



Featured Application: *Phthalates on LPGC Rxi-35Sil MS*

Faster LPGC-MS Phthalates Analysis Uses 67% Less Helium

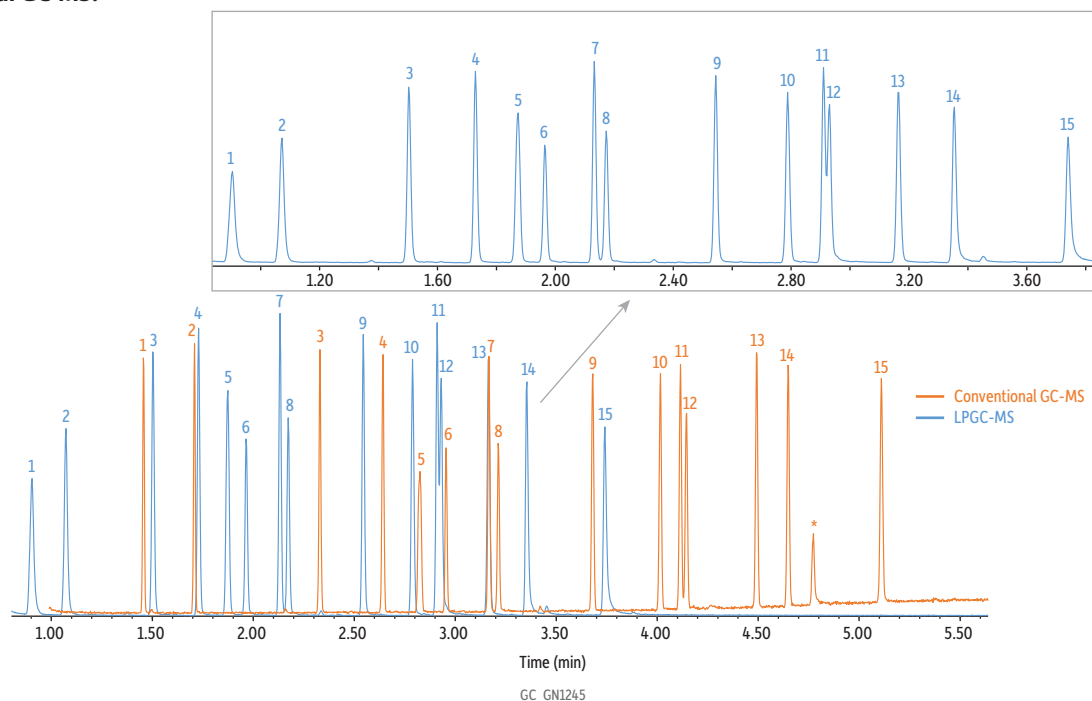
- Analyze phthalates 1.4x faster than conventional GC-MS.
- Cut costs by reducing helium consumption 67%.
- Pre-connected LPGC column kit prevents leaks, simplifies installation, and allows large-volume injection.

Phthalates are industrial additives that are commonly used to make plastics more flexible, and they are easily released through various degradation processes. They have become ubiquitous and are found in air, water, food, consumer products, and even the human body. Efficient methods are needed for analyzing phthalates both as raw materials and as contaminants. Phthalates analysis is typically done by conventional GC-MS using a capillary column that is 30 m or longer. However, this approach requires a high flow rate and uses a lot of helium, which is a limited and costly resource.

Low-pressure GC-MS (LPGC-MS) is an attractive alternative because it can significantly reduce helium consumption and also speed up the analysis, improving lab productivity. As shown in Figure 1, the LPGC-MS method is 1.4x faster and uses 67% less helium than the conventional phthalates analysis. A Restek LPGC Rxi 35Sil MS column kit provides additional benefits because it is factory connected to ensure easy installation and a leak-free connection between the analytical and restrictor columns. It also has the capacity for large-volume injection, whereas narrow-bore columns can be overloaded quickly. Visit www.restek.com/lpgc to learn more about this powerful technique.

