

# APPLICATIONS

## Faster Analysis of 18 Phthalates by GC-MS using Zebron™ ZB-PAH-CT GC Column

Ramkumar Dhandapani, Bryan Tackett, Rola El abaji and Richard Jack  
Phenomenex, Inc., 411 Madrid Ave., Torrance, CA 90501 USA

### Overview

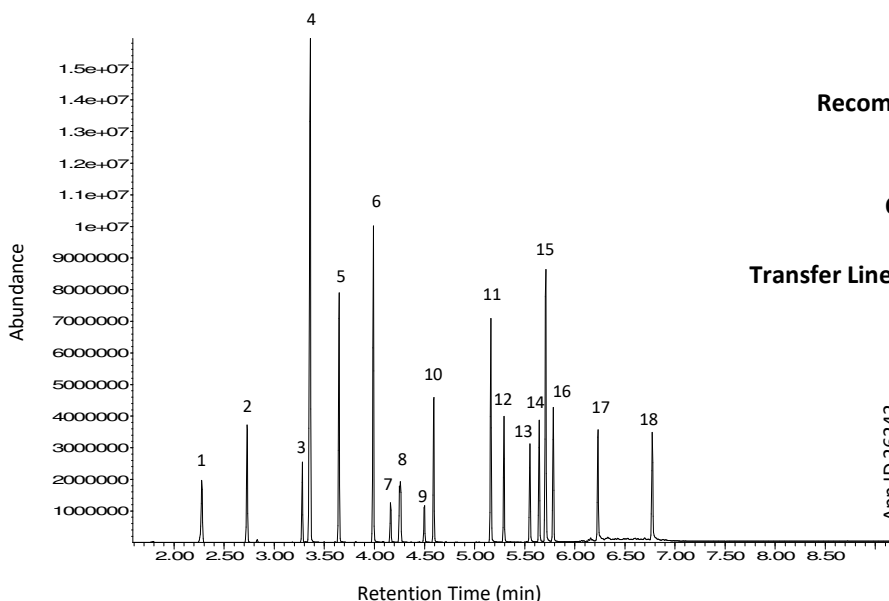
Phthalates are a group of chemicals that are added to plastics to increase their flexibility and are used widely in polyvinyl chloride plastics.

Presented in this application is an updated GC-MS method for 18 Phthalates using a Zebron ZB-PAH-CT GC Column. The Zebron ZB-PAH-CT is made of a proprietary stationary phase that provides recognition of small differences in electron density around the aromatic ring. This provides unique selectivity for aromatic compounds to result in enhanced resolution.

This study presents the fast GC analysis parameters for Phthalates analysis. **Figure 1** represents the separation of 18 Phthalates on a 20-meter column dimension and **Figure 2** represents the same separation on a 10-meter column dimension. **Table 1** shows the retention and peak area precision for both 20 and 10 meter ZB-PAH-CT GC columns. By decreasing the length of the GC column and maintaining phase volume ratio, the run time is also reduced, thus provides the user with a shorter run time and a more efficient separation of Phthalates.

#	Analyte (100 ppm in Methanol)
1	Dimethyl phthalate
2	Diethyl phthalate
3	Diallyl phthalate
4	Dipropyl phthalate
5	Diisobutyl phthalate
6	Dibutyl phthalate
7	bis(2-Methoxyethyl)phthalate
8	bis(4-Methyl-2-pentyl)phthalate
9	bis(2-Ethoxyethyl)phthalate
10	Dipentyl phthalate
11	Dihexyl phthalate
12	Butylbenzyl phthalate
13	bis(2-Butoxyethyl)phthalate
14	Di(ethylhexyl) phthalate
15	Diheptyl phthalate
16	Dicyclohexyl phthalate
17	Di-n-octyl phthalate
18	Dinonyl phthalate

**Figure 1: Separation of 18 Phthalates on a 20-Meter ZB-PAH-CT GC Column**



### GC-MS Conditions

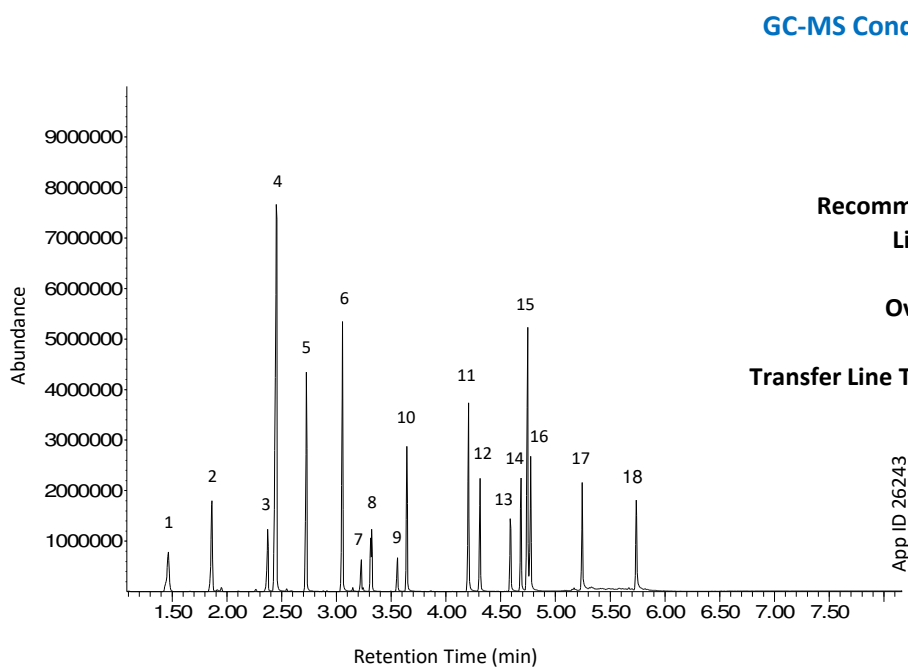
**Column:** Zebron ZB-PAH-CT  
**Dimension:** 20 meter x 0.18 mm x 0.14 µm  
**Part No.:** [7FD-G044-47](#)  
**Injection:** Split (20:1) @ 260 °C, 1 µL  
**Recommended Liner:** Zebron PLUS Single Taper with Wool  
**Liner Part No.:** [AG2-0A11-05](#)  
**Carrier Gas:** Helium @ 0.7 mL/min (constant flow)  
**Oven Program:** 135 °C to 320 °C @ 30 °C/min for 3.0 min  
**Detector:** GC-MS  
**Transfer Line Temperature:** 250 °C  
**Mode :** Scan (100-500 m/z)

