



The Analysis of Flavours in Beer with ChromSync Software

Ashleigh Mellor, Applications Specialist at SCION Instruments

One of the most widely purchased beverage in the world is beer. With the consumer market so large, breweries are developing their products to have its own distinct flavour. It is vital that breweries test and monitor the flavour compounds during the production process to ensure that the same flavours are consistently achieved. The volatile compounds that make up the flavour composition must therefore be profiled batch to batch.

Gas chromatography (GC) is often the instrumentation of choice for the analysis of flavour aromas in flavour and fragrance industries. Compass Chromatography Data System (CDS) is a state-of-the-art chromatography software solution for all laboratory needs. ChromSync is an application add on specifically for the flavour and fragrance industry; for both quality control and detection of counterfeit goods. ChromSync has the ability to determine the 'fingerprint' of flavour compounds in any sample. The individual 'fingerprints' are then compared with a reference standard. ChromSync rapidly compares peak retention time as well as area% profiles of complex chromatograms, making processing volatile flavour/fragrance profiles effortless. Additionally, ChromSync instantly confirms product batch to batch reproducibility whilst reporting any missing compounds and calculating the degrees of similarity. ChromSync and CompassCDS are user friendly platforms that allow users to control instrumentation, acquire data, process and report data on a single platform.

Manual comparisons of different flavour profiles are a time extensive process with an increased chance of error in reporting of results, especially in highly complex chromatograms, containing extensive flavour compounds.

With the automation ChromSync provides, the need for manual comparisons and time extensive processing is reduced with laboratory accuracy and productivity increased. ChromSync automatically determines tolerance levels for peaks set in the reference sample, however, users can set their own acceptable levels based upon the requirements in their own quality control procedures. These tolerance levels are then used to determine if peaks present in the sample are identical to those in the reference sample. Any peaks, so therefore aromas, that are present but out with the accepted tolerance levels are also highlighted. Peaks that are present in either the reference sample or comparative sample are also visualised. ChromSync is an excellent identification tool for monitoring any changes during the fermentation of beer and comparing batch to batch discrepancies; vital for quality control of beer production. On the comparison charts created during comparisons, the lower markers represent the reference sample with the comparative sample being the top markers. The peak area is represented by the size of the markers.

A SCION 456 GC-FID was coupled with the Teledyne Tekmar HT3 headspace autosampler. Four commercially available beers were prepared in 20mL headspace vials; 5mL of each sample was added with 3g of NaCl. The four beers analysed were labelled as reference sample, sample A, sample B and sample C.

Figure 1 shows the flavour profile/ chromatogram of the reference sample. Peak numbers for identification of the reference sample is also detailed (the identification remains the same throughout).

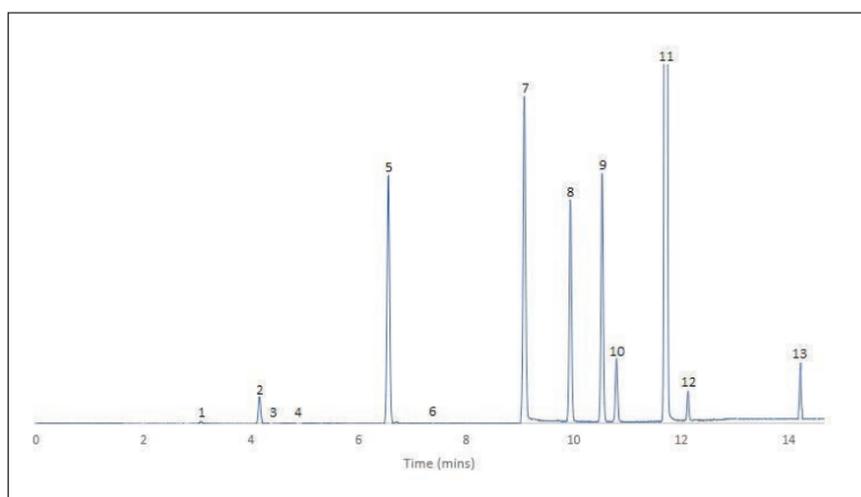


Figure 1. Flavour profile of the reference sample

Using the predefined tolerance limits of the software, ChromSync was used for the comparison of the reference sample and beer sample A. Figure 2 details the results of the comparison, generated in ChromSync.

