



Società Chimica Italiana
Divisione di Spettrometria
di Massa



XXII International Mass Spectrometry Conference

Florence (Italy) - August 26-31, 2018

BOOK of ABSTRACTS

draft



70 - APPLICATION OF SPME GC-MS TO EXPLORE POSSIBLE DIFFERENCES IN FREE-LACTOSE MILKS FROM THE MARKET

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Application of SPME GC-MS to explore possible differences in free-lactose milks from the market

Keywords: lactose-hydrolyzed milk, SPME GC-MS, volatile organic compounds

Introduction

Positive effects of milk on the human health are well-known. However, 70% of the global population is lactose intolerant [1]. For this reason lactose-free products, obtained adding lactase, have been released on the market [2]. According to the step in which lactase is added, downside effects can arise over time, due to its proteolytic side activity [3]. The present study aim to explore the potential of SPME GC-MS to catch VOCs profiling of commercial lactose-free milk.

Methods

UHT lactose-free milks from the local market, three freshly produced (FM1, FM2, FM3) and two after 180 days of storage (SM1 and SM2) were analyzed by SPME GC-MS according to Bergamaschi et al. (2015) [4]. Compounds were identified using the NIST-98/Wiley library and calculated retention indices (RI). Samples were compared by one-way ANOVA and Tukey post hoc test, when necessary, using the STATISTICA software (Dell Software Inc., Palo Alto, CA).

Results

Fifty-nine volatiles were identified and 64% of them were present in all the samples, suggesting differences in the VOCs profile. Many of those were already reported in other studies focused on lactose-free milk [3, 5, 6]. Fresh samples (FM1, FM2 and FM3) differed significantly for 7 compounds and 6 of them were higher in FM3. At the moment, we cannot speculate on the observed differences but the results suggested that the SPME GC-MS can catch the differences among milk batches. Fresh and stored milk differed significantly for 6 compounds, 5 of them having higher intensity after 180 days of storage (SM1 and SM2). Several of the VOCs that differed among the samples were methyl-ketones, well-known for their contribution to the off-flavor in UHT milk [7]. Some, such as 2-undecanone and 2-tridecanone, have long carbon chain and can be responsible for the heated flavor of milk [7]. The formation of methyl-ketones can also be addressed to the Maillard reaction, whose proceeding can be referred to the higher levels of these compounds found in SM1 and SM2.

Conclusions

The study indicated that the SPME GC-MS approach was able to catch differences in volatiles profiling of the milk tested. Conservation had a relevant impact and most of the changes were related to compound intensity. As the proteolytic side activities of lactase may play a role, it will be verified further. A shelf-life study is envisaged to verify the evolution of the VOCs profile in the samples and its contribution to the products sensory profile.

Novel Aspect

This study is an attempt to verify the suitability of the SPME GC-MS for tracking the evolution of the off-flavours formation in lactose-hydrolysed milk during storage.

References

1. Swallow D. M., Annual review of genetics, 37(1), 197-219 (2003).
2. Jelen P., Tossavainen O., Australian Journal of Dairy Technology, 58(2), 161(2003).
3. Troise A. D., Bandini E., De Donno R., Meijer G., Trezzi M., Fogliano, V., Food Research International, 89, 514-525 (2016).

4. Bergamaschi M., Aprea E., Betta E., Biasioli F., Cipolat-Gotet C., Cecchinato A., Bittante G., Gasperi F., *Journal of Dairy science*, 98(4), 2183-2196 (2015).
5. Jansson T., Jensen S., Eggers N., Clausen M. R., Larsen L. B., Ray C., Sundgren A., Andersen H. J., Bertram H. C., *Dairy Science & Technology*, 94(4), 311-325 (2014).
6. Jensen S., Jansson T., Eggers N., Clausen M. R., Larsen L. B., Jensen H. B., Ray C., Sundgren A., Andersen H. J., Bertram H. C., *European Food Research and Technology*, 240(6), 1247-1257 (2015).
7. Contarini G., Povolo M., Leardi R., Toppino, P. M., *Journal of Agricultural and Food Chemistry*, 45(8), 3171-3177(1997).