Tools I Can’t Live Without: Speed Up Method Development and Translation, Essentials for GC and GC/MS Users

Michelle Misselwitz, Julie Kowalski, Jack Cochran, Becca Stevens

michelle.misselwitz@restek.com
We need a new method developed… YESTERDAY!

You have:
Analyte list

You need:
GC column and instrument conditions
Speed Up and Simplify GC Method Development With Restek’s EZGC® Online Suite

- EZGC® Method Translator
- EZGC® Flow Calculator
- EZGC® Chromatogram Modeler

New! EZGC® Method Translator and Flow Calculator

2014 TASIA Award Winner

EZGC® Chromatogram Modeler
EZGC® Chromatogram Modeler

Enter compound names, synonyms, or CAS #s.

Examples:
1,4-dioxane
acetaldehyde, ethanol and isopropyl alcohol

Welcome to the Restek EZGC® Chromatogram Modeler, the easiest way to jump-start your method development! To get started, enter the compounds you wish to separate into the field above. To paste a list, first click the link "I need to paste a list" underneath the input field.

Browser requirements
To get the best results from the EZGC® modeler, we recommend one of the following browsers:
- Firefox (desktop or Android tablet)
- Chrome (Windows or Mac desktop or Android tablet)
- IE 8 or IE 9 or above (Windows desktop)
- Safari (desktop or iPad tablet)
- Opera (desktop or mobile)

Learn EZGC® in 5 Minutes!
Find out how easy it is to get started with the EZGC® app in this brief screencast.

Watch the Video

It’s Easy, but Powerful!
Restek Innovations Laboratory Manager Chris English goes into detail about how to get the most out of the EZGC modeler.

Watch the Video
Send Us Your Feedback!

EZGC® Chromatogram Modeler

Enter a compound name, synonym or CAS #, one per line.

Go

2,4'-DDD(x), 2,4'-DDE(x), 4,4'-DDD(x), 4,4'-DDE(x), 4,4'-DDT(x), 4,4'-Dibromobiphenyl(x), Captan(x), Carbofuran(x), Chlorobenzilate(x), Dichlorobiphenyl(x), Dibutyl chlorendate(x), Dicofol(x), Dieldrin(x), Endosulfan I(x), Endosulfan II(x), Endosulfan sulfate(x), Endrin(x), Endrin aldehyde(x), Endrin ketone(x), Heptachlor epoxide(x), Isodrin(x), Kepone(x), Methoxychlor(x), Mirex(x), Show All...

The following compounds were not found:
- a-chlordane(x)
- acifluorfen me(x)
- γ-chlordane(x)

Need more help?
Send this list to Restek Technical Service with your questions.

Untitled. Click here to edit.

Peaks | Ret. Time (ts) | Res. (R̂) | Peak Width
---|---|---|---
1. Isodrin | 30.21 | 8.31 | 0.10
2. Captan | 31.05 | 8.31 | 0.10
3. Heptachlor epoxide | 31.05 | 8.31 | 0.10
4. 2,4'-DDD | 32.14 | 3.58 | 0.10
5. 2,4'-DDE | 32.49 | 3.58 | 0.10
6. Endosulfan I | 33.00 | 1.02 | 0.10
7. cis-Nonachlor | 33.10 | 1.02 | 0.10
8. 4,4'-DDD | 34.08 | 2.51 | 0.10
9. Dieldrin | 34.33 | 2.14 | 0.10
10. 2,4'-DDD | 34.55 | 2.14 | 0.10
11. Perthane | 35.01 | 3.97 | 0.10
12. Endrin | 35.39 | 3.97 | 0.10
13. Endosulfan I | 35.63 | 4.12 | 0.10
14. trans-Nonachlor | 36.29 | 1.63 | 0.10
15. Kepone | 36.46 | 0.13 | 0.10
16. Chlorobenzilate | 36.47 | 0.13 | 0.10
17. 4,4'-DDD | 36.76 | 2.94 | 0.10
18. Endosulfan II | 37.13 | 1.96 | 0.10
19. Carbofuran(x) | 37.34 | 1.96 | 0.10
20. Endrin aldehyde | 37.70 | 3.26 | 0.10
21. 4,4'-DDT | 38.04 | 3.26 | 0.10
22. Endosulfan sulfate | 39.11 | 10.60 | 0.10
23. Methoxychlor | 40.42 | 3.10 | 0.10
24. Dibutyl chlorendate | 40.70 | 1.94 | 0.10
25. Endrin ketone | 40.92 | 1.56 | 0.10
26. Dicofol | 41.09 | 1.56 | 0.10
27. Mirex | 42.69 | 13.10 | 0.10
28. cis-Permethrin | 44.14 | 4.07 | 0.10
29. trans-Permethrin | 44.54 | 4.07 | 0.10
30. 4,4'-DDT | 47.47 | 29.80 | 0.10

