

# Agilent Multimode Inlet for Gas Chromatography

## Technical Note

### Agilent Multimode Inlet for the 7890A GC

Designed to give you ease of use and maximum flexibility, the Agilent Multimode Inlet does everything the standard split/splitless (S/SL) inlet can do and a great deal more. The inlet uses the same Turn Top easy maintenance features and the same liners and septa as our standard S/SL inlet, and offers:

- Enhanced sensitivity to improve the quality of your results
- Simplified solvent removal
- Minimal decomposition or degradation of thermally labile samples such as organophosphorus, organochlorines, triazines, phenylureas and carbamates
- Elimination of needle discrimination with compounds such as triglycerides, PCBs, PAH, and hydrocarbons
- Minimized matrix effects with dirty samples



**Agilent Technologies**

## Multimode Inlet Capabilities

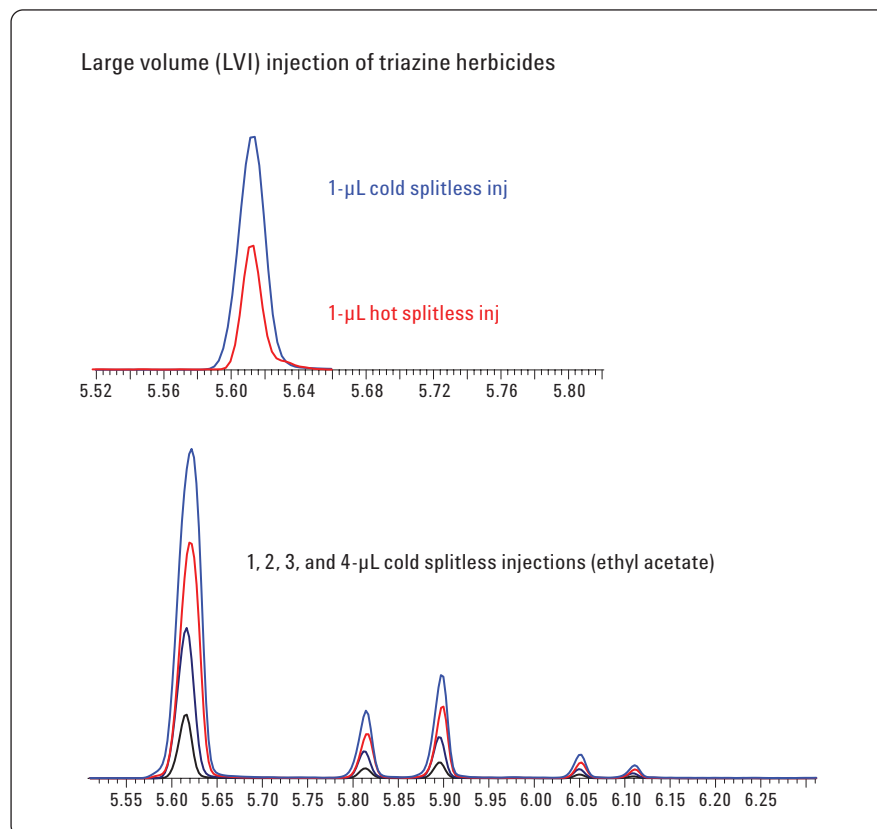
### The Challenge: Lowering Detection Limits

Today's detection requirements can challenge even the most selective and sensitive gas chromatograph (GC) detectors. To achieve highly sensitive detection, you can concentrate samples or reduce interferences during sample preparation, but these steps are time-consuming and costly.

### Practical Solution

A practical, time-saving solution is to introduce more sample into the GC column. However, introducing large volumes of solvent can sometimes cause severe band broadening, peak deformation, and column or detector damage. The Agilent 7890 Series GC systems eliminate such problems and provide the flexibility of more than one large volume injection option:

- You can introduce larger samples (5  $\mu\text{L}$  to 250  $\mu\text{L}$  or more) with Agilent 7890 Series GC systems configured with a Multimode Inlet. This lets you push detection limits down by one or two orders of magnitude while keeping the sample throughput and quality of results high.

