

What's in Your Beer? GC/MS Static Head Space with a DB-624 Ultra Inert Capillary GC Column

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Abstract

Static head space GC/MS is an excellent way to profile alcoholic beverages such as a centuries old favorite malted barley beverage, beer. The recipes and components in these beverages are as diverse as the individual yeast strains and varietal hops that are on the list of ingredients. What flavor components are positive indicators of a good beer and which are not is one facet of the craft of making fine beer. Single Quad GC/MS is a great starting point for helping to identify and monitor flavor components.

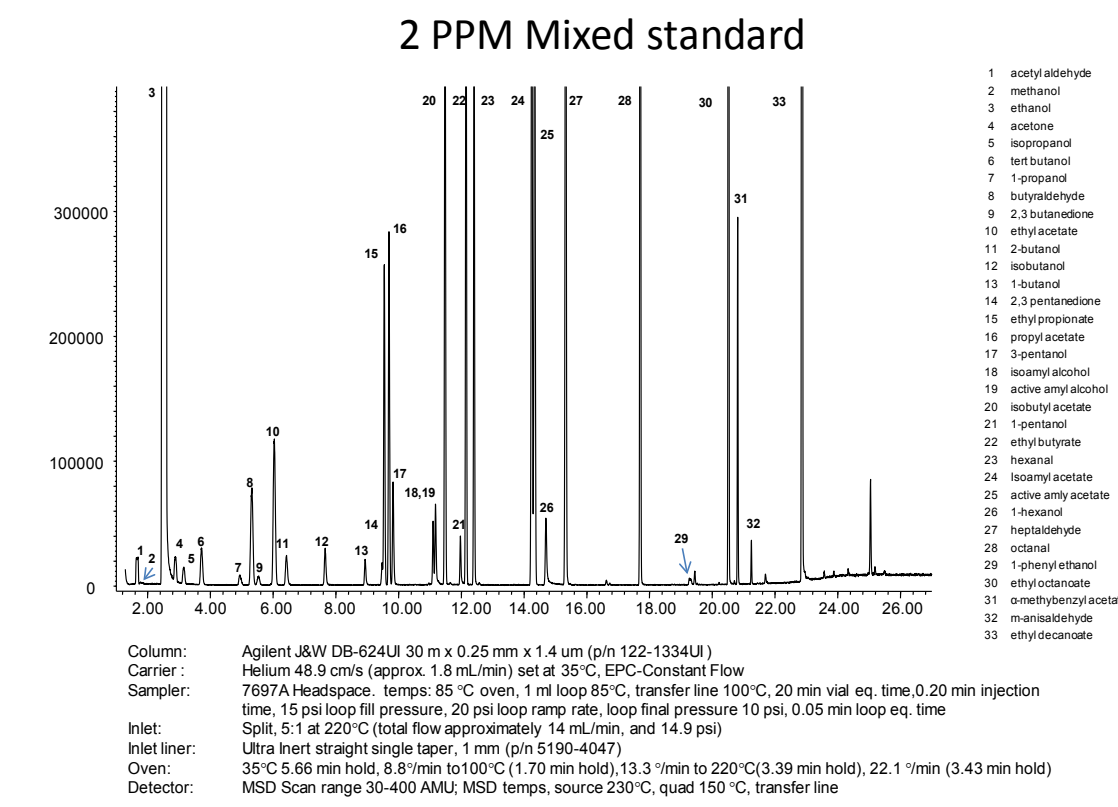
A number of the components in beer can be challenging to separate and chromatograph. The mix of components includes fusel oils, aldehydes, esters, and organic acids. The polarity of a 6 % cyano propyl phenyl stationary phase has been a traditional choice for this type of analysis. However, peaks shapes and low level detection of organic acids have been problematic for this phase. When highly inert DB-624 UI columns are used, consistent organic acid performance is achieved.

Static headspace GC/MS chromatograms of beer and also spirits illustrate the value of using a highly inert DB-624 UI column for this type of analysis. Key elements of this type of analysis are the separation of amyl and iso-amyl alcohols, their esters, aldehyde peak shapes and detector response for organic acids. Obtaining headspace profiles can be a tremendous aid in understanding flavor development, tracking flavor stability and authentication of fine crafted alcoholic beverages.