My EZGC® Models

Untitled

Product Suggestions
- Rtx®-PCB Columns
  - Cat. # 12220
  - $537.00/ea.

View/edit full list

Not found: a-chlordane, acifluorfen me, γ-chlordane
Not found: a-chordane, acifluorfen me, y chlo.
We need a new method developed... YESTERDAY!

You have:
- Analyte list
- GC column

You need:
- GC instrument conditions
We need to know…

Flow rate

Oven program

Accurate column length

Initial oven temperature

Splitless hold time
Optimal Flow for GC

SOF  EOF
Optimal Flow for GC

SOF

Speed
Optimized Flow

EOF

Efficiency
Optimized Flow
Theory of Fast Capillary Gas Chromatography – Part 3: Column Performance vs. Gas Flow Rate

Leonid M. Blumberg

Fast GC Consulting, PO Box 585, Hockessin, DE 19707, USA

Ms received: June 2, 1998; accepted: October 15, 1998

Key Words: Constant length optimization; constant efficiency optimization; efficiency-optimized flow rate; fast GC; film inefficiency factor; high pressure drop; speed-optimized flow rate

Summary

At the high pressure drop required for the fast analysis of complex mixtures, the equations for the column plate height, $H$, and plate duration, $Q$, as functions of the carrier gas velocity, $u$, differ substantially from the equations for the same quantities expressed via the carrier gas flow rate, $F$. While $u$ as an independent pneumatic variable is more convenient for the theoretical studies, $F$ is a more convenient as a control parameter in practical applications. Equations for $H$ vs. $u$ and for $Q$ vs. $u$ from Parts 1 and 2 are transformed here into expressions for $H$ vs. $F$ and $Q$ vs. $F$. An efficiency-optimized flow rate (EOF) and a speed-optimized flow rate (SOF) are found. Expressions for these two quantities are considerably simpler than their velocity-based counterparts. In particular, SOF does not depend on column length, film thickness, and pressure drop.

1 Introduction

This report continues the study [1, 2] of the speed-separation performance of a capillary column having an arbitrary film thickness and operating at an arbitrary pressure drop.

Speed-Optimized Flow and Efficiency-Optimized Flow

At a low pressure drop, the structure of the equations for the plate height, $h$, and plate duration, $q$, does not depend on the type of the independent pneumatic variable. Thus,

$$h = \frac{b}{w} + cw, \quad q = \frac{b}{w^2} + c$$

are, respectively. Van Deemter and Pumell [5, 6] equations in which the independent variable $w$ can be either $u$ or $F$ (or the column pressure drop) while $b$ and $c$ are the coefficients whose values do not change with the change in the value of $w$.

At the high pressure drop, however, the structure of the expression for both the plate height, $H$, and the plate duration, $Q$, depends on the selection of the independent pneumatic variable. Thus, for example, as a function of $u$, $H$ can be expressed as (see Part 1)

$$H = \frac{B}{u^2} + C_1u^2 + C_2u$$
Dear Editor,

I would like to bring to attention of the readers of your Journal that

• widely accepted formula for a column plate height \((H)\) in GC is incorrect, and that
• carrier gas average velocity \((\bar{u})\) is not the best variable for describing \(H\) as a function of a gas flow in GC columns.
Van Deemter Plot