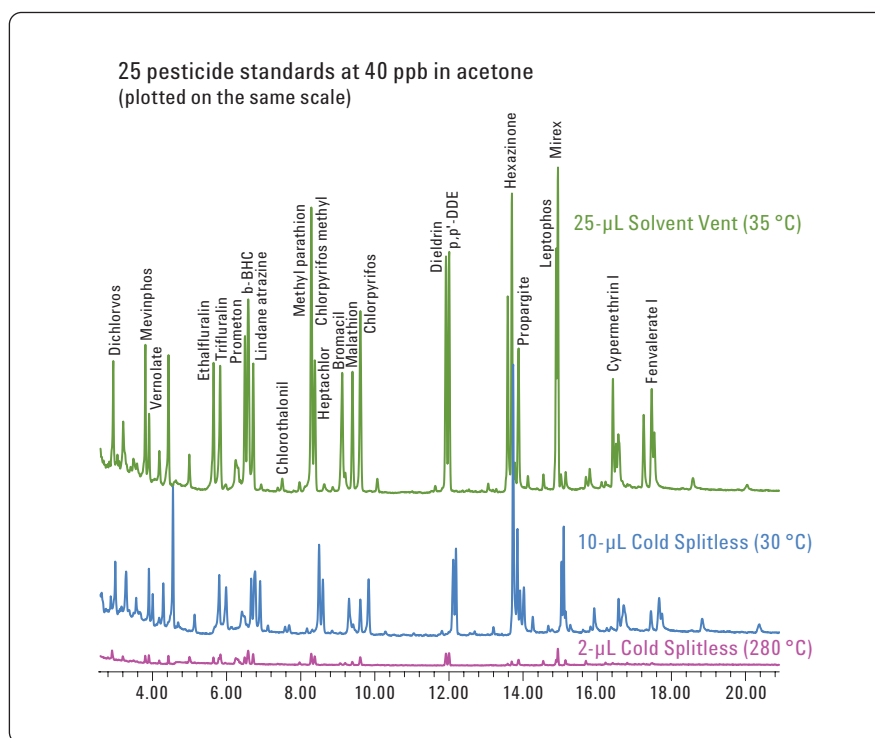


*The top chromatogram using the Multimode Inlet for 1- $\mu\text{L}$  Cold Splitless Injections, response is improved relative to that of the equivalent volume hot injection. In the bottom chromatogram Cold Splitless injection also facilitates larger volume injections while maintaining chromatographic performance.*

- If needed, you can use a pressure pulse with your Multimode Inlet just as you can a standard Agilent split/splitless inlet.

### Multimode Inlet for Complex Matrices

The Multimode Inlet is excellent for complex sample matrices and late eluters, making it particularly useful for pesticides, PAHs, food extracts, biological fluids, and wastewater extracts. A high flow of carrier gas evaporates the solvent inside the cooled inlet liner, causing the semivolatile compounds to concentrate there. You can inject up to 250  $\mu\text{L}$  in a single injection or up to 500  $\mu\text{L}$  with multiple injections.



*The power of the Multimode Inlet: Shown on the same scale, total ion chromatograms of test mix indicate the improved response possible using cold splitless or solvent vent mode.*

## Maximum Ease of Use and Excellent Performance

Solvent Elimination Calculator

Agilent Solvent Elimination Calculation Wizard

Welcome to the Solvent Elimination Calculator!

Please supply the following information.

If you don't know the first analyte boiling point, leave it at 150 °C.

Solvent: acetone

Injection Volume (μL): 25 μL

Boiling Point of first eluting analyte (°C): 150 °C

Buttons: LVI Method Help, Next, Cancel, Help

Solvent Elimination Calculator

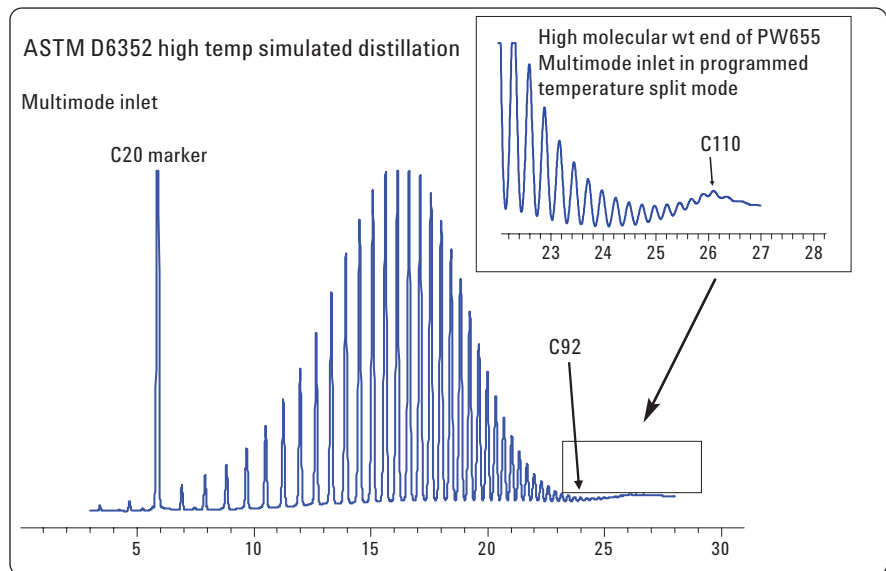
Agilent Solvent Elimination Calculation Wizard

