAHs on a Zebron[™] ZB-PAH GC Column

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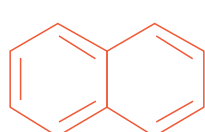
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Rola has a Masters degree in Chemistry. She enjoys reading and traveling. She believes dreams are future facts, only with some discipline.

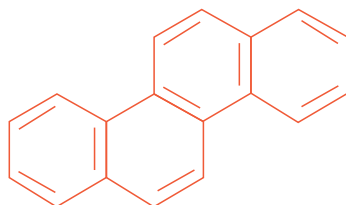
Overview

Polycyclic Aromatic Hydrocarbons (PAHs) are organic (highly hydrophobic) compounds that contain multiple aromatic rings (e.g. Naphthalene, Chrysene and Benzo[b]fluoranthene). PAHs often result from the incomplete combustion of organic substances such as wood, coal and oil and are found as pollution in air, water and soil. Amongst the PAHs are some of the most toxic compounds known. Including some that are carcinogenic, mutagenic, and teratogenic.

In the United States, the EPA (Environmental Protection Agency) has listed 16 priority PAHs. The European Union (EU) has regulated a series of PAHs found in food matrices. This list is referred to as the EU 15+1 list (**Table 1**).



Naphthalene



Chrysene

Introduction

In this study, resolution of all 24 combined PAHs is achieved, in under 28 minutes using a Zebron ZB-PAH 20 m x 0.18 mm x 0.14 µm GC column.

This mid polarity GC column, provides good resolution for the 16 US-EPA regulated PAHs and improves the resolution of the critical pairs for the 15+1 EU priority PAHs such as benz[a]anthracene, cyclopenta[c,d]pyrene, chrysene, benzo[b]fluoranthene, benzo[k] fluoranthene, benzo[j]fluranthene, and indeno[1,2,3-cd]pyrene, dibenz[a,h]anthracene allowing for more accurate detection and quantification refer to **Figure 1**.

Another set of challenging analytes is the four dibenzopyrene isomers. Due to their high molecular weight, these isomers are prone to discrimination and poor peak shape.

The Zebron ZB-PAH 20 m x 0.18 mm, 0.14 µm GC column provides a thinner film thickness and high operating temperatures which lead to improved peak shape for these analytes. **Table 1** will show a breakdown of EU and US-EPA regulated PAH Compounds Distribution.

Materials and Methods

Column: Zebron ZB-PAH

Dimensions: 20 m x 0.18 mm x 0.14 µm

Part No.: 7FD-G038-47

Injection: Splitless @ 300 °C, 0.5 µL

Recommended Liner: Zebron PLUS Single Taper with Wool

Liner Part No.: AG2-0A11-05 (for Agilent® systems)

Carrier Gas: Helium @ 1.8 mL/min (constant flow)

Oven Program: 70°C for 0.8 min to 180°C @ 70°C/min to 230°C @ 7°C/min for 6 min to 280°C @ 40°C/min for 5 min to 335°C @ 25°C/min for 5.0 min

Detector: Mass Spec @ 340 °C

- Sample:**
1. Naphthalene
 2. Acenaphthylene
 3. Acenaphthene
 4. Fluorene
 5. Phenanthrene
 6. Anthracene
 7. Fluoranthene
 8. Pyrene
 9. Benzo[c]fluorene
 10. Benzo[a]anthracene
 11. Cyclopenta[c,d]pyrene
 12. Chrysene
 13. 5-Methylchrysene
 14. Benzo[b]fluoranthene
 15. Benzo[k]fluoranthene
 16. Benzo[j]fluoranthene
 17. Benzo[a]pyrene
 18. Indeno[1,2,3-cd]pyrene
 19. Dibenz[a,h]anthracene
 20. Benzo[g,h,i]perylene
 21. Dibenz[a,i]pyrene
 22. Dibenz[a,e]pyrene
 23. Dibenz[a,l]pyrene
 24. Dibenz[a,h]pyrene



