Rtx®-CLPesticides Columns

Reduce Analysis Time; Reduce System Maintenance
Rtx®-CLPesticides and Rtx®-CLPesticides2 Fused Silica Columns

• Detect and confirm 20 common organochlorine pesticides simultaneously.
• Complete analysis in less than 14 minutes (see Figure 3).
• Primary and confirmation analysis with one injection.

Organochlorine pesticides represent a very common analysis in environmental laboratories, traditionally using Rtx®-5, Rtx®-35, Rtx®-1701, or equivalent columns. With traditional columns, however, it is difficult to resolve the 20 most commonly analyzed organochlorine pesticides in a reasonable time. Higher polarity columns also are problematic - they trap polar contaminants from the samples, and this reduces column lifetime.

Rtx®-CLPesticides and Rtx®-CLPesticides2 columns were designed specifically for this application, with consideration for both analysis time and column lifetime. They separate commonly analyzed organochlorine pesticides rapidly, with high temperature stability that assures reliable data. Figure 1 shows the analysis of 20 pesticides is completed in 24 minutes - 50% of the time required on a traditional column! Further, an Rtx®-CLPesticides column and an Rtx®-CLPesticides2 column can be used under the same injection port pressure and oven temperature program, which makes them an ideal pair for dual column analysis.

Some analysts prefer columns with internal diameters other than 0.32mm, and Rtx®-CLPesticides and Rtx®-CLPesticides2 columns with other IDs can be used without sacrificing resolution. Figure 2 shows these 20 pesticides exhibit the same resolution on 0.53mm ID columns, in the same analysis time, as on 0.32mm ID columns.

To increase lab efficiency and throughput, Rtx®-CLPesticides and Rtx®-CLPesticides2 columns can be used under fast analytical conditions, reducing analysis time to less than 14 minutes, as Figure 3 shows.

Column Deactivation

Rtx®-CLPesticides and Rtx®-CLPesticides2 columns incorporate our proprietary intermediate polarity deactivation to make the tubing surface non-adsorptive to active pesticides. A second version of CLPesticides columns, Stx™-CLPesticides and Stx™-CLPesticides2 columns, incorporate our Siltek® deactivation process, which makes the tubing surface virtually inert to endrin and other active compounds. These columns provide the ultimate performance for ppb on-column concentrations. Resolution on either column pair is not affected by the tubing deactivation.

Additional Applications

Laboratories strive to use one primary column / confirmation column pair for multiple methods, and Rtx®-CLPesticides and Rtx®-CLPesticides2 columns offer this convenience. In addition to organochlorine pesticides, compounds that are routinely analyzed by GC/ECD on these columns include triazine herbicides, chlorinated disinfection byproducts, haloacetic acids, and volatile chlorinated and brominated insecticides. Figures 4 - 6 demonstrate the versatility of Rtx®-CLPesticides and Rtx®-CLPesticides2 columns.

tech tip

A primary cause for downtime is system maintenance, to clean or replace contaminated injection port components. By using a "Y" connector to connect a guard column to an Rtx®-CLPesticides / Rtx®-CLPesticides2 column pair, one injection port and one injection of sample extract can be used for the primary and confirmation analysis. This cuts injection port maintenance by half, which greatly reduces downtime.
**Figure 1** Analyze and confirm 20 common organochlorine pesticides in 24 minutes, using an Rtx®-CLPesticides and Rtx®-CLPesticides2 column pair.

Rtx®-CLPesticides
30m, 0.32mm ID, 0.50µm
(cat.# 11139)

Rtx®-CLPesticides2
30m, 0.32mm ID, 0.25µm
(cat.# 11324)

Sample: Organochlorine Pesticide Mix AB#2 (cat.# 32292), Pesticide Surrogate Mix (cat. # 32000), 16-160pg each analyte on-column

Oven temp.: 120°C (hold 1 min.) to 300°C (hold 10 min.) @ 9°C/min.

Inj.: direct, Uniliner® inlet liner (cat.# 20335), 200°C

Detector: ECD, 300°C with anode purge

Dead time: 1.9 min.

Head pressure: 8.7psi (constant)

Flow rate: 1.3mL/min. @ 120°C, helium

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**Figure 2** 0.53mm ID Rtx®-CLPesticides and Rtx®-CLPesticides2 columns provide the same resolution as 0.32mm ID columns, in the same analysis time.

Rtx®-CLPesticides
30m, 0.53mm ID, 0.50µm
(cat.# 11140)

Rtx®-CLPesticides2
30m, 0.53mm ID, 0.42µm
(cat.# 11340)

Sample: Organochlorine Pesticide Mix AB#2 (cat.# 32292), Pesticide Surrogate Mix (cat. # 32000), 16-160pg each analyte on-column

Oven temp.: 120°C (hold 1 min.) to 300°C (hold 10 min.) @ 9°C/min.

Inj. port: direct, Uniliner® inlet liner (cat.# 20335), 200°C

Detector: ECD, 300°C with anode purge

Dead time: 1.9 min.

