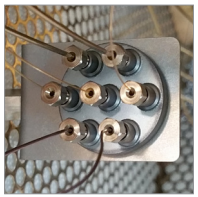
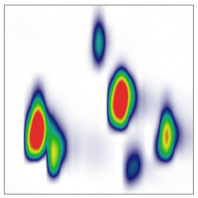
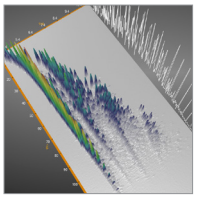
SepSolve Analytical

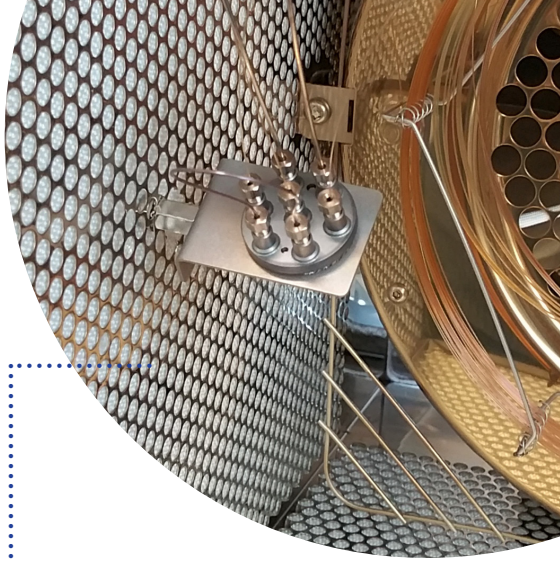




INSIGHT™

Outstanding performance
for routine GC×GC

INSIGHT

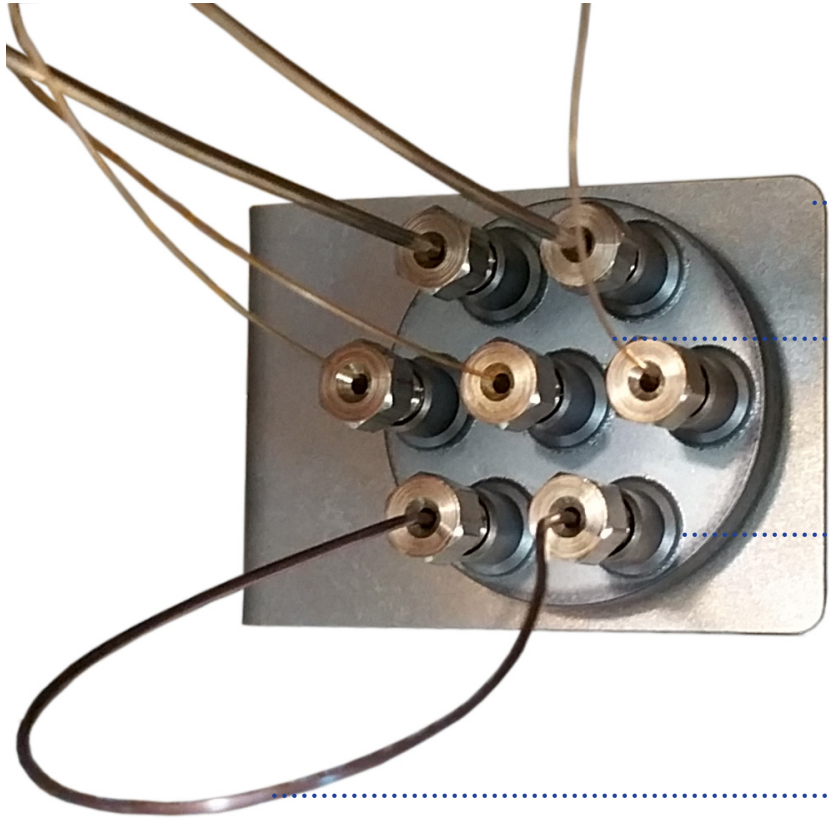
Robust modulator for repeatable, affordable multi-dimensional GC



INSIGHT™, the new flow modulator from SepSolve Analytical, overcomes the practical and performance difficulties experienced with other modulator designs for GC×GC.

