Optimization of the thermal modulation in comprehensive two-dimensional gas-chromatography

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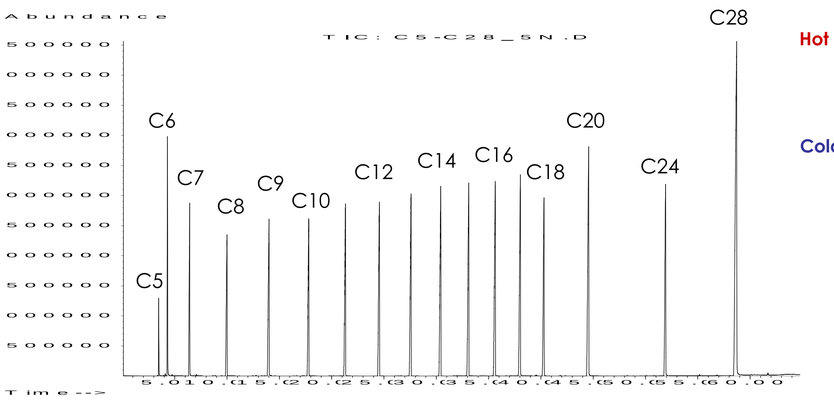
Optimization of the modulation on a wide boiling point range sample (36°C-431°C)

Figure 1: Unmodulated nC5-nC28 analysis



	nC5	nC8	nC15	nC20	nC28
Peak width	14.4	22.8	24	30	34.2
Modulation ratio*	1.8	2.85	3	3.75	4.3

*** with 8 seconds modulation period**

Figure 2: Minimum cold flow nC5 peak modulation

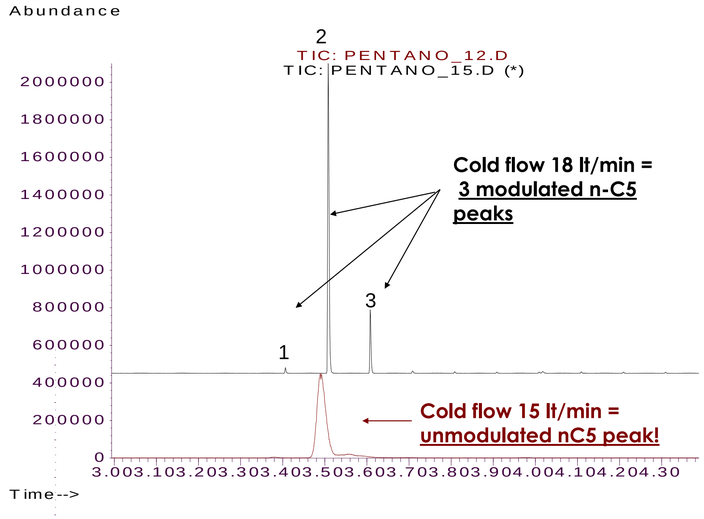


Figure 1 : nC5-nC28 unmodulated analysis for peak width measurement

Figure 2 : Determination of the minimum cold flow necessary to Modulate the nC5 (b.p.36°C) peak

Figure 3 : nC5-nC28 modulate analysis at constant cold flow (at the minimum value to modulate the nC5)

Figure 4 & 5 : nC5-nC28 modulate analysis with optimized cold flow rate and hot pulse time, in order to obtain the proper theorical modulation ratio

Figure 3: Modulated nC5-nC28 analysis

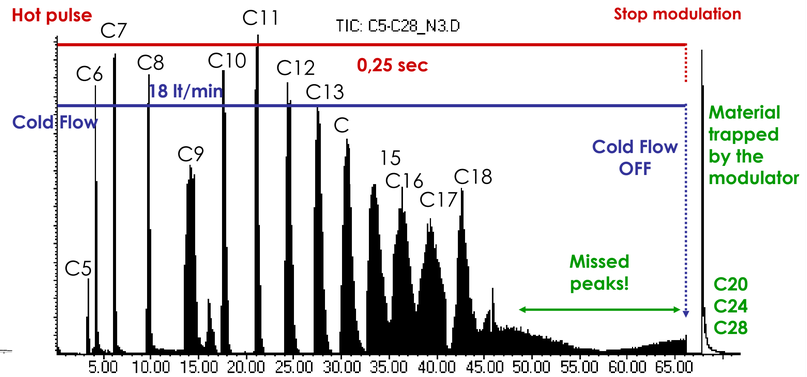
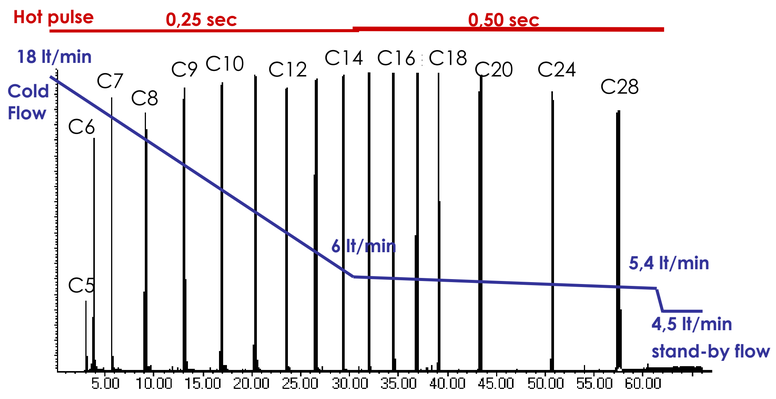


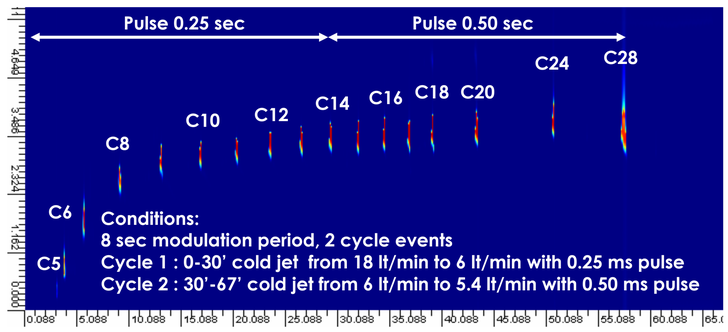
Figure 4: Optimized modulated nC5-nC28 analysis



	nC5	nC8	nC15	nC20	nC28
Nr modulations*	2	3	3	4	5

*** with 8 seconds modulation period**

Figure 5: 2-D view



Conclusions

- Using a thermal modulator, an accurate optimization of the thermal conditions is necessary to obtain a proper modulation ratio, expecially for wide range of b.p. samples.
- The cold jet flow and the hot jet pulse time can be used to rise the theorical modulation ratio
- A proper operation of the modulator improve quantitative remobilization of material into the secondary column
- Controlling the cold jet flow during and after run allows a reduction of gas and liquid nitrogen consumption

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