Head pressure: 3psi (constant)

Flow rate: 2.83mL/min. @ 120°C, helium

* surrogate standard
Figure 3: Fast GC conditions and Rtx®-CLPesticides / Rtx®-CLPesticides2 columns cut analysis time to less than 14 minutes.

Rtx®-CLPesticides
30m, 0.32mm ID, 0.50µm
(cat.# 11139)

Rtx®-CLPesticides2
30m, 0.32mm ID, 0.25µm
(cat.# 11324)

Sample: Organochlorine Pesticide Mix AB #2 (cat.# 32292)
8–80µg/mL each pesticide in hexane:toluene (1:1)
Pesticide Surrogate Mix (cat.#32000) 200µg/mL each surrogate in acetone
Inj.: 1.0µL direct, open-top drilled Uniliner® inlet liner (cat.# 21054)
Inj. temp.: 225°C
Carrier gas: helium, constant pressure
Linear velocity: 53cm/sec. @ 110°C
Oven temp.: 110°C (hold 1 min.) to 245°C @ 20°C/min. to 310°C (hold 1 min.)
Det.: ECD @ 330°C

1. 2,4,5,6-tetrachloro-m-xylene
2. α-BHC
3. γ-BHC
4. β-BHC
5. heptachlor
6. aldrin
7. heptachlor epoxide
8. γ-chlordane
9. α-chlordane
10. heptachlor epoxide
11. 4,4'-DDD
12. endosulfan I
13. dieldrin
14. endrin
15. 4,4'-DDT
16. endosulfan II
17. 4,4'-DDE
18. endrin aldehyde
19. methoxychlor
20. endosulfan sulfate
21. endrin ketone
22. decachlorobiphenyl

* surrogate standard

Figure 4: Chlorophenoxy acid herbicide derivatives are well resolved, with elution reversals, on Rtx®-CLPesticides / Rtx®-CLPesticides2 columns.

Rtx®-CLPesticides
30m, 0.32mm ID, 0.50µm
(cat.# 11139)

Rtx®-CLPesticides2
30m, 0.32mm ID, 0.25µm
(cat.# 11324)

Sample: derivatized chlorophenoxy herbicides, on-column conc.: 200–20,000pg/mL
Inj.: 1.0µL direct injection of Uniliner® inlet liner (cat.# 20335),
Oven temp.: 80°C (hold 1 min.) to 300°C @ 10°C/min. (hold 10 min.)
Inj. / det. temp.: 200°C/300°C
Carrier gas: helium
Inlet pressure: 12.5psi set @ 80°C
Det.: ECD w/anode purge

1. dalapon
2. 3,5-dichlorobenzoic acid
3. 4-nitroanisole
4. dicamba
5. MCPP
6. MCPA
7. dichlorprop
8. 2,4-D
9. pentachloroanisole
10. 2,4,5-TP
11. chloramben
12. 2,4,5-T
13. 2,4-DB
14. picloram
15. bentazon
16. dinoseb
17. DCPA
18. acifluorfen
Figure 5 Haloacetic acid methyl derivatives by US EPA Method 552.2 on Rtx*-CLPesticides / Rtx*-CLPesticides2 columns.

**Table:**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Retention Times</th>
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<tbody>
<tr>
<td>C = contaminant in solvent</td>
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<tr>
<td>Compounds analyzed as methyl derivatives</td>
<td></td>
</tr>
</tbody>
</table>

**Sample:** custom haloacetic acid methyl derivatives mix, 20-200µg/mL each component in MTBE

**Inj.:** 2µL splitless

**Oven temp.:** 40°C (hold 4 min.) to 200°C @ 14°C/min.

**Inj. temp.:** 200°C

**Carrier gas:** helium

**Linear velocity:** 46cm/sec.

**ECD temp.:** 300°C

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**GC_EV00399**

**Rtx*-CLPesticides**
30m, 0.32mm ID, 0.50µm
(cat.# 11139)

1. monochloroacetic acid MCAA
2. monobromoacetic acid MBAA
3. dichloroacetic acid DCAA
4. dalapon DL
5. 1,2,3-trichloropropane** IS
6. trichloroacetic acid TCAA
7. bromochloroacetic acid BCAA
8. dibromoacetic acid DBAA
9. bromodichloroacetic acid BDCAA
10. chlorodibromoacetic acid CDBAA
11. 2,3-dibromopropionic acid* SURR
12. tribromoacetic acid TBAA

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**GC_EV00400**

**Rtx*-CLPesticides2**
30m, 0.32mm ID, 0.25µm
(cat.# 11324)
**Figure 6** Volatile chlorinated and brominated insecticides by US EPA Method 504.1 on Rtx®-CLPesticides / Rtx®-CLPesticides2 columns.