Average Linear Velocity

$N_2$

$H_2$
Dear Editor,

I would like to bring to attention of the readers of your Journal that

- widely accepted formula for a column plate height \((H)\) in GC is incorrect, and that
- carrier gas average velocity \((\bar{u})\) is not the best variable for describing \(H\) as a function of a gas flow in GC columns.
Optimal Flow for GC

SOF (Speed Optimized Flow)

Column ID × constant

- Helium:
  8 × column ID
  8 × 0.25 = 2.0 mL/min

- Hydrogen:
  10 × column ID
  10 × 0.25 = 2.5 mL/min

EOF (Efficiency Optimized Flow)

\[
\text{SOF} = \frac{2.0}{\sqrt{2}} = 1.4 \text{ mL/min}
\]

\[
\text{Helium} \quad 2.0 / \sqrt{2} = 1.4 \text{ mL/min}
\]

\[
\text{Hydrogen} \quad 2.5 / \sqrt{2} = 1.8 \text{ mL/min}
\]
Optimal Flow for GC

**SOF**

*Speed Optimized Flow*

Helium, 0.25 mm ID  
2.0 mL/min

**EOF**

*Efficiency Optimized Flow*

Helium, 0.25 mm ID  
1.4 mL/min

✓ Considerably simpler than velocity-based
✓ SOF does not depend on column length, film thickness, and pressure drop
We need to know…

- Flow rate
- Oven program
- Accurate column length
- Initial oven temperature
- Splitless hold time
Optimal Heating Rate in Gas Chromatography

L. M. Blumberg,1 M. S. Klee2

1 Fast GC Consulting, P.O. Box 585, Hockessin, DE 19707, USA
2 Agilent Technologies, 2850 Centerville Road, Wilmington, DE 19808, USA

Received 8 June 2000; accepted 15 September 2000

J. Microcolumn Separations, 12 (9) 508-514 (2000)

Abstract: Several optimization criteria for column heating rate in temperature programmed gas chromatography (GC), under different optimization constraints are identified. Applying these criteria to experimental data, it is shown that when column pressure drop is high, the optimum heating rate for n-alkanes and pesticides in a column with a silicone stationary phase of a typical thickness is about 10°C per void time. This heating rate is recommended as a default for all temperature programs in capillary GC. © 2000 John Wiley & Sons, Inc. J Micro Sep 12: 508–514, 2000

Key words: gas chromatography; optimal heating rate; separation-speed tradeoff
Optimal Heating Rate for GCC

• Adequate separation of a required number of solutes in the shortest time
  – Maximizing peak capacity
  – Minimizing analysis time

• NOT aimed specifically at separating specific pairs of solutes

10°C

$\text{t}_M$

Air injection
100 split, 0.1 µL
Scan 25-100
Optimal Heating Rate for GCC

\[
\frac{10^\circ C}{t_M} \rightarrow \frac{10^\circ C}{1.18 \text{ min}} = 8.5^\circ C/\text{min}
\]
We need to know…

- Flow rate
- Oven program
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- Initial oven temperature
- Splitless hold time
**EZGC™ Method Translator and Flow Calculator**

- [http://www.restek.com/ezgc-mtfc](http://www.restek.com/ezgc-mtfc)
- Available in a web-based version
- Or, download the app from the link above
- Windows 8 – 7 – Vista – XP
### EZGC™ Method Translator

<table>
<thead>
<tr>
<th>Carrier Gas</th>
<th>Original</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier Gas</td>
<td>Helium</td>
<td>Helium</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Column</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>30.00 m</td>
<td>15.00 m</td>
</tr>
<tr>
<td>Inner Diameter</td>
<td>0.25 mm</td>
<td>0.25 mm</td>
</tr>
<tr>
<td>Film Thickness</td>
<td>0.25 µm</td>
<td>0.25 µm</td>
</tr>
<tr>
<td>Phase Ratio</td>
<td>250</td>
<td>250</td>
</tr>
</tbody>
</table>

| Control Parameters | | |
|--------------------|-----------------|
| Outlet Flow        | 1.40 mL/min     |
| Average Velocity   | 42.74 cm/sec    |
| Holdup Time        | 1.17 min        |
| Inlet Pressure     | 11.42 psi       |
| Outlet Pressure (abs) | 0.00 psi | 0.00 psi |