With cryogen-free operation and outstanding peak capacity, INSIGHT for the first time allows routine GC laboratories to benefit from the full power of GC×GC peak separation.

Take your GC analysis into a new dimension with INSIGHT flow modulation.



Compact design is easily mounted within the oven of any commercial GC.

Reverse fill/flush dynamics provide increased peak capacity and improved peak symmetry compared to other flow modulators.

Innovative design ensures the widest possible volatility range (C_1 to C_{60}), and the flexibility to perform heart-cutting, splitting for parallel detection, backflushing and critical component peak compression.

'Filling' and 'flushing' of a sample loop means low running costs and none of the logistical issues associated with liquid cryogen.

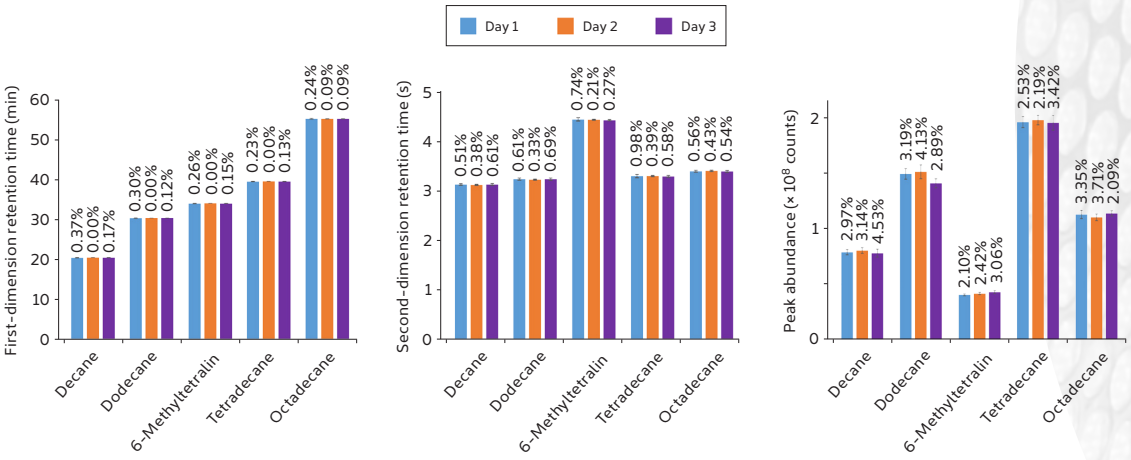
Why choose flow modulation?

Flow modulation simply involves using differential carrier gas flows to 'fill' and 'flush' a sample loop. In contrast to thermal modulation, this means:

- Low running costs for routine GC×GC.
- None of the logistical issues associated with liquid cryogen.
- Improved repeatability.
- Elimination of volatility restrictions.

Delivering the confidence required for routine applications

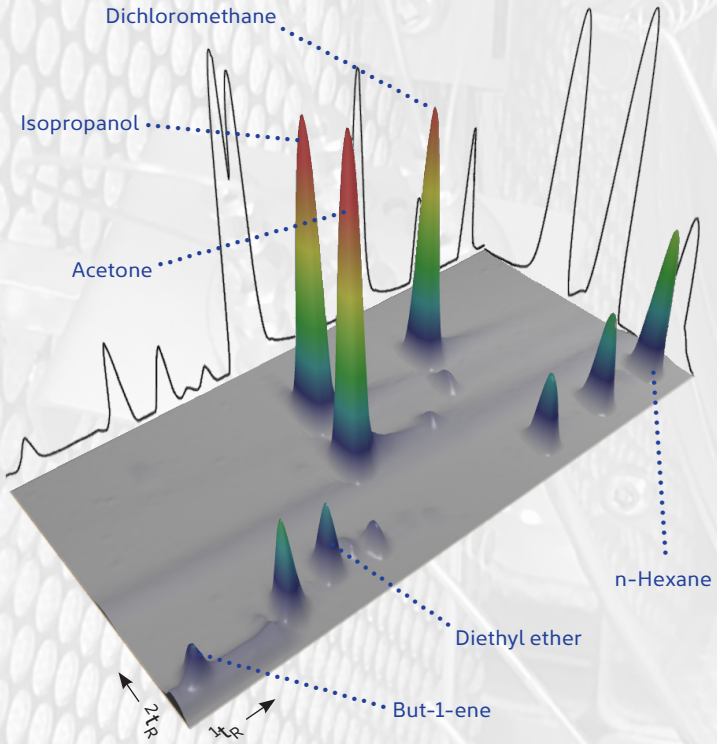
The valve-based INSIGHT allows identical configurations to be installed across multiple instruments, unlike in thermal devices, where small variations in column position can have a large impact on results.