**Rtx®-CLPesticides**
30m, 0.32mm ID, 0.50µm
(cat.# 11139)

**Rtx®-CLPesticides2**
30m, 0.32mm ID, 0.25µm
(cat.# 11324)

1. chloroform
2. bromodichloromethane
3. chlorodibromomethane
4. 1,2-dibromoethane (EDB)
5. 1,1,1,2-tetrachloroethane
6. bromoform
7. 1,2,3-trichloropropane
8. 1,2-dibromo-3-chloropropane (DBCP)

Dual-column analysis, using 0.32mm ID guard column (cat.# 10044), universal angled "Y" Press-Tight® connector (cat.# 20403),
Direct injection using a Uniliner® inlet liner (cat.#20335),
On-column conc.: 10pg each compound,
Oven temp.: 35°C (hold 2 min.) to 300°C @ 12°C/min.
Inj./det. temp.: 200°C/300°C
Carrier gas: helium, 12psi constant pressure.
### Rtx®-CLPesticides Columns (fused silica)

<table>
<thead>
<tr>
<th>ID</th>
<th>df (µm)</th>
<th>temp. limits</th>
<th>10-Meter</th>
<th>15-Meter</th>
<th>20-Meter</th>
<th>30-Meter</th>
<th>60-Meter</th>
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### Rtx®-CLPesticides2 Columns (fused silica)

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### Rtx®-CLPesticides Columns Kits

**0.25mm ID Rtx®-CLPesticides Kit**
- cat.# 11199 (Kit),
- Includes:
  - 30m, 0.25mm ID, 0.25µm Rtx®-CLPesticides Column
  - 30m, 0.25mm ID, 0.20µm Rtx®-CLPesticides2 Column
  - Universal Angled “Y” Press-Tight® Connector
  - 5m, 0.25mm ID Siltek® Guard Column
- cat. #
  - 11123
  - 11332
  - 20403
  - 10026

**0.32mm ID Rtx®-CLPesticides Kit**
- cat.# 11198 (Kit),
- Includes:
  - 30m, 0.32mm ID, 0.50µm Rtx®-CLPesticides Column
  - 30m, 0.32mm ID, 0.25µm Rtx®-CLPesticides2 Column
  - Universal Angled “Y” Press-Tight® Connector
  - 5m, 0.32mm ID Siltek® Guard Column
- cat. #
  - 11139
  - 11342
  - 20403
  - 10027

**0.53mm ID Rtx®-CLPesticides Kit**
- cat.# 11197 (Kit),
- Includes:
  - 30m, 0.53mm ID, 0.50µm Rtx®-CLPesticides Column
  - 30m, 0.53mm ID, 0.42µm Rtx®-CLPesticides2 Column
  - Universal Angled “Y” Press-Tight® Connector
  - 5m, 0.53mm ID Siltek® Guard Column
- cat. #
  - 11140
  - 11340
  - 20403
  - 10028

### Stx™-CLPesticides Columns (fused silica with Siltek® deactivation)

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### Stx™-CLPesticides2 Columns (fused silica with Siltek® deactivation)

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<td>-60 to 310/330°C</td>
<td>11442</td>
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**ordering note**
Custom lengths and film thicknesses available. Call Technical Service at 800-356-1688 or 814-353-1300, ext. 4, or contact your Restek representative.

**save money!**
Get six columns for the price of five. Call 800-356-1688, ext. 4, or contact your Restek representative, for details!
### Stx™-CLPesticides Columns Kits

<table>
<thead>
<tr>
<th>ID</th>
<th>Nominal OD</th>
<th>Description</th>
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<tr>
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<td>0.37 ± 0.04mm</td>
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<tr>
<td>0.53mm</td>
<td>0.69 ± 0.05mm</td>
<td>5m, 0.53mm ID Siltek® Guard Column</td>
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### Intermediate-Polarity Deactivated Fused Silica Guard Columns/Transfer Lines

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<th>5-Meter</th>
<th>5-Meter/6-pk.</th>
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<tr>
<td>0.32mm</td>
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<td>0.69 ± 0.05mm</td>
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### Siltek®-Deactivated Fused Silica Guard Columns/Transfer Lines

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<td>0.32mm</td>
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<tr>
<td>0.53mm</td>
<td>0.69 ± 0.05mm</td>
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<td>10038</td>
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### SeCure™ “Y” Connector Kits

- **SeCure**™ “Y” connector body, 3 knurled nuts, “Y” Universal Press-Tight® union, 3 ferrules.

<table>
<thead>
<tr>
<th>Description</th>
<th>Ferrules Fit Column ID</th>
<th>qty.</th>
<th>cat.#</th>
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<td>kit</td>
<td>20276</td>
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<td>SeCure™ “Y” Connector Kit</td>
<td>0.28/0.32mm</td>
<td>kit</td>
<td>20277</td>
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<td>SeCure™ “Y” Connector Kit</td>
<td>0.45/0.53mm</td>
<td>kit</td>
<td>20278</td>
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<td>Knurled nut</td>
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<td>3-pk.</td>
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