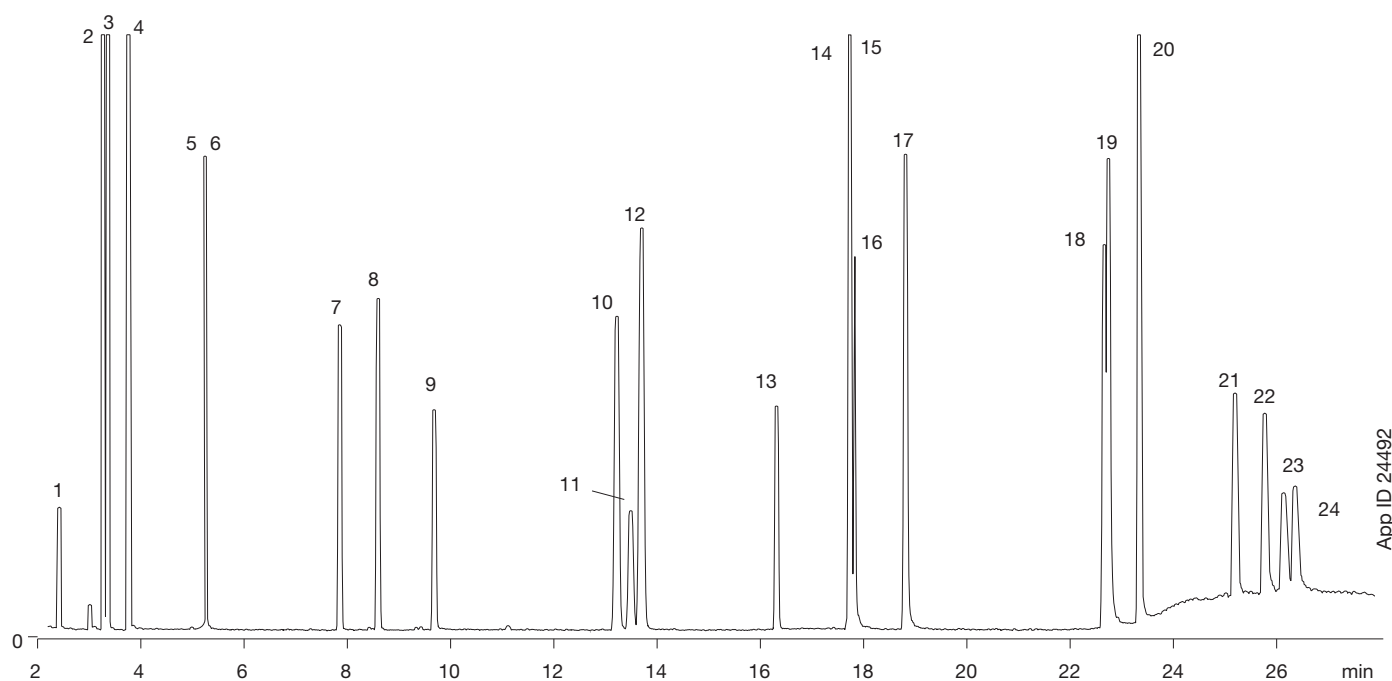
Table 1.
EU and US EPA Regulated PAH Compounds

Peak #	Sample	EU 15+1	EPA
1	Naphthalene		•
2	Acenaphthylene		•
3	Acenaphthene		•
4	Fluorene		•
5	Phenanthrene		•
6	Anthracene		•
7	Fluoranthene		•
8	Pyrene		•
9	Benzo[c]fluorene	•	
10	Benzo[a]anthracene	•	•
11	Cyclopenta[c,d]pyrene	•	
12	Chrysene	•	
13	5-Methylchrysene	•	
14	Benzo[b]fluoranthene	•	•
15	Benzo[k]fluoranthene	•	•
16	Benzo[j]fluoranthene	•	
17	Benzo[a]pyrene	•	•
18	Indeno[1,2,3-cd]pyrene	•	•
19	Dibenz[a,h]anthracene	•	•
20	Benzo[g,h,i]perylene	•	•
21	Dibenzo[a,l]pyrene	•	
22	Dibenzo[a,e]pyrene	•	
23	Dibenzo[a,i]pyrene	•	
24	Dibenzo[a,h]pyrene	•	

Conclusions

The Zebron™ ZB-PAH GC column resolved all 24 (EU 15+1 and US EPA) regulated PAHs in under 28 minutes, including the benzo[b,j,k] fluorene isomers which were separated for individual quantitation. Therefore, the Zebron ZB-PAH GC column is the recommended column when resolution of these isomers is required.

Figure 1.
Expanded EU 15+1 and EPA 610 PAH Analysis



Ordering Information

Zebtron™ GC Columns

Phase	ID (mm)	df (μm)	Length (m)	Part No.
ZB-PAH	0.18	0.14	20	7FD-G038-47
ZB-PAH	0.25	0.25	30	7HG-G038-11
ZB-PAH	0.25	0.25	60	7KG-G038-11

Zebtron PLUS GC Inlet Liners

	Description	Application	Dimensions ID x L (mm)	Unit	Part No.
For Agilent® or Thermo Scientific® GC Systems					
	Single Taper Z-Liner™	Semi-volatiles, dirty samples	4 x 78.5	5/pk	AG2-0A13-05
				25/pk	AG2-0A13-25
	Single Taper with Wool	Semi-volatiles	4 x 78.5	5/pk	AG2-0A11-05
				25/pk	AG2-0A11-25



If Phenomenex products in this technical note do not provide at least equivalent separation as compared to other products of the same phase and dimensions, return the product with comparative data within 45 days for a FULL REFUND.



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