### EZGC™ Flow Calculator

<table>
<thead>
<tr>
<th>Carrier Gas</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier Gas</td>
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<td>Length</td>
<td>30.00 m</td>
<td></td>
</tr>
<tr>
<td>Inner Diameter</td>
<td>0.25 mm</td>
<td></td>
</tr>
<tr>
<td>Film Thickness</td>
<td>0.25 µm</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>40.00 °C</td>
<td></td>
</tr>
</tbody>
</table>

| Control Parameters | | |
|--------------------|-----------------|
| Outlet Flow        | Optimum Range 1.4 to 2.0 mL/min |
| Average Velocity   | 42.74 cm/sec    |
| Holdup Time        | 1.17 min        |
| Inlet Pressure     | 11.42 psi       |
| Outlet Pressure (abs) | 0.00 psi | 0.00 psi |

### Oven Program

- **Isothermal**: Ramp Rate (°C/min) | Temp (°C) | Hold Time (min) | Ramp Rate (°C/min) | Temp (°C) | Hold Time (min)
- **Ramps**: Number of Ramps (1-4) | Ramp Rate (°C/min) | Temp (°C) | Hold Time (min) | Ramp Rate (°C/min) | Temp (°C) | Hold Time (min)

- 1 Isotropic
- 40 Ramps

### Control Method

- Constant Flow

### Results

- **Efficiency**: Solve for
- **Speed**: 2.83 x
- **Translate**: 1.17 to 1.5 min
- **Custom**: 1.00 mL

- **Run Time**: 36.12 min
- **Splitless Valve Time**: 1.1 to 1.5 min

- **Flow**: 1.40 mL/min
- **Outlet Pressure (abs)**: 0.00 psi
- **Temperature**: 250.00 °C

- **Liner Volume**: 1.00 mL

- **Use MT Original Values**
- **Use MT Translation Values**

**Download**

EZGC™ Method Translator and Flow Calculator

For Windows 8/7/Vista/XP
**GC Column Length Determination**

- Using Holdup Time and the Flow Calculator
- Upon initial GC column installation
- Enables accurate Electronic Pneumatic Control of GC carrier gas flow

- Also used after column trimming
The Flow Calculator shows 1.14 min as Holdup Time, but the actual value is 1.20 min. Therefore, the column must be longer than 30 meters.
**EZGC™ Flow Calculator**

**Carrier Gas**
- Helium

**Column**
- Length: 30.00 m
- Inner Diameter: 0.25 mm
- Film Thickness: 0.25 μm
- Temperature: 90 °C

**Control Parameters**
- Outlet Flow: 1.40 mL/min
- Average Velocity: 43.73 cm/sec
- Holdup Time: 1.14 min
- Inlet Pressure (gauge): 14.91 psi
- Outlet Pressure (abs): 0.00 psi

**Inlet**
- Temperature: 250 °C
- Liner Volume: 0.99 mL
- Flow: 1.23 mL/min
- Splitless Valve Time: 1.2 to 1.7 min

**Instructions**
- Double click here to "lock" Inlet Pressure.
- Click the "spinner" to increase Length.
- The "spinner" advances the Holdup Time.
Holdup Times measured and from Flow Calculator now match.

Column is 30.7m.

Electronic Pneumatic Control will be accurate!
Holdup Times measured and from Flow Calculator now match.

Column is 30.7m.

Electronic Pneumatic Control will be accurate!
### Combining Optimized Flow and Optimal Heating Rate

