What's in Your Beer?

Part 2: GC/MS Static Head Space with a Highly Inert 624 Capillary GC Column

Introduction

Some ingredients in beer can be challenging to separate and chromatograph. Common flavor components include flavor oils, aldehydes, esters, and organic acids. The polarity of a 6% cyanopropyl phenyl stationary phase (624) has been a traditional choice for this type of analysis and works well however, peaks shapes and low level detection of organic acids have been problematic for this phase. When inertness performance verified 624 columns are used, consistent organic acid performance is achieved.

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 achieved. Agilent’s Quad GC/MS is a great starting point for helping to identify and monitor flavor components.

Static headspace GC/MS chromatograms of beers and spirits illustrate the value of using inertness performance verified 624 columns 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. Organic acids can be a tremendous aid in understanding flavor development, leading flavor stability and authentication of fine crafted alcoholic beverages. Comparing GC/MS profiles of various summer style beers and some of their flavor elements in thing hopping.

Experimental

Example Total Ion Chromatogram
2 ppm aldehydes, alcohols and esters in water

Results Summer Style Beers

Total Ion Chromatogram
Helze-Wizen, summer style wheat beer

Total Ion Chromatogram
Kolsch, clear crisp finish Pilsner style hops

Total Ion Chromatogram
Tangerine Ale

Total Ion Chromatogram
Lemon Shandy

Total Ion Chromatogram
Light Lager

Results and Discussion – Superior Organic Acid Response

Superior Organic Acid Responses - Test Probe Mix

Other Cyanopropyl phenyl columns absorb organic acids

Conclusions

- Static headspace GC/MS profiles show differences and similarities among beer styles - good for profiling
- Organic acid response superior using a highly inert 624 column
- Choose inert components for optimal results
- Better analytical tools for making better beer

References

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Better analytical tools for making better beer-yes

Comparing GC/MS profiles of various summer style beers and some of their flavor elements in thing hopping