Confirm Copy values to Method Editor.  
(Check parameters to change.)

|   |            |
|---|------------|
| <input checked="" type="checkbox"/> Inlet temperature | 35 °C      |
| <input checked="" type="checkbox"/> Inlet hold time   | 0.33 min   |
| <input checked="" type="checkbox"/> First ramp rate   | 600 °C/min |
| <input checked="" type="checkbox"/> First temperature | 325 °C     |
| <input checked="" type="checkbox"/> First hold time   | 5 min      |
| <input checked="" type="checkbox"/> Vent time         | 0.33 min   |
| <input checked="" type="checkbox"/> Vent pressure     | 5 psi      |
| <input checked="" type="checkbox"/> Vent flow rate    | 150 mL/min |
| <input checked="" type="checkbox"/> Purge time        | 2.83 min   |
| <input checked="" type="checkbox"/> Purge flow rate   | 60 mL/min  |
| <input checked="" type="checkbox"/> Injection rate    | 75 μL/min  |
| <input type="checkbox"/> Oven initial temperature     | 50 °C      |
| <input type="checkbox"/> Oven initial hold time       | 2.83 min   |

Buttons: LVI Method Help, Previous, Confirm and Copy, Cancel, Help

Use the Agilent Solvent Elimination Calculator to develop your solvent vent parameters. Input your solvent choice, injection volume and boiling point of first analyte and suggested starting inlet parameters are calculated for you. Once calculated, you have the choice of copying values to the method editor.



The Multimode Inlet can also be used for High Temperature Applications such as the Automated Preparation of Simulated Distillation Samples for ASTM Methods D2887, D7213, D7398 and D6352 using a Dual Tower 7693A and Tray (Agilent Technologies publication 5990-3778EN).

## The Bonus: Reduced Sample Preparation

Large volume injection concentrates the sample within the inlet and reduces or eliminates the need for manual concentration steps. You can also use large volume injection to decrease the size requirement of your original sample, which lowers solvent consumption and waste by a factor of ten or more. The result is significantly improved laboratory throughput, higher quality results, and lower operating costs.

### Multimode Inlet Specifications

|   |   |
|---|---|
| Cryogenic Cooling   | Liquid N <sub>2</sub> to -160 °C, liquid CO <sub>2</sub> to -70 °C        |
| Air cooling   | To ambient +10 °C with oven temperature <50 °C                            |
| Heating Rate  | Up to 900 °C per minute   |
| Maximum Temperature   | 450 °C  |
| Temperature Programming   | Up to 10 ramps at up to 900 °C/min  |
| Injection Modes   | Hot or cold split/splitless, pulsed split/splitless, solvent vent, direct |
| Capillary column suitability  | All (50 µm to 530 µm)   |
| EPC pressure range  | 0 to 100 psig   |
| Split ratio   | Up to 7500 to 1 to avoid column overload                                  |
| Total flow setting range  | 0 to 200 mL/min N <sub>2</sub> , 0 to 1,250 mL/min H <sub>2</sub> or He   |
| Compatible with Merlin Microseal septum   | Yes   |
| Setup of parameters facilitated with Agilent Solvent Elimination Calculator                                 | Yes   |
| Compatible with Turn Top Inlet Sealing System for quick, easy liner changes                                 | Yes   |
| Splitless mode for trace analysis. Pressure pulsed splitless is easily accessible for improved performance. | Yes   |
| Electronic septum purge flow control  | Yes   |
| Solvent elimination mode  | Yes   |

## For More Information

For more information on our products and services, visit our Web site at [www.agilent.com/chem](http://www.agilent.com/chem).

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