

Interactive comment on “A novel inlet system for on-line chemical analysis of semi-volatile submicron particulate matter” by P. Eichler et al.

Anonymous Referee #2

Received and published: 28 October 2014

This manuscript describes the development and performance of a new inlet for the sampling of atmospheric aerosol to improve on-line measurement of aerosol organic composition. The authors provide a description of the inlet components and present results from laboratory tests of critical performance metrics. On two occasions, the authors state that chemical interpretation of the data presented is outside the scope of the manuscript, which is entirely reasonable given the technical focus of the paper. The manuscript overall is succinct, clearly written and well structured and the material appropriate for publication in Atmospheric Measurement Techniques. A brief, but sufficient, description of the current state of aerosol organic measurement is included in the introduction. Measurement of aerosol organic composition is a major area of research and improved capabilities such as that described by the authors is of interest

C3366

and benefit to the science community.

My principal criticism of the manuscript is that, given its technical focus, insufficient details are presented to allow the interested reader to fully understand and evaluate the design of the inlet. Figure 1 presents a flow-chart representation of the inlet, which adds little to the textual description, when what would be truly useful are technical drawings of the inlet design and the experimental arrangement (e.g. aerosol vs gas sampling). I would encourage the authors to replace Figure 1 (or add an additional figure if they feel the current Figure 1 merits inclusion) with schematics/technical drawings and include dimensional information to bring the level of the physical description of the inlet into line with the technical description of the performance evaluations performed.

Specific comments:

Abstract: The abstract feels a little weighted toward the inlet+PTR-ToF-MS instead of focused on the inlet that is the topic of the manuscript. Some of the inlet performance details should be included in the abstract: flow rate, enrichment, gas-phase removal efficiency, etc.

P10110, L1: The authors present more than the concept of the inlet, but an evaluation of a constructed inletâ€”suggest rewording to remove “concept”. “Novel” may be a bit strong given the last decade of aerosol inlet developmentâ€”the new feature is the use of the aerodynamic lens to produce an enhancement in the sampled aerosol mass. The denuder and thermo-desorption (evaporation?) have been used in concert before (e.g. Rollins et al., ES&T, 2010 among others cited by the authors) and an enhancement technique (mVACES) is reported in Vogel et al. and others.

P10110, L9: The sentence “The combined set-up...” seems limited since experiments with organics are reported as well.

P10114, L1: The statement that the individual compound mixing ratios were varied was initially a little confusing. The dynamic dilution of the mixture resulted in the mixing

C3367

ratios of individual compounds ranging from 0 to 30 ppb (and of the total organic loading from 0 – 11*30=330 ppb).

P10114, L20: The aerodynamic lens by itself does not produce an enrichment in aerosol concentration, rather it is the combination of the lens to produce a collimated aerosol jet along with what is effectively a virtual impactor that produces the enrichment in the minor flow.

P10118, L8: I am not sure what “mainstream” cigarette smoke is. Is this a technical term?

P10121, L9: It would be nice to have a summative discussion of the estimated enrichment of aerosol organics (combining all of the factors discussed individually) and how that might relate to measurement of compounds in ambient aerosol. There is a brief mention in section 3.3, but a more complete description of how the inlet would improve the analytical detection limit (e.g. of the PTR-ToF-MS) for aerosol organic compounds would be useful. This quantity could also be stated in the abstract. The authors could also include the improvement MDL/MQL expected from further inlet improvements.

Interactive comment on *Atmos. Meas. Tech. Discuss.*, 7, 10109, 2014.

C3368