Figure 1: Phthalates on LPGC Rxi-35Sil MS Compared to Conventional GC-MS Analysis

- **LPGC-MS is 1.4x faster and uses 67% less helium compared to conventional GC-MS.**



| Peaks | tr (30 m) | tr (LPGC) | Conc. (ppm) |
|---|-----------|-----------|-------------|
| 1. Dimethyl phthalate | 1.456 | 0.904 | 10 |
| 2. Diethyl phthalate | 1.709 | 1.073 | 10 |
| 3. Diisobutyl phthalate | 2.33 | 1.504 | 10 |
| 4. Di- <i>n</i> -butyl phthalate | 2.642 | 1.73 | 10 |
| 5. Bis(2-methoxyethyl) phthalate | 2.824 | 1.873 | 10 |
| 6. Bis[4-methyl-2-pentyl] phthalate isomers | 2.955 | 1.964 | 10 |
| 7. Di- <i>n</i> -pentyl phthalate | 3.167 | 2.133 | 10 |
| 8. Bis(2-ethoxyethyl) phthalate | 3.212 | 2.173 | 10 |
| 9. Di- <i>n</i> -hexyl phthalate | 3.68 | 2.545 | 10 |
| 10. Butyl benzyl phthalate | 4.015 | 2.789 | 10 |
| 11. Bis(2-ethylhexyl) phthalate | 4.115 | 2.911 | 10 |
| 12. Bis(2-butoxyethyl) phthalate | 4.146 | 2.931 | 10 |
| 13. Dicyclohexyl phthalate | 4.492 | 3.166 | 10 |
| 14. Di- <i>n</i> -octyl phthalate | 4.649 | 3.357 | 10 |
| 15. Dinonyl phthalate | 5.11 | 3.741 | 10 |

* = Contaminant

**Column
Standard/Sample**

Diluent:

Conc.:

Injection

Inj. Vol.:

Liner:

Inj. Temp.:

Carrier Gas

Detector

Mode:

Transfer Line Temp.:

Analyzer Type:

Source Temp.:

Quad Temp.:

Electron Energy:

Tune Type:

Ionization Mode:

Instrument

Sample Preparation

Notes

See notes

EPA method 8061A phthalate esters mixture (cat.# 33227)

Hexane

100 µg/mL

1 µL split (split ratio 10:1)

Topaz, splitless, single taper inlet liner, 4.0 mm x 6.5 x 78.5 (cat.# 23303)

280 °C

He

MS

Scan

280 °C

Quadrupole

330 °C

180 °C

70 eV

PFTBA

EI

Agilent 7890B GC & 5977A MSD

The standard was diluted with hexane to 100 ppm; analyzed in a 2 mL, short-cap, screw-thread vial (cat.# 21143); and capped with a short-cap, screw-vial closure (cat.# 24495).

Conventional (30 m) Analysis:

Column: Rxi-35Sil MS, 30 m, 0.25 mm ID, 0.25 µm (cat.# 13823)

Temp. program: 200 °C (hold 0.5 min) to 330 °C at 30 °C/min (hold 5 min)

Flow: 2 mL/min

Scan start time: 0.9 min

Scan range: 55-400 amu

Scan rate: 10 scans/sec

LPGC-MS Analysis:

Column: LPGC Rxi-35Sil MS column kit, includes 10 m x 0.32 mm ID x 0.25 µm Rxi-35Sil MS analytical column and 5 m x 0.15 mm ID Rxi restrictor factory connected via SilTite connector (cat.# 11806) Temp. program: 180 °C (hold 0.5 min) to 200 °C at 75 °C/min to 300 °C at 35 °C/min (hold 5 min)

Flow: 0.9 mL/min





Scan start time: 0.5 min

Scan range: 55-300 amu

Scan rate: 9.7 scans/sec

For phthalates analysis, we also recommend Resprep C18 SPE disks (cat.# 24004) and C18 SPE cartridges (cat.# 28961) for sample preparation.

Featured Products

| Reference Standards | Analytical Column | Maintenance & Accessories |
|---|--|--|
|  <p>EPA Method 8061A phthalate esters mixture cat.# 33227</p> |  <p>LPGC Rxi-35Sil MS column cat.# 11806</p> |  <p>GC Accelerator cat.# 23849</p> |
|  <p>Topaz single taper splitless inlet liner cat.# 23303</p> | | |



LPGC Rxi-35Sil MS column kit

- 1.4x faster analysis of phthalates with 67% less helium consumption.
- Factory-coupled, leak-free kit makes setup as simple as a column change.
- Ideal for speeding up GC-MS and GC-MS/MS methods.