Excellent repeatability of retention times is aided by the use of a dedicated EPC for each column. The charts show <1% RSDs for first-dimension and second-dimension retention times, and <5% RSDs for peak abundance, for 24 injections of diesel over 3 days (n = 8 injections/day).

Tackling a wider range of samples

Flow modulation does not suffer from the same volatility restrictions as thermal modulation, because it does not rely on trapping analytes using a cold jet. Analytes as volatile as methane can be modulated efficiently without any need for liquid cryogen.



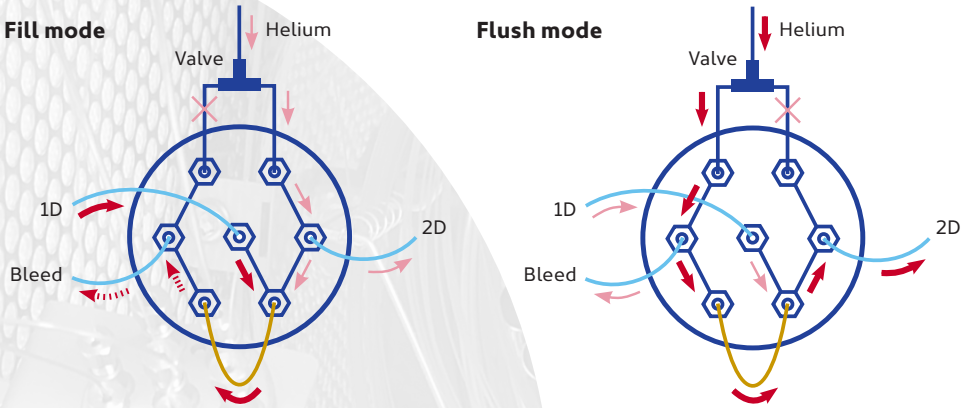
Efficient modulation of compounds <C_6 using INSIGHT provides sharp and symmetrical peaks for volatiles in blood.

The next generation of flow modulators

INSIGHT, as a reverse fill/flush device, offers superior performance to first-generation forward fill/flush flow modulators. As well as its operational simplicity, minimal breakthrough allows sharp, symmetrical peaks, while an interchangeable collection channel provides greater flexibility in method development.

Reverse fill/flush operation

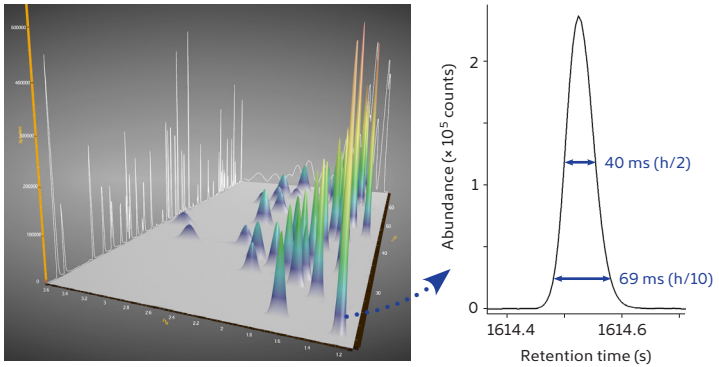
Differential flows in the INSIGHT modulator are used to 'fill' and 'flush' a sample loop – meaning low running costs for routine GC×GC and none of the logistical issues associated with liquid cryogen.



