



Applications



> Food & Flavor Science:

Aroma real-time quantification with PTR-MS: rapid analytics for consistent sensory quality

SENSORY PERCEPTION OF AROMA

Everything we eat and drink impacts our sensory perception. Especially aroma perception is highly developed in humans and allows us to detect subtle changes in the food products we are used to consume.

Coffee, for example, as a natural resource is subject to variation over time but today's industrial production and branding strategies need a constant product quality.

Changes in ingredients and composition of food are challenging the food industry to supply consumers with a consistent aroma quality and profile they are used to have.

Sensory evaluation by e.g. trained panels is a widely accepted standard in the industry that instrumental approaches should support with robust and reproducible quality monitoring methods.

RAPID ANALYTICS BY PTR-MS

IONICON PTR-MS has outstanding advantages to assist the understanding of perception in food research and its results can directly be used for process monitoring and quality control in food production facilities. PTR-MS data allows to obtain chemical fingerprints of different food samples in real-time. Together with sensory data, it is a perfect input for chemometric datamining methods. In combination with the robustness and reproducibility of PTR-MS data, developed models can be used for sustainable high quality production of food with a distinguished aroma profile.

PTR-MS

- > Rapid screening for volatile flavors
- > Chemical fingerprints of complex aroma
- > Real-time sampling with high throughput
- > Efficiency by autosampler integration

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MEASUREMENT OF ESPRESSO COFFEE HEADSPACE WITH PTR-MS

Analytical studies and sensory profiling are performed on different commercially available espresso coffee products. On-line analysis using PTR-MS is used to obtain chemical information about differences in composition of the coffee headspace characterizing multiple coffee blends. The IONICON autosampler, an add-on to PTR-MS, can be used for optimizing this procedure by increasing throughput and sample screening efficiency. In addition, an expert panel trained for coffee tasting describes each sample by scoring 10 key flavor attributes on a 10-point scale. The overall sensory description of each sample is correlated with the analytically obtained differences in chemical composition in order to develop a statistical tool to predict the sensory profile based on analytical data. In a second step, the prediction is validated using a new series of coffee blends, which differ in the aroma profile.

RESULTS OF PTR-MS DATA IN COMPARISON WITH SENSORY PROFILES

The overall sensory prediction of the new blends based solely on the analytically generated data shows a good match with the sensory profiles independently obtained by the expert panel. This novel and efficient approach of characterizing the aroma of coffee blends by online analysis may shorten the time required for the development of new products and improve quality control in a more automated and objective manner.

Figure 2 shows espresso coffee online headspace measurement with PTR-MS.

Figure 3 indicates that a correlation between the prediction resulting from PTR-MS data and the sensory profile of the trained panel exists.

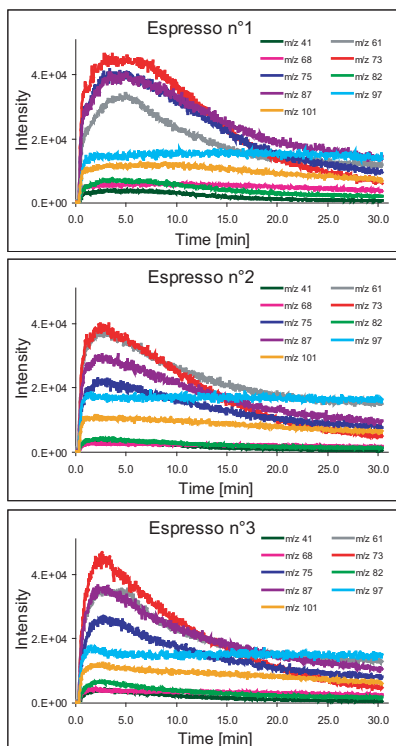




Fig. 2: PTR-MS online measurement of espresso coffee headspace.

Sensory profile (trained panel) 
 Predicted sensory profile 

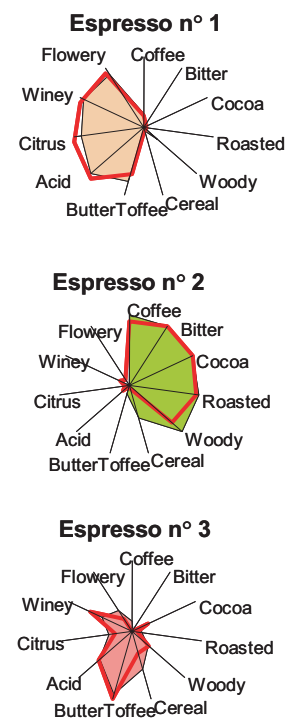


Fig. 3: Validation of flavor prediction by a trained panel.

■ Related article:

C. Lindinger et al.: When Machine Tastes Coffee: Instrumental Approach To Predict the Sensory Profile of Espresso Coffee. Anal. Chem. (2008). DOI: 10.1021/ac702196z