



At-Line Extraction MS Analysis of Caffeine in Redbull

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INTRODUCTION

The Microsaic 4000 MiD[®] is a miniaturised single quadrupole mass detector. The core technologies are chip-scale “plug & play” versions of traditional MS components which can be rapidly interchanged by the user for maximum application flexibility. The detector requires minimal training and maintenance making it ideal for bench chemists. Integrating all the vacuum pumps and computer into a compact enclosure, the Microsaic 4000 MiD[®] provides a tiny footprint, low energy consumption and good quality data.

This paper reports on the rapid and low cost screening of caffeine in RedBull by at-line extraction MS analysis. In particular, an automated extraction platform was coupled to the 4000 MiD[®] mass detector for at-line extraction MS analysis.

EXPERIMENTAL

The at-line extraction MS analysis of caffeine (exact mass of 194.19 Da) was carried out by loading few microliters of Redbull onto the extraction platform for automated sample clean-up and direct MS analysis.

An aliquot of Redbull was manually diluted and then directly infused into the mass detector for comparison.

4000 MiD[®] conditions

Table 1 shows the MS conditions used for the analysis caffeine in RedBull.

Table 1: Conditions for the at-line extraction MS analysis of caffeine

Microsaic Systems 4000 MiD [®]	
Scan mode	Full scan
Mass Range	m/z 100 to m/z 300 for caffeine
Scan Rate	1 Hz
Ion mode	Positive
Gas flow	2.5 L/min

RESULTS AND DISCUSSIONS

Figure 1 shows the extracted ion chromatogram (EIC) of m/z 195.2 (a) and the mass spectrum generated from the peak at 1.62 min (b).

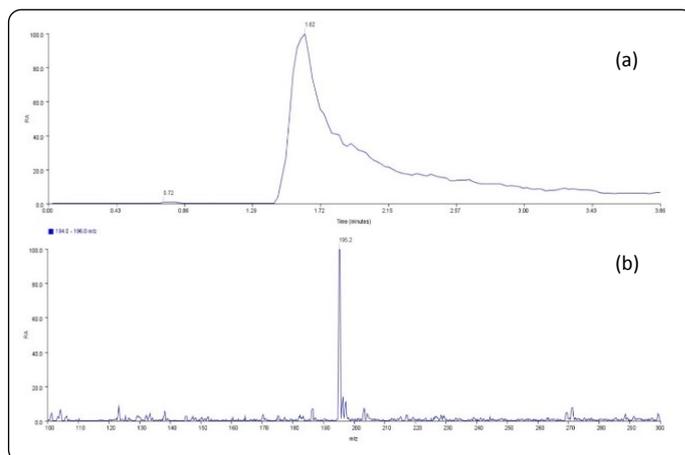


Figure 1: EIC of m/z 195.2 (a) and mass spectrum of peak at 1.62 min (b) for the direct extraction MS analysis of caffeine in Redbull.

Figure 2 shows the mass spectrum acquired from a Redbull's sample manually diluted and directly infused into the mass detector. This procedure is highly disadvantageous since a low purity of the sample generates ion suppression and produces elevated background.

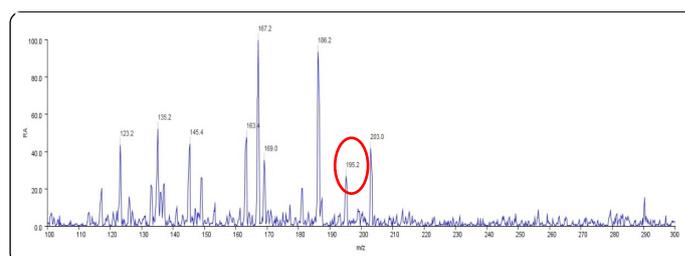


Figure 2: Mass spectrum for the direct analysis of diluted Redbull showing caffeine (m/z 195.2 – red circle) ion suppression.

CONCLUSION

This experiment demonstrates all the advantages of using the Microsaic 4000 MiD[®] mass detector coupled to an automated extraction platform for the analysis of caffeine in Redbull. At-line extraction MS analysis was carried out in less than 15 min. This shows direct extraction MS analysis to be a rapid, simple and low cost approach for the screening of analytes in dirty matrices.

Bringing mass spectrometry down to size