App ID 26242



# APPLICATIONS

**Figure 2: Separation of 18 Phthalates on a 10-Meter ZB-PAH-CT GC Column**



### GC-MS Conditions

**Column:** Zebron ZB-PAH-CT  
**Dimension:** 10 meter x 0.10 mm x 0.10  $\mu$ m  
**Part No.:** [7CB-G044-02](#)  
**Injection:** Split (40:1) @ 260  $^{\circ}$ C, 1  $\mu$ L  
**Recommended Liner:** Zebron PLUS Single Taper with Wool  
**Liner Part No.:** [AG2-0A11-05](#)  
**Carrier Gas:** Helium @ 0.4 mL/min (constant flow)  
**Oven Program:** 135  $^{\circ}$ C to 320  $^{\circ}$ C @ 30  $^{\circ}$ C/min for 2.0 min  
**Detector:** GC-MS  
**Transfer Line Temperature:** 250  $^{\circ}$ C  
**Mode:** Scan (100-500 m/z)

App ID 26243

**Table 1.**

**Precision Data of 18 Phthalates on a 20-Meter and 10-Meter ZB-PAH-CT GC Columns**

#	Analyte	Average RT (min)	%RSD 20-meter column		Average RT (min)	%RSD 10-meter column	
		20-meter column	RT	Peak Area	10-meter column	RT	Peak Area
1	Dimethyl phthalate	2.279	0.02	1.31	1.466	0.02	1.51
2	Diethyl phthalate	2.731	0.02	1.08	1.864	0.02	1.23
3	Diallyl phthalate	3.282	0.02	1.21	2.375	0.02	0.83
4	Dipropyl phthalate	3.361	0.02	9.57	2.454	0.02	0.72
5	Diisobutyl phthalate	3.649	0	0.7	2.729	0.02	1.51
6	Dibutyl phthalate	3.991	0	0.69	3.058	0.02	1.23
7	bis(2-Methoxyethyl)phthalate	4.164	0.01	0.53	3.229	0.02	8.41
8	bis(4-Methyl-2-pentyl)phthalate	4.261	0.01	0.98	3.325	0.02	0.72
9	bis(2-Ethoxyethyl)phthalate	4.501	0.01	1.28	3.559	0.01	3.46
10	Dipentyl phthalate	4.594	0.01	0.67	3.646	0.02	1.22
11	Dihexyl phthalate	5.164	0.01	0.72	4.208	0.01	0.97
12	Butylbenzyl phthalate	5.295	0.01	0.48	4.313	0.01	2.42
13	bis(2-Butoxyethyl)phthalate	5.554	0.02	1.29	4.592	0.02	3.41
14	Di(ethylhexyl) phthalate	5.646	0.03	0.5	4.687	0.01	0.94
15	Diheptyl phthalate	5.711	0.04	0.19	4.747	0.01	1.1
16	Dicyclohexyl phthalate	5.787	0.05	0.47	4.776	0.01	0.6
17	Di-n-octyl phthalate	6.232	0.09	0.57	5.246	0.02	0.84
18	Dinonyl phthalate	6.775	0.11	1.26	5.737	0.04	0.73

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t: +32 (0)2 503 4015 (French)  
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beinfo@phenomenex.com

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info@phenomenex.com

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cninfo@phenomenex.com

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nordicinfo@phenomenex.com

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t: +91 (0)40-3012 2400  
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t: +353 (0)1 247 5405  
eireinfo@phenomenex.com

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t: +39 051 6327511  
italiainfo@phenomenex.com

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t: +31 (0)30-2418700  
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t: 01-800-844-5226  
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t: +31 (0)30-2418700  
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pl-info@phenomenex.com

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ptinfo@phenomenex.com

### Singapore

t: +65 800-852-3944  
sginfo@phenomenex.com

### Slovakia

t: +420 272 017 077  
sk-info@phenomenex.com

### Spain

t: +34 91-413-8613  
espinfo@phenomenex.com

### Sweden

t: +46 (0)8 611 6950  
nordicinfo@phenomenex.com

### Switzerland

t: +41 (0)61 692 20 20  
swissinfo@phenomenex.com

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