GC Flow Modulator

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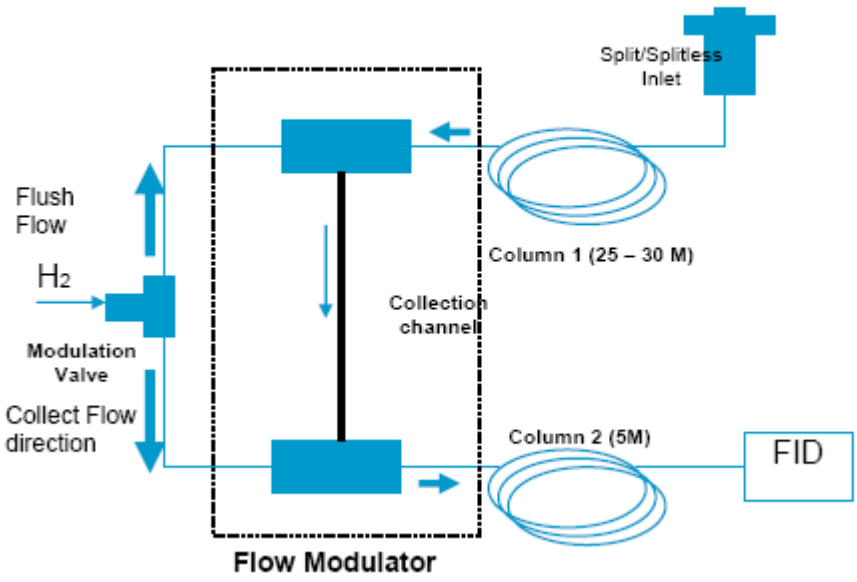
On February 1st 2008, Agilent Technologies released a new product utilising Capillary Flow Technology. The product is the G3486A and is named the Flow Modulator.

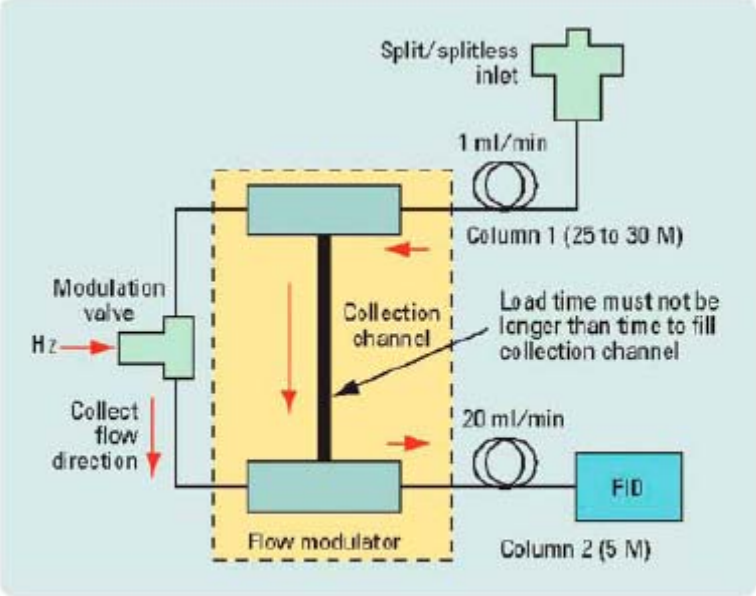
What is the Flow Modulator.

Two-dimensional GC (GC x GC), a relatively new gas chromatographic technique, is being recognized for its powerful separation capabilities for the analysis of complex mixtures. The methodology involves the use of two capillary columns of usually very different polarities installed in series. Between the two columns a device known simply as a flow modulator is installed and interfaced to an auxiliary programmable control module (PCM) on a 7890A gas chromatograph through a three-way solenoid valve. In the flow modulator, analyte bands from the first column are collected in a fixed volume channel and successively injected very quickly into the short second column in very narrow bands. Any separation that occurs on the first column is preserved during transfer to the second column. In summary, GC x GC can greatly increase peak resolution and peak capacity.
The unique flow modulator used in this system is based on Agilent's Capillary Flow Technology hardware and does not require the use of cryogenics for focusing. The modulator consists of a planar structure where flow splitters and collector channel are all incorporated internally to the device. All external connections are made through Agilent CPM fittings (ultimate union technology) incorporated into the plate for zero unswept volumes and leak proof seals. A three-way solenoid valve is installed on side of the GC oven and is interfaced to a PCM module.

