Purge & Trap of a Soft Drink - Ethanol Found

Application Note
Food & Flavor

Author:

Xiaohui Zhang

Abstract

CDS 7000C Purge and Trap Concentrator coupled to a PAL RTC System is a powerful Purge and Trap automation solution. This application demonstrates a very interesting finding when a soft drink sample was tested for flavor profiling, where ethanol was identified.

Introduction

It is no coincidence that the human nose is directly over the mouth and there is an “aromatic” class of organic compounds. While smell is not strictly speaking a component of taste, it certainly can have a significant effect. On the quantitative analytical testing side, a purge and trap method can extract and concentrate volatile flavor compounds from a liquid sample for subsequent analysis by GC/MS. In this application, a soft drink was tested with purge and trap-GC/MS on a CDS 7000C Purge and Trap Concentrator coupled to a PAL RTC 850 System. The result shows some interesting findings.

Results and Discussion

Figure 1 tagged seven of the most significant peaks from a soft drink sample. Of particular interest is that ethanol was found on sub hundred ppb level. Typically, beverage manufacturers’ recipes and formulations are trade secrets. Based on general industry knowledge and analytical experience, it is highly unlikely that ethanol is added as a formulary compound. Since the sample contained sugar, low level ethanol is hypothesized as the result of fermentation. Ethanol is among the compound list, verifying that it was found by other researchers and ingested by consumers, although at very low levels. Figures 2 depicts a more detailed look, with more than sixty compounds identified in the purge and trap-GC/MS chromatogram.

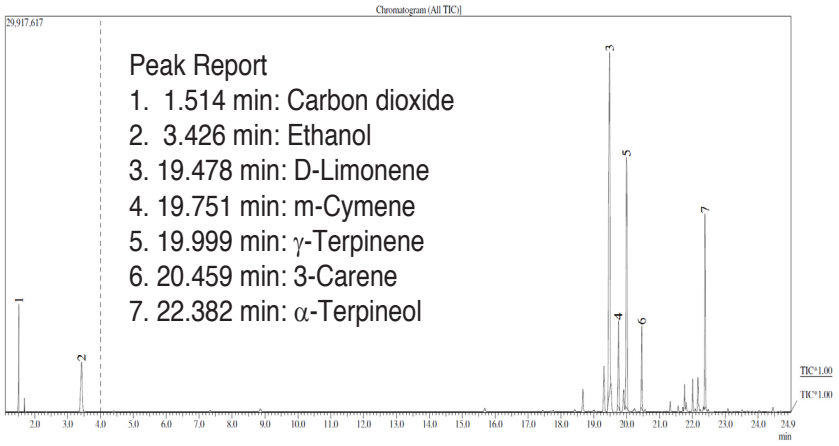

Figure 1: Most significant peaks from a soft drink sample shown in the purge and trap-GC/MS chromatogram.

Experimental Conditions

P&T conditions	
Sample Volume	5.0 mL
Purge Time	11 min
Purge Temp.	40 °C
Purge Flow	40 mL/min
Trap Temp.	35 °C
Dry Purge Time	2 min
Dry Purge Temp.	35 °C
Dry Purge Flow	100 mL/min
Pre-Desorb Temp.	245 °C
Desorb Temp.	250 °C
Desorb Time	4 min
Desorb Flow	300 mL/min
Trap Bake Temp.	260 °C
Trap Bake Time	8 min
Trap Bake Flow	200 mL/min
Wet Trap Ready	45 °C
Trap Bake Temp.	260 °C
Valve Oven Temp.	130 °C
GC Transfer Line	130 °C
Hot Water Rinse	70 °C

GC conditions	
Column	Rtx-VMS (30/0.25)
Oven Temp.	35 – 220 °C
Column Flow	1.0 mL/min
Injector Temp.	135 °C
Injection Split	20 to 1
Purge Flow	3.0 mL/min

MS conditions	
MS Type	QP 2010
Source Temp.	200°C
Interface Temp.	220°C
ACQ Mode: Scan	35-260 m/z
Event Time	0.30 s

The data presented here is a simple capability demonstration. As a routine practice, quantitative P&T-GC/MS is performed in EPA Methods 525 and 8260 for aqueous samples. Potential applications for ethanol content include: process monitoring/optimization and comparative sample analysis for diet beverages.

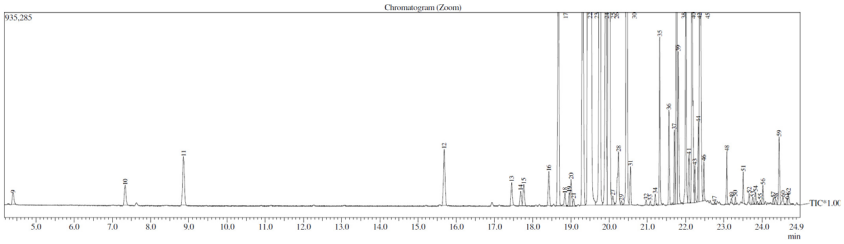

Figure 2: More detailed peak profile in the purge and trap-GC/MS chromatogram