

Unit duty-cycle differential flow modulation GC×GC-MS: insights on the modulation process

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Abstract

One of the major limitations of current-day flow-modulated comprehensive two-dimensional gas chromatography (FM GC×GC) is the generation of high gas flows (e.g., 20 mL/min) in the second analytical dimension, if unit sampling duty cycle is considered [1]. Even though such high flows are necessary to efficiently flush the content of the modulator onto the second dimension, they also greatly restrict the employment of mass spectrometry (MS), which is nowadays considered as the most powerful and informative detection tool. One way to enable the use of MS systems, in FM applications, is to divert a substantial part of the second-dimension flow to waste, with an obvious negative impact on sensitivity. The present contribution is focused on the development of unit sampling duty cycle methods using flow-modulated comprehensive two-dimensional gas chromatography in combination with mass spectrometry. Specifically, a FM GC×GC-MS approach was developed in which the flows necessary to efficiently flush the modulator were greatly reduced (<5 mL/min) [2]. The approach finely reconsiders the accumulation and injection phases of modulation and allows a full transfer onto the second dimension and the detector with no need to divert the flow [3]. The efficiency of the set-up is demonstrated on real-world samples (petrochemical and fragrance).

References

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