INSIGHT uses a two-stage process involving the sample loop (orange) to achieve effective modulation. In fill mode, the primary column eluate enters the sample loop (with any overfill directed to a bleed line), while the modulation valve directs auxiliary carrier gas to the secondary column. The valve then switches, and the contents of the sample loop are flushed rapidly on to the secondary column as a narrow chromatographic band.

Improved peak capacity

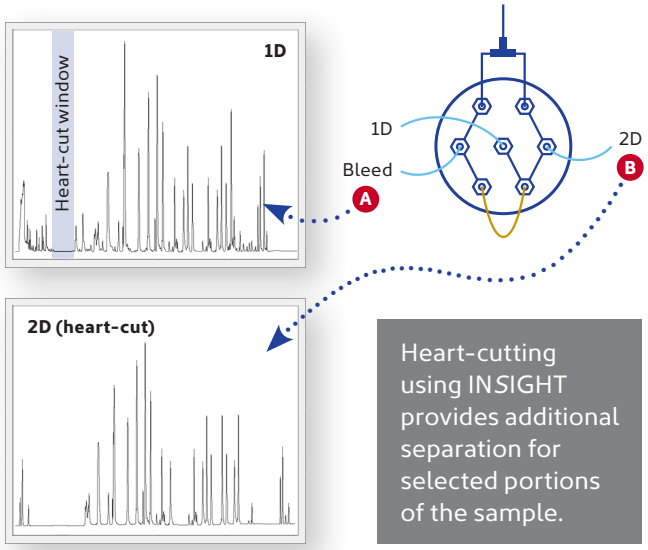
Reverse fill/flush dynamics provide narrower peaks in the second dimension than previous generations of flow modulators, leading to improved sensitivity and greater peak capacity.



INSIGHT provides narrow peaks (<100 ms) for improved sensitivity and peak capacity in this fragrance sample.

Flexible configuration

INSIGHT's design makes it easy to configure for other (non-GC×GC) modes of operation – for example, connecting a second detector (B) allows hassle-free heart-cutting.