| Catalog No. | Includes | Units |
|-------------|--|-------|
| 11806 | 10 m x 0.32 mm ID x 0.25 µm Rxi-35Sil MS analytical column and 5 m x 0.15 mm ID Rxi restrictor factory connected via SilTite connector | kit |



Topaz Single Taper Splitless Inlet Liner

Topaz GC inlet liners feature revolutionary technology and inertness to deliver you the next level of True Blue Performance:

- **Deactivation**—unbelievably low breakdown for accurate and precise low-level GC analyses.
- **Reproducibility**—unbeatable manufacturing controls and QC testing for superior reliability across compound classes.
- **Productivity**—unparalleled cleanliness for maximized GC uptime and lab throughput.
- **100% Satisfaction**—if a liner doesn't perform to your expectations, we will replace it or credit your account.

Patented

| Catalog No. | Product Name | Units |
|-------------|---|-------|
| 23303 | Topaz, single taper, splitless inlet liner, 4.0 mm x 6.5 x 78.5, for Agilent GCs, w/quartz wool, premium deactivation | 5-pk. |

GC Accelerator Oven Insert Kit for Agilent 5890, 6890, 7890, and 8890 GCs

- GC Accelerator kit installs easily without damaging the GC column or interfering with the MS interface.

| Catalog No. | Product Name | Instrument | Units |
|-------------|--------------------------------|--|-------|
| 23849 | GC Accelerator oven insert kit | for Agilent 5890, 6890, 7890, and 8890 GCs | kit |

If using a 120 V GC oven, a GC Accelerator oven insert kit (cat.# 23849) may be needed to meet aggressive ramp rates.



EPA Method 8061A Phthalate Esters Mixture

| | |
|---|--|
| Benzyl butyl phthalate (85-68-7) | Di- <i>n</i> -hexyl phthalate (84-75-3) |
| Bis(2- <i>n</i> -butoxyethyl)phthalate (117-83-9) | Dimethylphthalate (131-11-3) |
| Bis(2-ethoxyethyl)phthalate (605-54-9) | Di-nonyl phthalate (84-76-4) |
| Bis(2-ethylhexyl)phthalate (117-81-7) | Di- <i>n</i> -octyl phthalate (117-84-0) |
| Bis(2-methoxyethyl)phthalate (117-82-8) | Dipentylphthalate (131-18-0) |
| Bis(4-methyl-2-pentyl)phthalate (84-63-9) | Phthalic acid dicyclohexyl ester (84-61-7) |
| Di- <i>n</i> -butylphthalate (84-74-2) | Phthalic acid diisobutyl ester (84-69-5) |
| Diethylphthalate (84-66-2) | |

| Catalog No. | Concentration | Solvent | Volume | Units |
|-------------|---------------|------------------------|------------|-------|
| 33227 | 1000 µg/mL | Hexane:acetone (80:20) | 1 mL/ampul | ea. |



Vials and Caps

| Catalog No. | Product Name | Units |
|-------------|--|----------|
| 21143 | Short-Cap Vial with Grad Marking Spot, 9-425 Screw-Thread, 2.0 mL, 9 mm, 12 x 32 (vial only), Amber | 1000-pk. |
| 24495 | Short Screw Caps, Polypropylene, Screw-Thread, PTFE/Silicone/PTFE Septa, Black, Preassembled, 2.0 mL, 9 mm | 100-pk. |



Resprep SPE Disks

- Glass fiber disks embedded with C18 or C8 bonded silica.
- Extract semivolatile organic compounds.
- Deep-pore design reduces clogging and allows faster flow rates.
- Meet requirements for EPA Methods 525.1, 506, 550.1, and 549.1.

| Cat.# | Includes | Units |
|-------|-------------------------------|--------|
| 24004 | SPE Disks, Resprep-C18, 47 mm | 20-pk. |



Resprep SPE Cartridges

- High-quality, silica-based hydrophobic adsorbents.
- Used to extract hydrophobic analytes from polar matrices, such as water (e.g., pesticides from water).
- Stable over the pH range (2 – 8).
- C18 silica is end-capped.



| Cat.# | Product Name | Units |
|-------|--|--------|
| 28961 | Resprep C18 SPE Cartridge, 6 mL/500 mg | 30-pk. |

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Lit. Cat.# GNFA4234A-UNV