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Atmospheric
Measurement
Techniques
Discussions

Interactive comment on "Potential of needle trap microextraction – portable gas chromatography – mass spectrometry for measurement of atmospheric volatile compounds" *by* Luís Miguel Feijó Barreira et al.

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Referee comments

1. General Comments

The manuscript of Barreira et al., entitled "Potential of needle trap microextraction–portable gas chromatography–mass spectrometry for measurement of atmospheric volatile compounds" addresses the important question of application of modern analytical techniques in the atmospheric measurements. Combination of Needle Trap Microextraction (NTME) technique with portable GC-MS provides novel approach for

fast and in situ analysis of target analytes in environmental samples. The results are good and support the assumption of application of portable NTME-GC-MS system for Biogenic VOC analysis in atmospheric air. Authors demonstrated that using the here proposed method it is possible to link the concentrations of diverse organic molecules (mainly aldehydes) with new particle formation and provide an evidence that Biogenic VOCs can be accumulated in and later released from the snow, potentially contributing to the formation of secondary organic aerosol.

2. Specific Comments

Authors should consider addition of more references to the NTME technique. Apart from environmental analysis, there are several interesting articles about NTME dealing with optimization of adsorption and desorption parameters affecting the efficient preconcentration of volatile organic compound. In this regard, authors may consider the following additions/clarifications:

- Introduction, p. 2, line 34: after the sentence "… of the sorbent packed in the needle (Eom et al., 2008)." add the information that - additionally to the mentioned volume of adsorbent - also the type of adsorbent material (microporosus/mesoporous structure, mechanical/thermal stability) as well as sampling parameters (temperature and sample flow rate during adsorption) affect the reproducibility and efficiency of adsorptive preconcentration on needle trap devices as demonstrated by Filipiak et al. [doi:10.1088/1752-7155/6/2/027107 J. Breath Res. 6 (2012) 027107]. Furthermore, the robustness, easiness and rapidity of the analysis with NTME were shown to be superior for the BTEX determination in gaseous and even in aqueous samples [Jurdakova et al., doi:10.1016/j.chroma.2008.04.065 J. Chrom. A, 1194, 2008, 161–164].

- Section 2.3, p. 3, line 30: it would be helpful to explain to a reader what exactly is "CUSTODION® needle trap microextraction syringe", as there is no information about this device on a manufacturer's website (http://torion.com/products/custodion.html). It is particularly interesting exactly how was a thermal desorption performed, as authors mention “syringe” in terms of needle trap device (NTD), whereas desorption from needle traps is typically done by simple insertion of NTD (plugged on other end) into GC injector (operating at preset temperature)... Did authors use additional sample-flow through the needle trap during injection to GC?

- Section 2.3, p. 4, line 8: authors used 25 ml/min sample flow rate over 100 minutes for adsorption on Needle Trap Device (NTD), what results in 2,5 L of sample drag through needle trap. Are the authors sure that there is no saturation of adsorbents in needle trap? This is very large volume of sample, typically used for adsorption on conventional “sorption tubes” (sampling tubes) filled with incomparably larger amounts of the same adsorbents...

- Section 2.3, p. 4, line 23: in extracted ion chromatograms it has no sense to use m/z=83 for propionaldehyde. This compound has a molecular weight of 58 and simply cannot generate a signal at m/z=83.

- Section 3, p. 4, line 30: if authors state that “factors affecting sensitivity and chromatographic separation including peak shape were considered”, they should also provide information which exactly factors were taken into consideration, what is the effect, why certain parameters (what values) were selected etc. In a present form such statement does not bring much information...

- Section 3, p. 4, line 32: authors normalized the peak areas to the adsorbed gas volume. This could be done only in case of linear relationship of the acquired peak area and adsorbed sample volume (i.e. no saturation of NTD). Could authors present a proof that collecting 2,5L of sample on needle trap still guarantees this linearity?

3. Technical Correction

Authors are asked to clarify the description of sampling procedure in the following way: a) If there was no syringe (containing a sample) connected to a needle trap, authors should not use the term “needle trap syringe” (e.g. p.4, line 3) but “needle trap device”

or an abbreviation “NTD” thorough the manuscript. b) If there was a syringe (with sample) connected to a needle trap, it should be stated clearer (but this would mean 2,5L syringe, according to author’s description of sampling). Perhaps, authors could add a sketch depicting the system used.

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