Atmos. Meas. Tech. Discuss., 3, C1–C3, 2010
www.atmos-meas-tech-discuss.net/3/C1/2010/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Development and validation of a portable gas phase standard generation and calibration system for volatile organic compounds" *by* P. Veres et al.

Anonymous Referee #1

Received and published: 3 February 2010

The paper by Veres et al describes a portable instrument for the generation of known VOC mixing ratios for use in calibrating atmospheric instruments. Although the concepts of generation through diffusion/permeation and validation through conversion to CO2 are not entirely new ones, the paper brings a range of tests together on different VOCs and CO2 analysers and presents a very useful overview of what can be achieved in this area. Problems of polar and semi-volatile VOC calibration are widespread and the combined approach described appears to be very robust. The paper is likely to be of interest to a wide range of researchers, is well written and following a small number of clarifications would be suitable for publication in AMT.

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

A general point which would benefit from expansion is a discussion on the conversion efficiency to CO2 for differing VOC types. In this study CH4, benzene, formic acid and HCHO are all individually tested directly. Other VOCs are indirectly assessed through mixtures, but here one or more VOCs could have poor response whilst the overall result still lay within the combined gas cylinder and MOCCS uncertainty. Is there any experimental or literature evidence on the types of VOCs that will efficiently convert? In particular does the presence of a halogen or nitrogen atom create deviations.

Independent calibration of the GC-MS for response to benzene. The paper refers to it being independently calibrated with over 20 different cylinder gas standards. Was this really done in one measurement cycle before testing against MOCCS? Or rather is this that over the GC-MS lifetime it has observed an internally and self-consistent calibration from this number of different cylinders. If this is the case which was the 'current' VOC standard used?

Table 1 could be made clearer by labelling the 4th column as 'measured Carbon by MOCCS' and including an additional column that indicated the nominal carbon as derived from the cylinder values. I appreciate these appear in figure 5 but they would be useful here also.

Figure 3 shows a large number of replicate measurements of benzene as derived from the total carbon measured by MOCCS. It would be interesting to have some assessment of whether the authors believed this variability to be due to variability in the ability to generate a consistent amount of vapour from the permeation or variability in the CO2 conversion / CO2 measurement. E.g. would this graph have less scatter if the Li-COR instrument had been used?

There appears to be some inconsistency in the uncertainties associated with the NOAA VOC cylinder standards. P 431 line 1 gives 20% but later on p 342 line 17 this is given as 10%.

Figure 4b y axis should be labelled MOCCS I think.

AMTD

3, C1–C3, 2010

For the fire intercomparison, can the language around line 20 be tightened up. – A good R2 value for the comparison tells use nothing about whether the calibrations are within uncertainties. This is only derived from the slope of the data.

Figure 6 for the purposes of this paper would be much better as an x/y correlation rather than two overlaid time series.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 333, 2010.