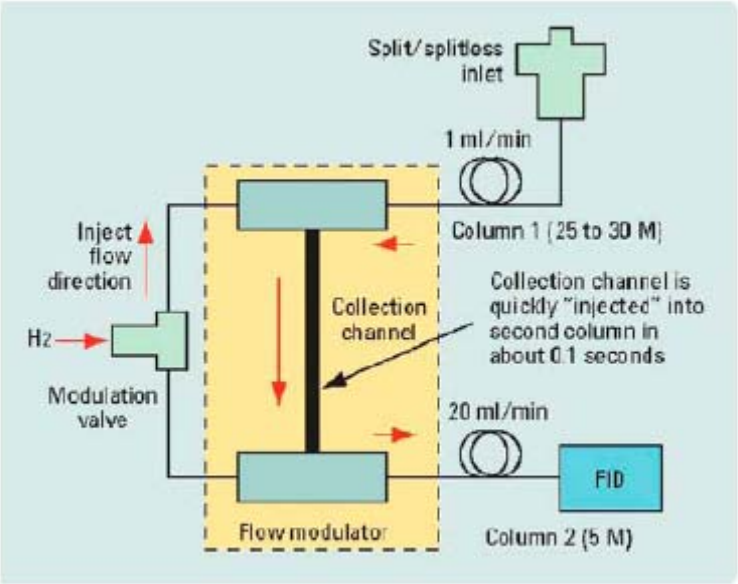
The Flow Modulator can only be installed on a 7890 equipped with a Split/Splitless Injection port, PCM and FID. The first column is installed between the Split/Splitless injection port and the Flow Modulator plate. The second column is installed between the modulator plate and the FID.
The two "gas in" lines to plate come from the modulation valve. The modulation valve is identical to the valve used in TCD modulation. It is controlled by a modified TCD board. Hydrogen gas is supplied to the valve via a PCM. Within the flow modulator, analyte bands from the first column are collected in a fixed-volume channel and successively launched quickly into the short second column in very narrow bands. Any separation that occurs on the first column is preserved during transfer to the second column. During the entire run the PCM flow is modulated between the load or collect mode (filling up the "loop" in the plate) and the inject mode (flushing the contents of the loop onto the second column.

How does it work.



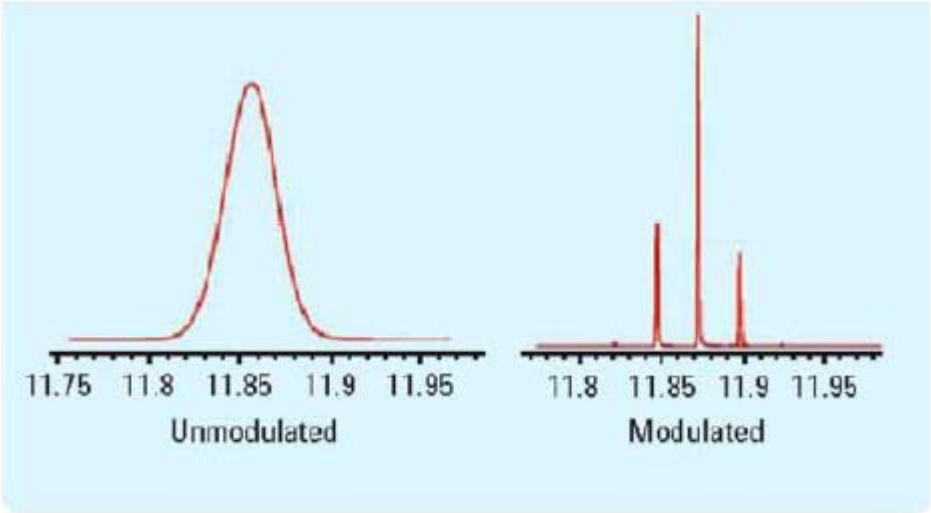


Load Mode.

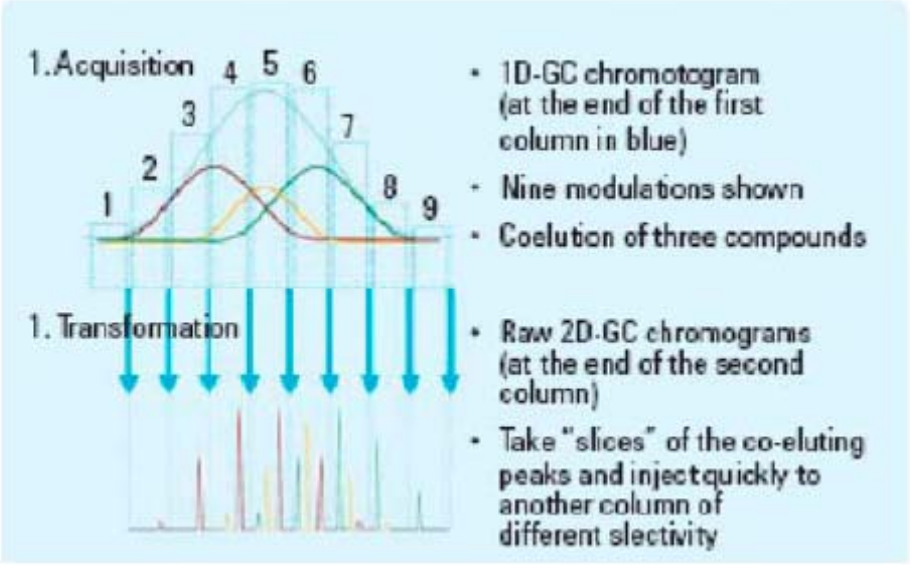


Inject Mode.

When a peak elutes from the first column it is “flushed” onto the second column where secondary separation occurs.



The above chromatogram shows the same peak with and without flow modulation.
The area under the unmodulated peak is the same as the total of the areas under the modulated peaks.



The chromatogram above shows a peak that contains 3 compounds. The flow is modulated 9 times across this peak, thus giving us a chromatogram of each “slice”.
You notice that each compound is separated on the second column. We are thus able to see co-eluting peaks.
Please contact your Agilent Technologies representative for more details.

www.chem.agilent.com

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