Experimental

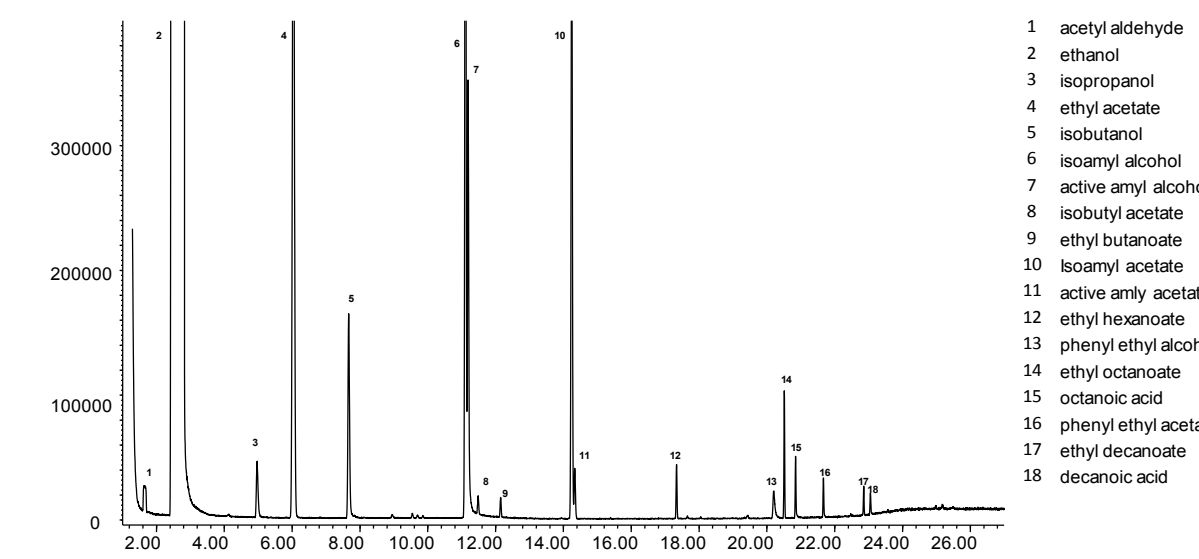
- 10 ml aliquots of each beer sample were added to 20 ml crimp cap headspace vials
- Samples were analyzed using an Agilent 7890/5975C GC/MS system equipped with a 111 position 7697A headspace sampler
- GC FID experiments highlight organic acid performance observed on Agilent's latest UI innovation: the DB-624 Ultra Inert GC column