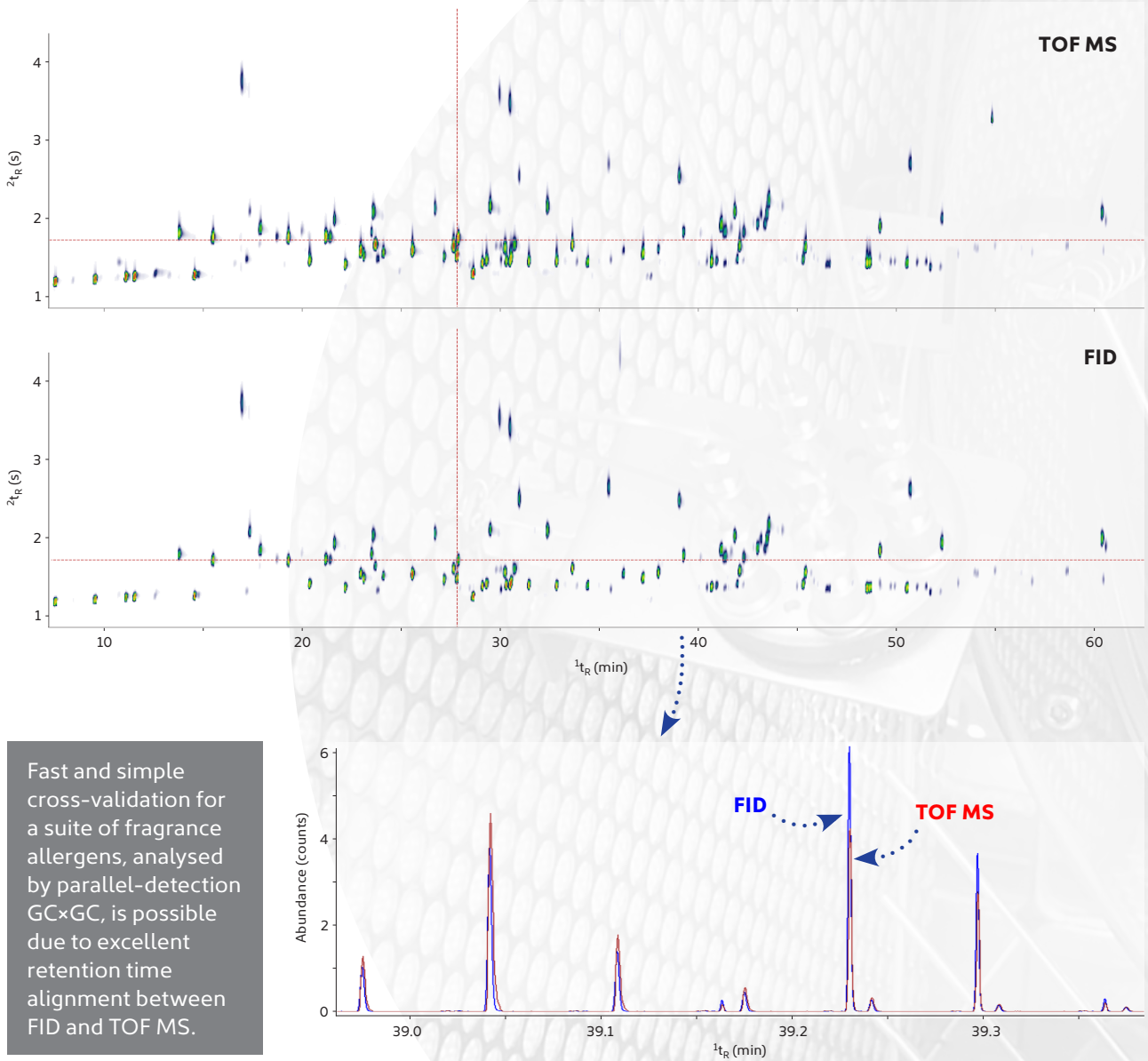
Heart-cutting using INSIGHT provides additional separation for selected portions of the sample.

Another level of information with parallel detection

Using parallel detection by MS and FID is the ideal way of achieving qualitative *and* quantitative analyses in a single run. While this can be troublesome to configure in thermally-modulated systems, optimal alignment of retention times can easily be achieved with INSIGHT.

Keeping fragrance labs ahead of the regulations

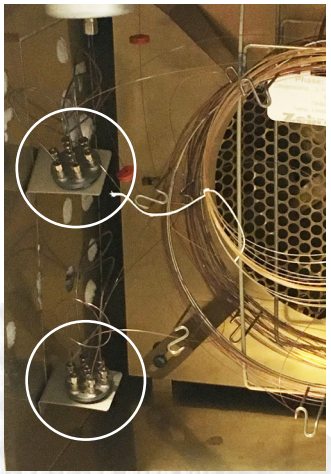
Hundreds of similar terpenes, diverse sample types and complex matrices make monitoring allergens in cosmetics a challenging prospect. INSIGHT keeps labs ahead of the regulations, by providing the separation required for confident identification and quantitation of an extended suite of allergens.