<table>
<thead>
<tr>
<th>GC Column</th>
<th>Detector</th>
<th>He EOF mL/min</th>
<th>Avg Vel cm/sec</th>
<th>Holdup time (min)</th>
<th>OHR °C/min</th>
<th>Anal time min</th>
</tr>
</thead>
<tbody>
<tr>
<td>60m x 0.25mm x 0.25µm</td>
<td>MS</td>
<td>1.4</td>
<td>31</td>
<td>3.23</td>
<td>3.1</td>
<td>74.2</td>
</tr>
<tr>
<td>30m x 0.25mm x 0.25µm</td>
<td>MS</td>
<td>1.4</td>
<td>44</td>
<td>1.14</td>
<td>8.8</td>
<td>26.1</td>
</tr>
<tr>
<td>15m x 0.25mm x 0.25µm</td>
<td>MS</td>
<td>1.4</td>
<td>62</td>
<td>0.40</td>
<td>25.0</td>
<td>9.2</td>
</tr>
<tr>
<td>20m x 0.18mm x 0.18µm</td>
<td>MS</td>
<td>1.0</td>
<td>39</td>
<td>0.74</td>
<td>13.5</td>
<td>17.0</td>
</tr>
<tr>
<td>60m x 0.25mm x 0.25µm</td>
<td>ECD</td>
<td>1.4</td>
<td>27</td>
<td>3.71</td>
<td>2.7</td>
<td>85.1</td>
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<tr>
<td>30m x 0.25mm x 0.25µm</td>
<td>ECD</td>
<td>1.4</td>
<td>35</td>
<td>1.45</td>
<td>6.9</td>
<td>33.3</td>
</tr>
<tr>
<td>15m x 0.25mm x 0.25µm</td>
<td>ECD</td>
<td>1.4</td>
<td>42</td>
<td>0.60</td>
<td>16.7</td>
<td>13.8</td>
</tr>
</tbody>
</table>

- Mass spectrometer is a vacuum-outlet detector.
- Holdup time is at 90°C.
- Analysis time is based on 90 to 320°C oven program.
Methiocarb 30.7m x 0.25mm x 0.25µm Rxi-5ms

1.4 mL/min
8.5°C/min

Fenthion
Chlorpyrifos
Dichlofluanid
Pirimiphos methyl
Malathion
30.7m x 0.25mm x 0.25µm Rxi-5ms

1.0 mL/min; 7.1°C/min
18.41min

Efficiency-optimized flow
1.4 mL/min; 8.5°C/min
15.45min

Speed-optimized flow
2.0 mL/min; 10.1°C/min
13.00min
30.7m x 0.25mm x 0.25µm Rxi-5ms

Efficiency-optimized flow

1.4 mL/min; 8.5°C/min
15.45min

Speed-optimized flow

2.0 mL/min; 10.1°C/min
13.00min

4.0 mL/min; 14.3°C/min
9.23min
We need to know...

- Flow rate
- Oven program
- Accurate column length
- Initial oven temperature
- Splitless hold time
Initial Oven Temperature

**ANALYTE FOCUSING**
Cold trap analytes ONLY

**SOLVENT FOCUSING**
Cold trap analytes AND solvent
Initial Oven Temperature

SOLVENT FOCUSING

Boiling point of 1\textsuperscript{st} analyte

Boiling point of solvent

20-40°C lower

Initial Oven Temperature
Initial Oven Temperature

ANALYTE FOCUSING

Boiling point of 1st analyte

20°C lower

60-80°C

20°C higher

Boiling point of solvent
Solvent Focusing: Solvent Polarity Mismatch

Mismatched Polarity

solvent will bead or puddle

Polarity Match

even wetting by solvent

If solvent boiling point is NOT below that of lowest analyte boiling point focusing of both solvent and analytes
Initial Oven Temperature

**Solvent Focused:**
Acetonitrile enters column as liquid and beads because of solvent/stationary phase mismatch.

**Analyte Focused:**
Acetonitrile is flash vaporized and not cold trapped (condenses) on the front of the column.

**No Cold Trapping**
Both the acetonitrile and analyte (o-Phenylphenol) are NOT cold trapped effectively on the front of the column.

o-Phenylphenol, XIC at m/z 170
We need to know…

- Flow rate
- Oven program
- Accurate column length
- Initial oven temperature
- Splitless hold time
Splitless Valve Time

Calculating the Splitless Valve Time with the Flow Calculator
Calculating the GC Inlet Liner Volume for Splitless Valve Time

- Volume of a cylinder
  \[ V = \pi r^2 h \]

- Inlet liner for Agilent GC
  - \( 3.1416 \) (\( \pi \))
  - 4 mm diameter, 2 mm radius (r)
  - 78.5 mm height (h)

- Liner \( V = 986 \, \mu\text{L} \enspace (0.99 \, \text{mL}) \)
  - Ignore wool and taper
Calculating the GC Inlet Liner Volume for Splitless Valve Time

Liner volume 0.99 mL
Want 1.5 to 2x sweep...

