

BOOK OF ABSTRACTS

9th International Symposium on **RECENT ADVANCES IN FOOD ANALYSIS**

**November 5-8, 2019
Prague, Czech Republic**

Jana Pulkrabová, Monika Tomaniová, Michel Nielen and Jana Hajšlová
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Published by the University of Chemistry and Technology, Prague
Technická 5
166 28 Praha 6
Czech Republic



Edited by Jana Pulkrabová, Monika Tomaniová, Michel Nielen and Jana Hajšlová

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ISBN 978-80-7592-055-3

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RECENT ADVANCES IN FOOD ANALYSIS

November 5-8, 2019

Prague • Czech Republic

Clarion Congress Hotel Prague

Organized by

**Department of Food Analysis and Nutrition,
University of Chemistry and Technology, Prague (UCT Prague),
Czech Republic**

&

**Wageningen Food Safety Research (WFSR), part of Wageningen
University & Research, The Netherlands**



MINISTRY OF AGRICULTURE
OF THE CZECH REPUBLIC

*RAFA 2019 is held under auspices of the Minister of
Agriculture of the Czech Republic, Miroslav Toman.*

LECTURES

L14

GC-IRMS TECHNIQUE SNIFFS OUT AROMA FRAUDS

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Flavour is an important quality trait of food and beverages and is determined by taste and aroma, but the growing demand for natural aromas and increasing raw material costs is raising prices and lowering quality of food products. One solution is to replace natural flavourings with cheaper, more readily available synthetic flavourings, and adulteration of products for economic gain is a concomitant phenomenon in the production of aromas. Gas chromatography-combustion/pyrolysis-isotope ratio mass spectrometry (GC-C/P-IRMS) for the analysis of volatile compounds, sampled using solid phase microextraction (SPME), is an appropriate tool for authenticity assessment of aromas because it allows differentiation between synthetic and natural produced aroma compounds. The demanding work involved in GC-C/P-IRMS and lack of knowledge about how SPME parameters affect stable isotope measurements have meant that SPME-GC-IRMS has so far typically been used for the determination of isotopic values of single (or few) aroma compounds. This study examined the suitability of the method for the determination of $\delta^{13}\text{C}$ and $\delta^2\text{H}$ values of more than 15 aroma compounds within the same run. It also investigated how SPME and analysis conditions affect the relative abundance of isotopic values resulting in possible isotopic fractionation and, in this regard, outlines the process of data normalisation and method validation necessary to obtain meaningful data for use in authenticity studies. The results show that by using an optimised SPME method with the appropriate processing, we can obtain highly reproducible $\delta^{13}\text{C}$ and $\delta^2\text{H}$ values without fractionation for different volatile compounds. Verification of commercial samples also requires building databases of authentic flavour compounds with well-defined origins. In this study, stable isotope databases for apple, strawberry, vanillin, and truffle aroma compounds were established and comprised 50 apple samples, and 18 strawberry laboratory produced recovery aroma samples of natural origin, 173 samples of 10 different truffle species and 50 authentic samples from vanilla pods. Pure synthetically derived characteristic aroma compounds and nature-identical vanillin samples were also characterised. Additional types of fruits were tested, and the apple and strawberry database was expanded to include the analysis of raw fruit and fruit juices. For most of the selected aroma compounds, good discrimination was obtained between the natural and synthetic authentic range of isotope values. Finally, commercial samples were tested and revealed possible falsification for several fruit aroma compounds. All the products labelled as "natural vanilla flavour" contained synthetic vanillin. Also, fresh truffle samples from the market are suspected of being flavoured with synthetically derived truffle aroma. As these results indicate, significant doubt exists about the authenticity of flavoured products on the market, and extensive testing is necessary.

Acknowledgement: *Research is implemented in the framework of Smart Specialization Program: Food for Future and takes part of MASSTWIN (H2020, GA no. 692241), ERA Chair ISO-FOOD (H2020, GA no. 621329), REALMed and J4-1766 (Slovenian Research Agency) project.*