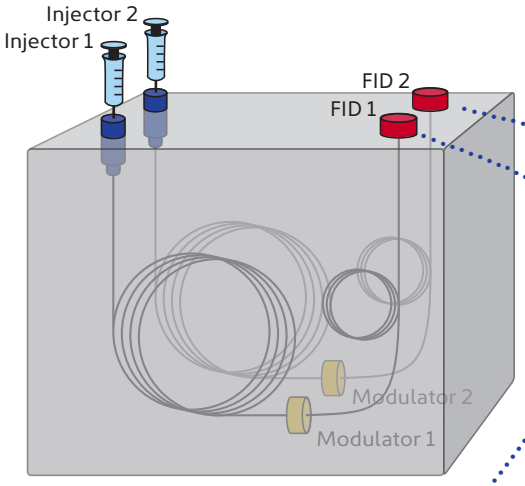


Fast and simple cross-validation for a suite of fragrance allergens, analysed by parallel-detection GC×GC, is possible due to excellent retention time alignment between FID and TOF MS.

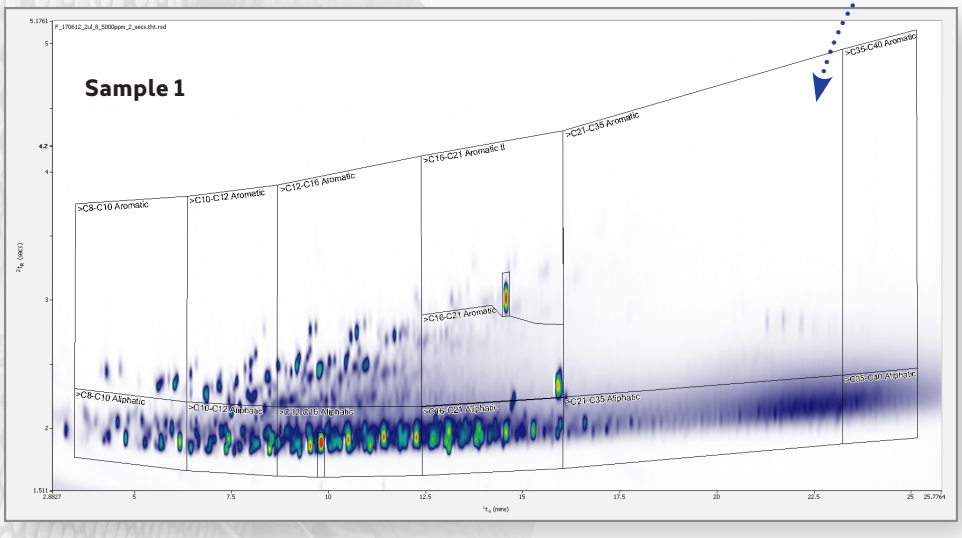
Dual-channel configuration for enhanced productivity

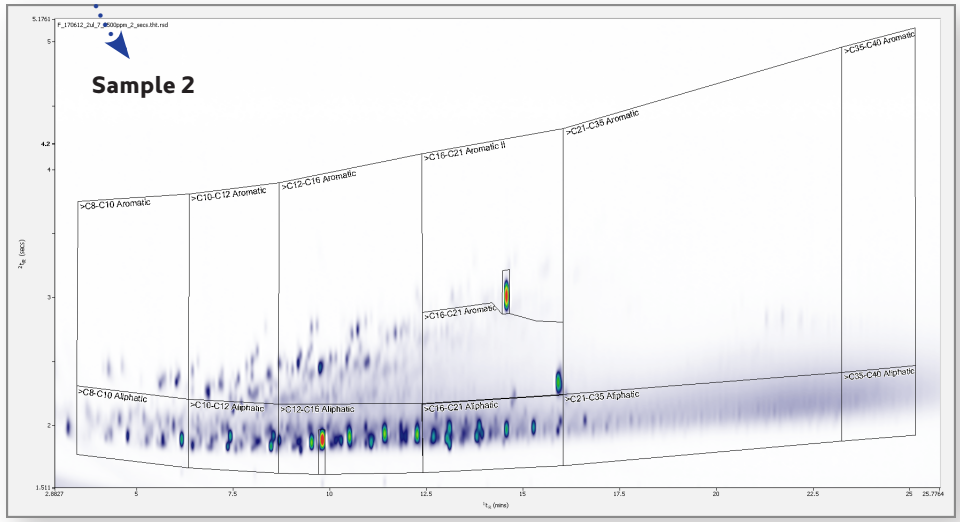
The compact design of INSIGHT enables two devices to be installed within the same GC oven. This allows the simultaneous analysis of two samples using dual injection – optimising lab productivity.