Standard Chromatogram- alcohols, aldehydes, esters

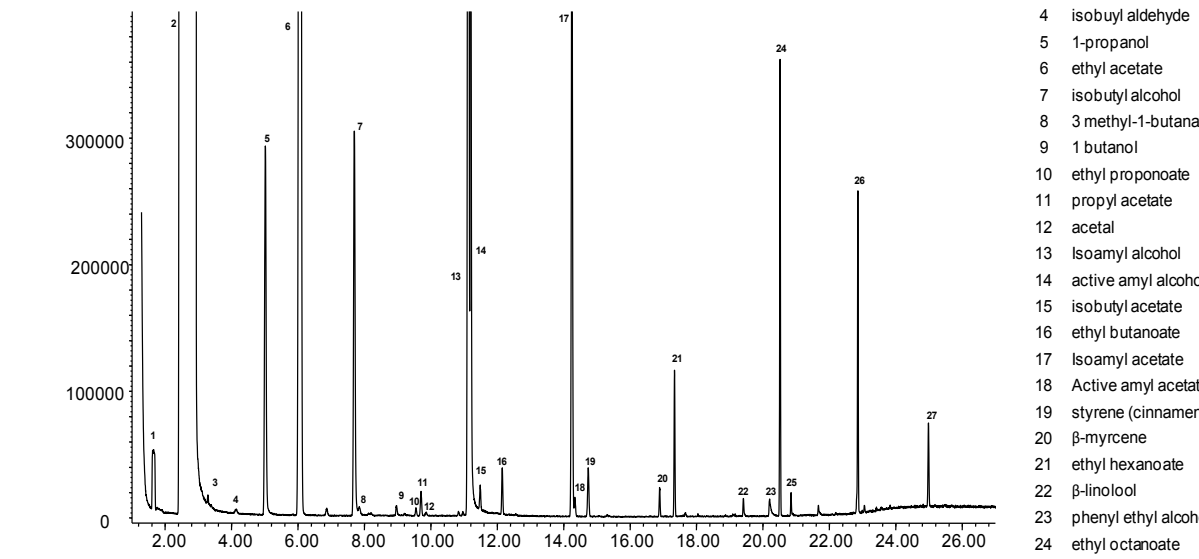


GC/MS Static Head Space Profiles of Some Popular Beers

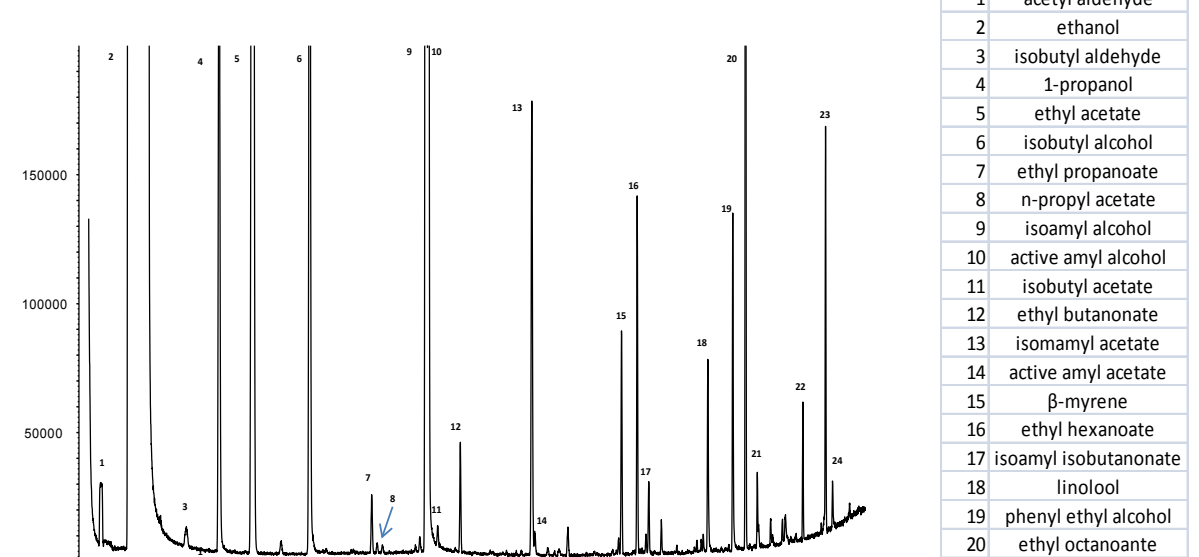
Light Lager



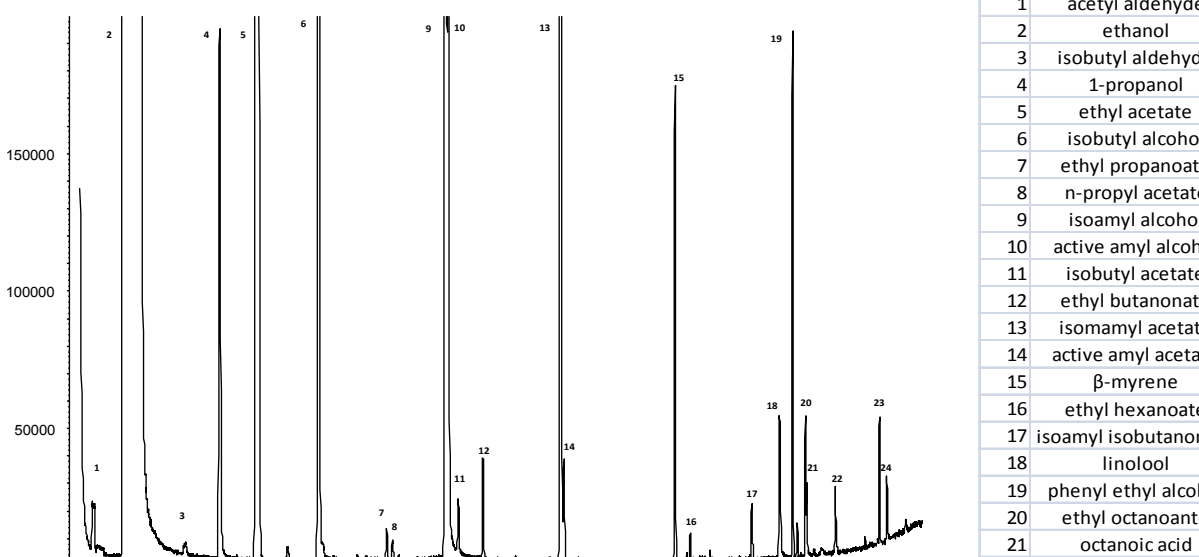
Pale Ale



Wet Hopped Ale

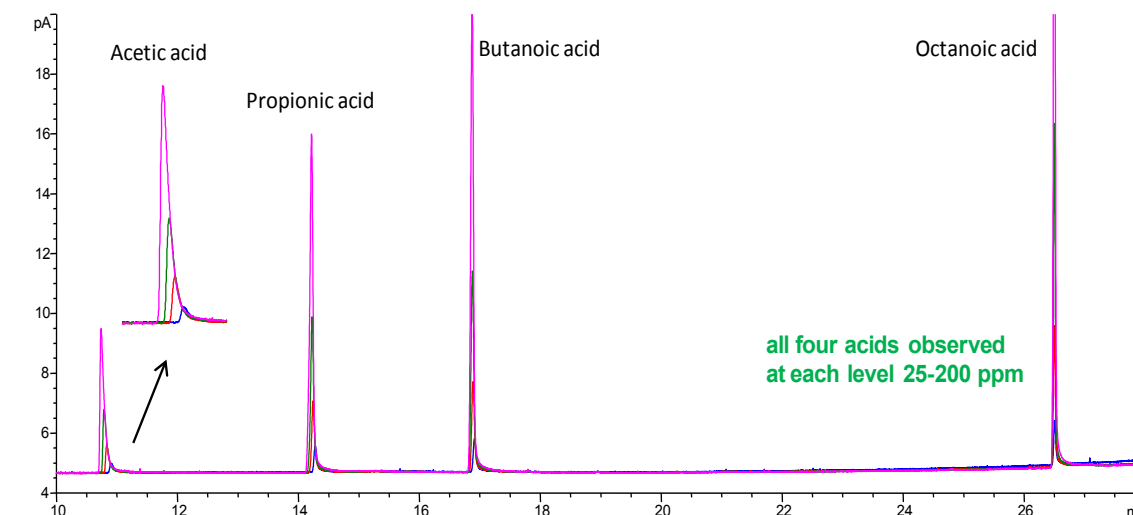


Wheat Beer

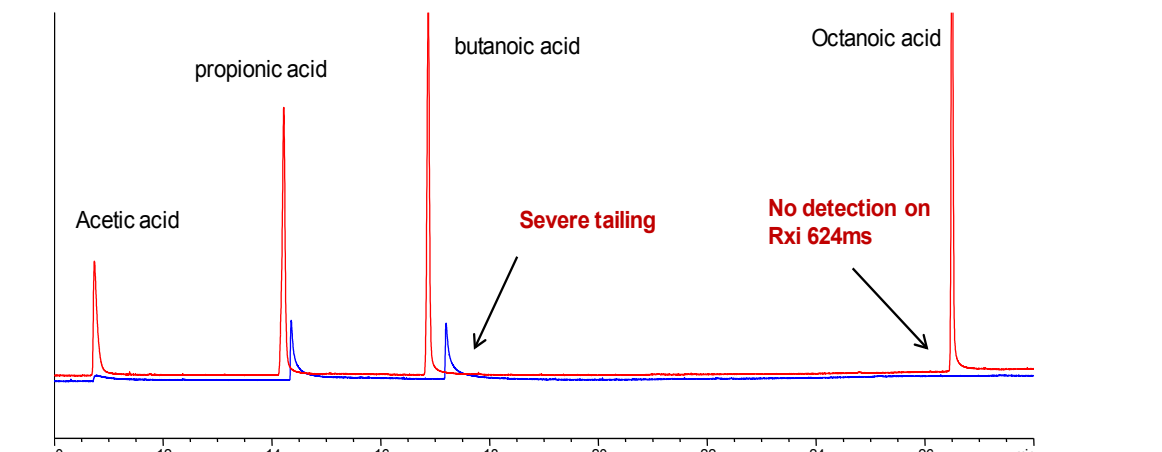


What's Unique about Agilent's DB-624 Ultra Inert Column?

Agilent J&W DB-624UI Organic Acid Performance



Agilent J&W DB-624UI vs. Competitor's 624ms Column Organic acid performance at 200 ppm



Conclusions

- Static headspace GC/MS provides an excellent means to profile various beer styles quickly
- Each sample showed some commonality in profile as well as unique attributes
- GC flow path inertness is an important consideration for the study of the brewing process and volatile flavor elements
- The DB-624 Ultra Inert column demonstrated superior organic acid performance vs. a competitor's premium priced traditional 624 phase column

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