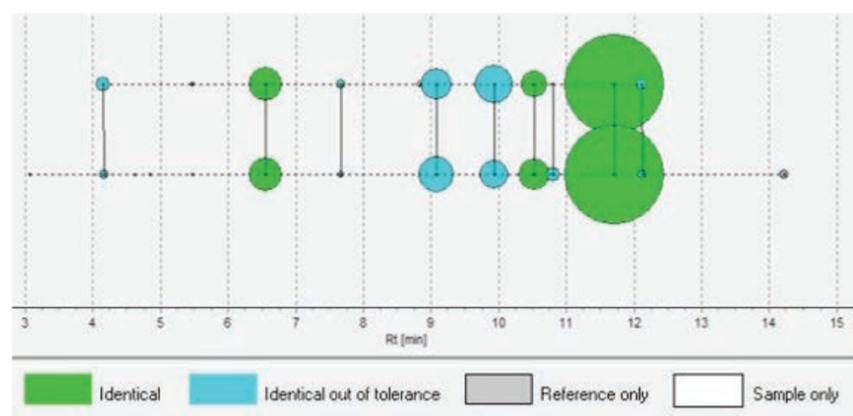


Figure 2. Reference beer sample and Sample A comparison

The green markers show the identical peaks within both samples whereas the blue markers show identical peaks that are out of the predefined tolerance levels. Adjusting the tolerance levels to those acceptable to industry specific quality control limits alters the blue markers to green, showing that the identical peaks are present, and within the acceptable limits, as shown in Figure 3.

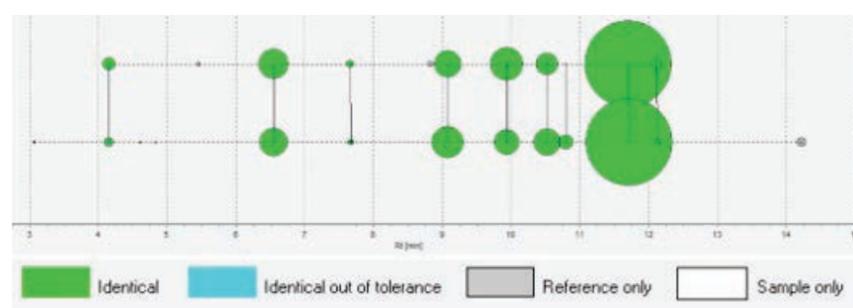


Figure 3. Adjusted tolerance levels of Figure 2 samples

Figure 4 details a comparison between the reference sample and Sample B.

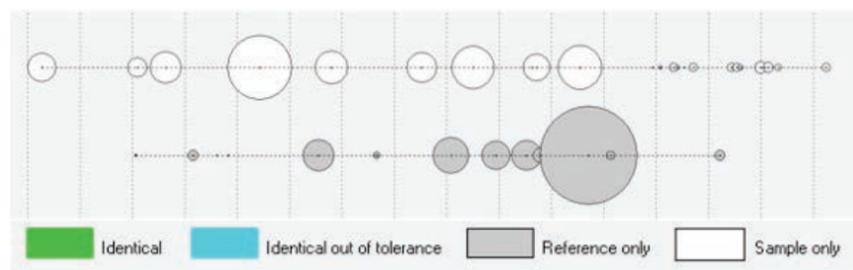


Figure 4. Reference beer sample and Sample B comparison

Sample B has a completely different flavour profile when compared to the reference sample. There were no identical flavours between the two samples, as represented by the white and grey markers in *Figure 4*. Sample B contains more flavour components than the reference sample.

The comparison of the reference sample and Sample C is shown in *Figure 5*. 30% of both samples contained the same flavour compounds, with an additional 10% in the out of tolerance range for Sample C. The larger blue markers show that the peak area of the aromas in Sample C are significantly greater than those in the reference sample, hence the representation of the blue out of tolerance marker.

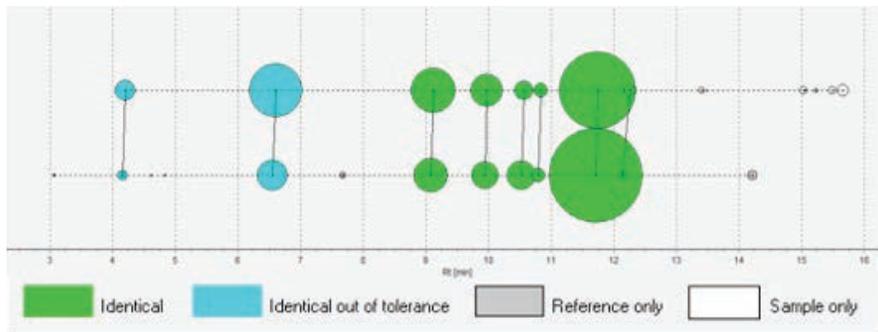


Figure 5. Reference beer sample and Sample C comparison

ChromSync accurately performs comparisons regardless if there are issues surrounding peak distortion, scaling, column aging, retention time shifts and even changes in experimental conditions. The user-friendly software offers easily amendable parameters to counteract any of the above instances, for example if only the larger aroma peaks are of interest the software can automatically filter small peaks with a defined minimum area, at the touch of a single button.

ChromSync Key Features:

- Chromatograph comparison software
- CompassCDS Add On
- Eliminates time consuming manual comparisons
- Identification of identical and missing peaks of flavour profiles
- Tabulated and graphical results
- Perfect for the flavours and fragrance industries



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