



Comparison of different approaches for quantification of volatile organic compounds in ambient air

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Emission of volatile organic compounds (VOCs) leads to a significant decrease in air quality in many regions around the world and has a negative impact on climate change, human health and the biosphere. Quantitative analysis of these substances by gas chromatography coupled to mass spectrometry (GC-MS) is especially challenging since VOCs are usually present in ambient air at low levels (pg/L to µg/L) and it is often impractical, expensive or even impossible to provide standard substances for all compounds identified in the real samples. Thus, in this paper we compare two methods for quantification of fourteen VOCs belonging to different chemical classes: one based on external calibration and one based on anisole as an internal standard. Then, both methods were used for determination of the concentrations of the detected VOCs in ambient air samples taken on Radiello adsorbents at two locations in Skopje: Institute of Chemistry and Macedonian Academy of Sciences and Arts.

Both methods gave comparable results and the calculated concentrations for each VOC was within $\pm 30\%$ of the theoretical concentration. Calibration curves were linear in the range from 100 to 4000 µg/L and the RSD of the average RRF met the acceptance criteria and was $\leq 30\%$ for each target VOC¹. Toluene, chlorobenzene, C₆-C₂ and C₆-C₃ substituted benzenes gave similar values for the average RRFs in the range from 1,260 to 1,601 and RSD of 8,533%. It can be concluded that quantification based on anisole as an internal standard is a simple and reliable method for determination of concentrations of VOCs as a convenient alternative to external standard calibration.

Keywords: volatile organic compounds, internal standard, external calibration, GC-MS

References:

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