EZGC™ Flow Calculator
Splitless Valve Time range is 1.2 to 1.7 min.
Normalized Response

2 to 1.5x inlet flow sweep of Sky 4mm single taper with wool liner

Splitless Valve Time (min)
We need to know…

- Flow rate
- Oven program
- Accurate column length
- Initial oven temperature
- Splitless hold time
• Increasing speed of analysis
  – Decreasing column L and/or ID
  – Switching to a faster carrier gas (e.g., He to H₂)

• Updating oven temperature program after column trimming for maintenance

• Improving Original methods in separation and/or speed of analysis

Translating methods from GC-FID (or other atmospheric outlet detector) to GC-MS (vacuum outlet) or vice versa
<table>
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<td>Phase Ratio</td>
<td>250</td>
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<tr>
<th>Control Parameters</th>
<th>Original</th>
<th>Translation</th>
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<tbody>
<tr>
<td>Outlet Flow</td>
<td>1.40 mL/min</td>
<td>1.40 mL/min</td>
</tr>
<tr>
<td>Average Velocity</td>
<td>42.74 cm/sec</td>
<td>60.44 cm/sec</td>
</tr>
<tr>
<td>Holdup Time</td>
<td>1.17 min</td>
<td>0.41 min</td>
</tr>
<tr>
<td>Inlet Pressure</td>
<td>11.42 psi</td>
<td>3.77 psi</td>
</tr>
<tr>
<td>Outlet Pressure (abs)</td>
<td>0.00 psi</td>
<td>0.00 psi</td>
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<tr>
<th>Oven Program</th>
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<td>Ramp Rate (°C/min)</td>
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<tr>
<td>Temp (°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hold Time (min)</td>
<td></td>
<td></td>
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<tr>
<td>Number of Ramps</td>
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<td>40</td>
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<tr>
<td>(1-4)</td>
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<table>
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<tr>
<td>Constant Flow</td>
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<table>
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<tr>
<th>Results</th>
<th>Solve for</th>
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<td>Run Time</td>
<td>36.12 min</td>
<td>12.78 min</td>
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<tr>
<td>Speed</td>
<td></td>
<td>2.83 X</td>
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<table>
<thead>
<tr>
<th>Use Flow Calculator Values</th>
<th>Use MT Original Values</th>
<th>Use MT Translation Values</th>
</tr>
</thead>
</table>

Download
EZGC™ Method Translator and Flow Calculator
For Windows 8/7/Vista/XP
The EZGC™ Method Translator is a tool built for gas chromatography (GC) method development. Generally, the goal of Method Translation is to allow alteration of GC column format, carrier gas, flow, etc., while keeping peak elution order—NOT retention times—the same. (Note that Method Translation assumes that the GC stationary phase type remains the same between Original and Translation methods.)

Some of the most practical uses for Restek's EZGC™ Method Translator are listed below:

- Increasing speed of analysis through decreasing column length and/or decreasing inner diameter and/or switching to a faster carrier gas (e.g., going from helium to hydrogen).
- Updating the oven temperature program through Translation after column trimming for maintenance so peak elution orders do not change.
- Improving Original methods in separation and/or speed of analysis by solving for Efficiency or Speed in Translation.
- Translating methods from GC-FID (or other atmospheric outlet detector) to GC-MS (vacuum outlet) or vice versa.

Basic Navigation in the EZGC™ Method Translator and Flow Calculator

"White" cells are user-entry cells. "Blue" cells are locked cells that contain calculated values. In the Method Translator, the Translation’s Control Parameters can be unlocked by selecting the Custom translation method in the Results section.

Highlighting numerical values using the mouse allows easy user entry of new values. A double mouse click in any user-entry cell highlights the value automatically for user entry. Hitting the Tab key while in a cell updates the cell with the user entered value and moves to the next cell for additional user entry, if necessary.

