



Società Chimica Italiana
Divisione di Spettrometria
di Massa



XXII International Mass Spectrometry Conference

Florence (Italy) - August 26-31, 2018

BOOK of ABSTRACTS

draft



1229 - RAPID AND DIRECT ANALYSIS OF COFFEE BEANS (GREEN AND ROASTED) AND ONLINE MONITORING OF COFFEE ROASTING BY SIFT-MS: FOCUS ON VOLATILE ALDEHYDES

Iuliia Khomenko (1) - Andrea Caretta (2) - Valentina Lonzarich (3) - Franco Biasioli (1) - Luciano Navarini (4)

Edmund Mach Foundation, Department of Food Quality and Nutrition, San Michele all'Adige, Italy (1) - SRA Instruments S.p.A., technical assistance, Cernusco sul Naviglio, Italy (2) - Aromalab illycaffè S.p.A., Research & Innovation, Trieste, Italy (3) - illycaffè S.p.A., Research & Innovation, Trieste, Italy (4)

Keywords: direct injection, volatile organic compounds

Introduction:

Aroma of coffee beans (*Coffea arabica*) contributes to its quality evaluation and its origin tracing. The part of coffee aroma such as volatile aldehydes is linked directly to volatile organic compounds (VOCs) naturally occurring in green coffee beans as well as to roasting process. Fast and direct volatile aldehydes detection in green beans, during coffee roasting, and in roasted beans by a selected ion flow tube mass spectrometer (SIFT-MS) may possibly be a way for characterization of coffee origins.

Methods:

VOCs of coffee beans of 5 geographical origins and 3 batches each were measured by SIFT-MS (SYFT VOICE200 ultra, Syft Ltd, New Zealand). 5 green coffee beans were placed in a 22 mL glass vial, incubated at 37°C for 30 min, and measured for 1 min by an autosampler coupled to SIFT-MS. Single bean was placed in a vial and roasted in the oven at 211°C for 20 min. SIFT-MS monitored roasting through the oven ventilation. Then vials were closed and measured in the same way as green beans.

Results:

Twenty one aldehydes, two alcohols, and two methoxypyrazines were monitored in green beans along with a nonspecific monoterpene peak. Some typical compounds such as furans, pyridine, and pyrazine were added to the list of monitored compounds for the online monitoring of coffee bean roasting and the screening of roasted coffee beans. During roasting two types of evolution curve of VOC emissions were observed: the peak of emission at the beginning (2-nonenal, benzaldehyde, and 2-pentylfuran) and at the end of the roasting (hexanal, 2-hexenal, and others).

The special attention was paid for the possibility of aldehydes to discriminate the coffee bean origin. In green beans origin was characterized by the significant differences in the concentrations of five aldehydes such as benzaldehyde, hexanal, 2-methyl-2-propanal, 2-methylbutanal, and pentanal. The concentration of aldehydes in roasted beans was significantly different from green ones but no significant difference according to their origin was observed.

Conclusions:

The technique was successfully applied for screening of green and roasted coffee beans and for online monitoring of the coffee bean roasting. The main differences in aldehyde content in coffee beans were found in green beans rather than in roasted ones.

Novel Aspect:

For the first time the analysis of green and roasted coffee beans and online monitoring of VOC emission during coffee roasting was performed by SIFT-MS. Moreover for the first time SIFT-MS was coupled with a multipurpose GC automatic sampler.