

Interactive comment on “An unheated permeation device for calibrating atmospheric VOC measurements” by J. Brito and A. Zahn

J. Brito and A. Zahn

joel.brito@kit.edu

Received and published: 12 August 2011

The highly relevant comments from referee #2 are addressed below.

RC: “1) The introduction is very detailed, almost too detailed in places, and so the main conclusion of the paper is somewhat diluted. Since this is an instrumental journal I find this acceptable, but would still suggest to significantly shortening chapters 2.1 and 3.1 and the discussion about the static and dynamic calibration methods on page 2933.”

AC: Sections 2.1 and 3.1 have been eliminated and overall description in section 2

C1360

shortened.

RC: “2) Even though the introduction is very detailed there is one important topic not discussed and I would like to see that added. To my opinion the main advantage of permeation tubes compared to gas cylinders is not discussed in the paper. Many VOCs, such as oxygenated compounds like aldehydes, alcohols and especially acids, are not stable in cylinders and degrade over time or can never be quantitatively recovered from cylinders. Permeation or diffusion sources are the only means for calibrating for those compounds. On the other hand, compounds that are in the gas phase at room temperature such as alkane or alkenes cannot be filled well into a permeation device. I would like to see a section added that discusses which compounds are not suitable for gas cylinders and have to be calibrated using permeation sources and what type of compounds cannot be done with the device as described here.”

AC: Such discussion has been added in the text.

RC: “3) In here also lies the main problem of the device described here. The permeation rate from the source can be calculated, if all the parameters of the PTFE TeiňCon film are known, but it seems to me that ultimately the mixing ratio in the output of the permeation device was determined using a calibration gas cylinder of acetone. If this is the case, how do you calibrate for compounds, where no gas standard is available. Usually permeation tubes are weighed very carefully every few months to determine the weight loss and therefore the permeation rate. Can you weigh the permeation device or calibrate as described for example in Veres et al 2010? I would like to see that explained in the text.”

AC: Indeed the permeation rate of the calibration source described here can only be

C1361

obtained by means of a characterization curve, obtained using another standard. This standard, on the other hand, can be obtained using a permeation device (which can be certified or weighed over months) or a gas cylinder. The main advantage remains the robustness of this source for field deployment.

RC: “4) How do you monitor the temperature? In the description no temperature measurement is indicated, but this is the most important parameter for the permeation rate. For example, small unpowered USB thermometers are available that record the temperature for days, which could be used to monitor the temperature change and therefore the thermal stability of the system while not powered.”

AC: When power is available, the temperature is monitored using three thermostats which were not indicated in Fig. 3. This Figure has been corrected. Using the measured temperature, the permeation rate can be retrieved using a characterization curve as shown in Fig. 6. Without power, the extremely low temperature drift guarantees that the permeation rate is in equilibrium, not requiring temperature measurement when the system is off.

RC: “I would like to see a graph of how the temperature in the fully insulated system changes with time. The temperature drift is only calculated, but this is a very easy measurement and should be added to the manuscript.”

AC: Experimental results have been added into the manuscript.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 2931, 2011.