In the Control Parameters section for both the Method Translator and Flow Calculator, a double mouse click in the Outlet Flow, Average Velocity, Holdup Time, or Inlet Pressure cell will make that cell the "set point" around which the other control parameters are calculated. Column dimensions (and Temperature, in the Flow Calculator) can then be changed, and the set point value will remain fixed. A blue arrow denotes the "set point" cell.
Column Trimming for Maintenance

Before

After injecting that DIRTY extract!!
No Method Translation

- Trimming column for maintenance
- But, not updating column length for flow control
- And, updating column length, but not translating oven temperature program

I just want to trim my column and change NOTHING!
What if you don’t translate?

I just want to trim my column and change NOTHING!

I will input my new column length but NOT my oven program rate!
30.7m x 0.25mm x 0.25µm Rxi-5ms

Original Method

- Fenthion
- Chlorpyrifos
- Aldrin
- Malathion
- Parathion
29.6m x 0.25mm x 0.25µm Rxi-5ms

No column length update or method translation

Malathion

Aldrin

Fenthion

Chlorpyrifos

Parathion
27.6m x 0.25mm x 0.25µm Rxi-5ms

No column length update or method translation
23.7m x 0.25mm x 0.25µm Rxi-5ms

I will change my column length but that is IT!!
After column trimming, use “Speed” to predict new retention times.

Actual retention times previous method divided by “Speed” factor = predicted retention times for translated method.
After column trimming, use “Speed” to predict new retention times.

Actual retention times previous method divided by “Speed” factor = predicted retention times for translated method.
Increasing speed of analysis
Decreasing column L and/or ID
Switching to a faster carrier gas (e.g., He to H₂)
Method Translator sets flow and oven rate for Translation column.
Methiocarb 30.7m x 0.25mm x 0.25µm Rxi-5ms

90°C (0.1 min), 8.5°C/min to 320°C

Pirimiphos methyl

Dichlofluanid

Malathion

Chlorpyrifos 15.45min

He 1.4 mL/min

20.1m x 0.18mm x 0.18µm Rxi-5ms

90°C (0.1 min), 13.6°C/min to 320°C

He 1.0 mL/min

9.59min
Results

<table>
<thead>
<tr>
<th>Solve for</th>
<th>Efficiency</th>
<th>Speed</th>
<th>Translate</th>
<th>Custom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run Time</td>
<td>29.34</td>
<td>18.35</td>
<td></td>
<td>5.00</td>
</tr>
<tr>
<td>Speed</td>
<td>15.45 / 9.59 = 1.61</td>
<td>1.60 x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Methiocarb
30.7m x 0.25mm x 0.25µm Rxi-5ms

90°C (0.1 min), 8.5°C/min to 320°C

Fenthion

Dichlofluanid

Pirimiphos methyl

Malathion

He 1.4 mL/min

Chlorpyrifos

15.45min

90°C (0.1 min), 13.6°C/min to 320°C

Malathion

He 1.0 mL/min

9.59min
Helium to Hydrogen Carrier Gas

- 20m x 0.18mm x 0.18µm
20.1m x 0.18mm x 0.18μm Rxi-5ms

Helium at 1.0 mL/min
Oven at 13.6°C/min

Methiocarb
Pirimiphos methyl
Dichlofluanid
Malathion
Fenthion
Chlorpyrifos

Hydrogen at 1.3 mL/min
Oven at 22.8°C/min

9.59min
5.75min
Efficiency

Helium at 1.0 mL/min
Oven at 13.6°C/min

Methiocarb
Pirimiphos methyl
Dichlofluanid
Malathion

Fenthion
Chlorpyrifos

20.1m x 0.18mm x 0.18µm Rxi-5ms

Speed

Hydrogen 1.8 mL/min
Oven at 27.2°C/min

4.85min
9.59min
Simplify Method Development

- SOF, EOF and OHR
- EZGC Chromatogram Modeler
- EZGC Flow Calculator
- EZGC Method Translator

THANK YOU!!

YOU WANT TO HEAR A JOKE ABOUT NITRIC OXIDE?
NO

ONCE, I TOLD A CHEMISTRY JOKE
THERE WAS NO REACTION