Application Note

Rancidity and Off-note Detection in Headspace of frying Oil and fried Products

Highlights

- **Quality Control of commodities**
- **Rancidity marker quantification**
- **Off-smell detection**
- **Headspace analysis**
- **Analysis without sample pre-treatment**

Subject

This application note briefly describes the economical and sensitive Gas Chromatograph-Ion Mobility Spectrometer (GC-IMS) solution for the analysis of defects and degradation products in the headspace of frying oils an fried products. The samples can be analyzed right as-present without special pre-treatment.

The full spectrum of Volatile Organic Compounds (VOC) of a sample is 2-dimensionally separated and measured at ppb-level. Marker substances (e.g. hexanal for oxidation of fatty acids) can be quantified automatically. Undesired compounds like off-smells are easily detected to ensure a reliable quality control.

The FlavourSpec® combines the outstanding sensitivity of an IMS with a fast GC pre-separation. The 3-dimensional measurement results offer the separated analysis of individual VOCs even in complex mixtures.

Frying oils -when exposed to light and/or temperature- oxidize with time producing a wide series of aldehydes, ketones and acids so that the oil finally becomes rancid. Some of these compounds exhibit very low odour thresholds, affect the product flavour and are critical with respect to customer acceptance. For optimization of the process the refreshing cycles of frying oil resp. the grade of rancidity has to be measured accurately. This can either be done by quantification of the aldehyde effusion of the oil or even directly from the fried products. Furthermore high odour-active compounds can be detected within the same measurement.

Figure 1: FlavourSpec®

FlavourSpec®: Your analytical Tool for Crisps

Workflow Crisps

Solid and liquid samples can be analyzed as-present. Crisps are simply weighted into vials. The FlavourSpec® handles all necessary conditioning automatically (20min@60°C) and analyzes the VOC composition and concentration.

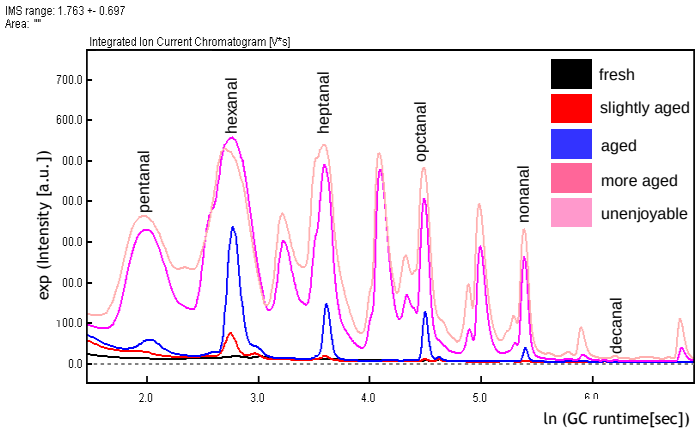

Figure 2: Total Ion Current Chromatograms of aged crisp samples

Conditions

Sample per vial:	2g crunched crisps
Inj. Volume:	0.5ml
Carrier:	N_2, 25ml/min
Drift gas:	N_2, 250ml/min
IMS Temperature:	45°C
Column:	MCC OV-5, 20cm

Results – Marker Substance Quantification

- The aldehyde signals determine the rancidity of the crisps.
- Furthermore additional characteristic signals arise for degraded samples.

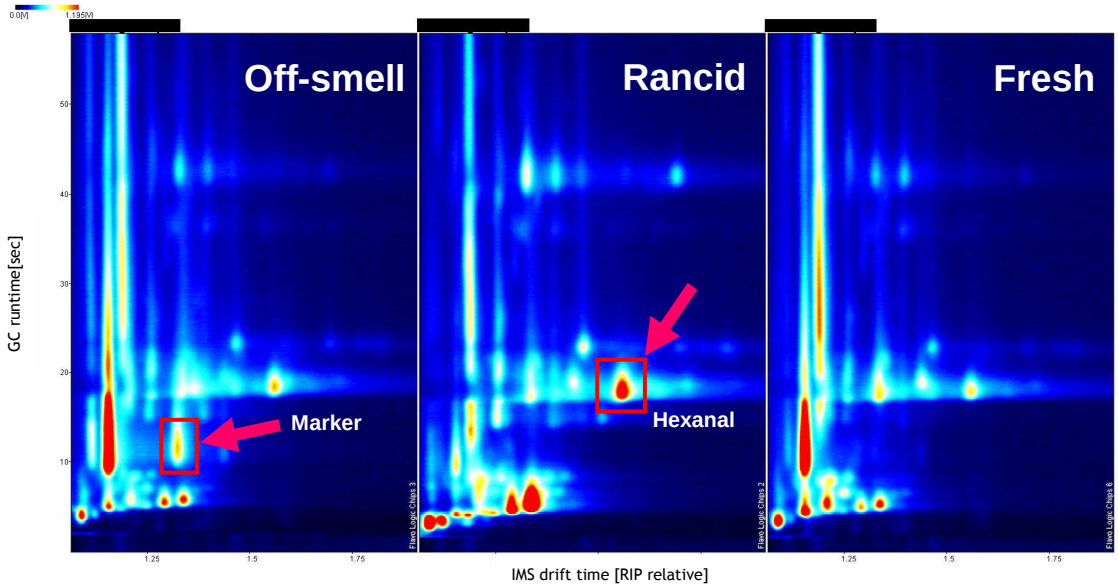

Figure 3: Chromatogram clippings of fresh and aged Crisps samples

Conclusions

1. Rancid or aged samples can be classified by quantification of marker compounds like hexanal.
2. G.A.S. software 'LAV' offers various ways to automatically highlight signal pattern variations that correlate to quantitative compound changes.
3. Undesired substances can easily be identified by comparison with reference compounds.

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