

## **Dissertation assessment**

### **Doctoral thesis: Development and metrological evaluation of gas chromatographic methods for quality and safety control of alcoholic products**

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The doctoral thesis deals with an unusual analytical approach for accurate quantification of alcoholic beverage congeners; those are important analytes for evaluating the quality of alcoholic beverages. The scientific problem was exact and suitable stated as well as the scientific approach by the author. The thesis consists of two main parts. First, theoretical background, together with the state of the art of quantification methods of alcoholic beverage congeners, was mentioned. The authors identified the main disadvantages of the conventional qualification method for congeners using internal and external standards. The second part consists of six scientific papers published by the author in peer-reviewed impacted journals and related to the dissertation topic.

The author developed a new quantification approach using ethanol as the main alcoholic beverage component as an internal standard (called "ethanol as IS"). I have to say that it can sound crazy. The author stated the essential mathematical instrument for the "ethanol as IS approach" compared to other conventionally used quantification methods. The solution design was then verified and compared with conventional quantification methods for congener analysis using GC-FID and GC-MS. As a result, the crazy idea became very useful, and the developed method was fully validated, especially for GC-FID analysis of congeners. I appreciate that an inter-laboratory study was also conducted as part of the validation. The author also demonstrated the ability to evaluate the statistical results and draw appropriate conclusions.

The developed approach was also applied for GC-MS analysis of congeners in alcoholic beverages. The author originally solved the problem with mass spectrometry detector saturation by the routinely monitored more abundant ions.

The thesis is well-written and free of ambiguities and factual and formal errors. All the background, experiments and resulting conclusions are concise but well summarised. Given that all results were published in impacted journals and underwent a rigorous and rigorous peer review process, I have no comments on the results.

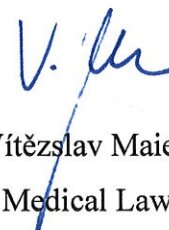
The positive side of the dissertation is the application of the obtained results for real analyses in the food industry, as evidenced by the fact that one of the very reputable companies uses the developed method in their laboratories.

In the context of the scientific debate during the defence of the dissertation, I would like to ask the author:

1. The coefficient of determination is not precisely the most appropriate indicator of the linearity of the calibration curve. Have any statistical methods been used to validate and test the suitability of the linear calibration model?
2. You have shown that the developed "ethanol as IS" method applies to GC-MS in SIM mode. Is it possible to use the method for GC-MS/MS analysis?
3. The "Ethanol as IS" method has many advantages. Does it also have any disadvantages compared to conventional quantification methods of congeners in alcoholic beverages?

In conclusion, I can state that this dissertation meets the requirements for this type of work. I recommend the submitted dissertation for defence.

In Olomouc, 13th October 2022



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