FURANEOL AND MESIFURANE IN STRAWBERRIES – AN ANALYTICAL CHALLENGE

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2,5-Dimethyl-4-hydroxy-3(2H)-furanone (furaneol, DMHF) and 2,5-dimethyl-4-methoxy-3(2H)-furanone (mesifurane, DMMF) are very important flavour compounds in various fruits. Furaneol is for example considered to be an impact compound for strawberry flavour. Both compounds show very low odour threshold values ($4^{*}10^{-5}$ mg kg^{-1} for furaneol; $3^{*}10^{-5}$mg kg^{-1} for mesifurane). For strawberries, very large differences in concentrations have been reported for both compounds (0-5.422 µg kg^{-1} for furaneol® (1, 2) and 0-12.600 µg kg^{-1} for mesifurane (3, 4)). Reasons for these variations in concentrations may be found in different strawberry varieties or differing ripening stages of the fruits. Regarding the facts that both compounds are thermally instable and that both show varying stability depending on the pH value (5, 6) in combination with the high affinity of furaneol to the strawberry matrix based on its pronounced polarity, the variations of up to five orders of magnitude might also be due to parameters used for the analysis.

In this study three alternating sample extraction methods for the quantitative determination of the furanoid compounds were investigated in order to gain a reproducible and sensitive way to determine the compounds in the complex strawberry matrix. Method development was performed using aqueous solutions as well as the strawberry matrix. The determination of the compounds was performed by gas chromatography using polar analytical columns.

The following sample preparation techniques were investigated:

1. Headspace solid phase microextraction (HS-SPME) using a DVB/PDMS/Carboxen fibre (2 cm Stable Flex). The influence of different sampling temperatures as well as of the addition of different salts was studied.
2. Direct immersion of SPME fibres into the sample matrix. Eight different fibre materials were tested regarding the extraction yield and the reproducibility for mesifurane and furaneol.
3. The sample preparation technique described in (7) using solid phase extraction (SPE) for the extraction of the furanoid compounds was adapted for the strawberry matrix. The sample matrix was homogenized with an aqueous tartaric buffer (pH 3.5). After centrifugation the clear supernatant was transferred onto SPE cartridges (crosslinked polystyrene/DVB). The elution of the analytes was performed with acetone. Aliquots of the eluate were used for the GC analysis.

The sample preparation respectively extraction methods are compared with respect to reproducibility and extraction yields for furaneol and mesifurane.

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