Use of two INSIGHT modulators in a dual-channel configuration immediately doubles productivity, resulting in a swift return on investment. This is illustrated for environmental monitoring of total petroleum hydrocarbons (TPH) using the 'stencil' feature in SepSolve's ChromSpace software.





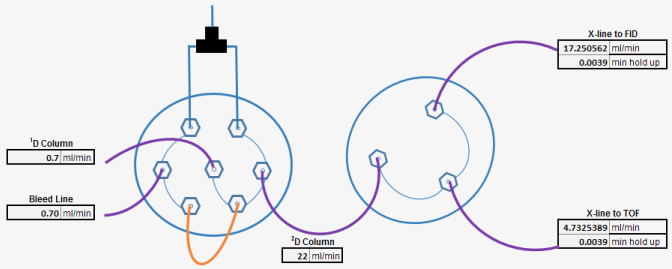
From niche to mainstream...

It is commonly said that flow modulators are difficult to use – but this is no longer the case, and the appeal of GC×GC is broadening as a result. With tools and advice from SepSolve, analysts the world over are finally able to incorporate GC×GC into routine workflows.

Simple method development

INSIGHT can be retrofitted to most popular GCs, with the field kit containing everything you need to get started. An easy-to-use flow calculator is included to simplify method development, for beginners and experts alike.

INSIGHT Flow Calculator	
Column flows and bleed line	
Carrier Gas	Helium
Oven Temp (Deg. C)	60
PCM Pressure (psig)	21.05
Secondary column length (m)	2.48
Secondary column diameter (mm)	0.25
Bleed line length (m)	2.42
Bleed line diameter (mm)	0.1026
2D Effluent Splitter	
X-line to TOF length (m)	1
X-line to TOF diameter (mm)	0.18
X-line to FID length (m)	0.84
X-line to FID diameter (mm)	0.32
Loop Fill and Flush	
alues valid for 0.530 mm ID tubing only. Calculations are for He carrier gas	
LOOP VOLUME	
Loop Length (cm)	23
Loop Internal diameter (mm)	0.53
Volume (µl)	50.74
FILL	
^{1}D Column volumetric flow rate (ml/min, He)	0.7
^{1}D Column Average linear velocity (cm/sec, He)	5.60
Loop fill time by volumetric flow rate (seconds)	4.349329
Loop fill time by average linear velocity (seconds)	4.107143
75% capacity fill time (by volume)	3.26
75% capacity fill time (by velocity)	3.08
FLUSH	
^{2}D Column volumetric flow rate (ml/min, He)	22
^{2}D Column Average linear velocity (cm/sec, He)	173.12
Loop flush time by volumetric flow rate (milliseconds)	138.3878
Loop flush time by average linear velocity (milliseconds)	132.8568
Loop flushed 1.5 times in milliseconds (by volume)	208
Loop flushed 1.5 times in milliseconds (by velocity)	199



Simplify your GC×GC method development by using the flow calculator that comes as part of the INSIGHT software package.

Bespoke training packages

Our specialists can offer customised training, so that you can make the most of your modulator from the moment it is installed, whatever your application area:

- Environmental

- Petrochemical

- Food/beverage aromas

- Fragrances

- Defence and forensic

About SepSolve Analytical

SepSolve Analytical is dedicated to helping analysts select the best equipment for GC and GC×GC analysis.

The wide range of products offered include SepSolve's INSIGHT™ flow modulator for GC×GC, and sample preparation equipment, robotic autosamplers, thermal desorbers and mass spectrometers with novel soft EI capability from leading manufacturers including GL Sciences, CTC Analytics and Markes International.

SepSolve's application experience is extensive, placing it in an excellent position to advise on getting the best from an analysis – in everything from environmental monitoring to petrochemical analysis and food aroma profiling.

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