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Atmospheric Measurement Techniques Discussions

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

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The authors gratefully acknowledge the useful comments, addressed below.

RC: "1a. The importance of accurate and reliable calibrations is described well in the introduction. I recommend removing the ïňĄrst paragraph of Section 2 (Pp. 2934 lines 19 26). 1b. Likewise, static calibration methods are also described with good detail in the introduction and these are not the focus of the paper. I recommend eliminating Section 2.1 (Pp. 2935 lines 1 - 16). If necessary, the sentence about uncertainty of

gas cylinders (Pp. 2935 lines 11 - 14) could be included in the introduction (Pp. 2933 section a). 1c. Following these two changes, Section 2 can be renamed "Theoretical description of permeation devices." 1d. I recommend removing Section 3.1, which describes the theory and details of PTRMS. PTRMS is a well-established technique and is not the focus of this paper. The section could be replaced with a statement like "The output of the permeation device was measured using proton-transfer-reaction mass-spectrometry (PTRMS) [reference describing the particular instrument used in these experiments]. The precision and accuracy of the PTRMS instrument are xxx pptv min-1 and xxx pptv.""

AC: Following the suggestion of the referee section 2.1 and 3.1 have been eliminated and overall description in section 2 shortened.

RC: "2. Has the thermal stability of the permeation device been measured? This would seem like a straightforward test, and perhaps I missed ïňĄnding it in the paper. In Section 3.4, the authors calculate a maximum temperature drive of 0.5 K/h for a temperature differential of 30 K. Is this theoretical result achieved experimentally?"

AC: Former tests have shown promising results considered satisfactory. After careful experimental test the temperature drift of 0.5K/h has been measured for a temperature difference of 20K. The difference between the calculated and measured temperature drift is assumed to be due a higher heat conductance of the insulation bricks as stated by the manufacturer. Nonetheless the temperature drift is well within acceptable levels. The manuscript has been adjusted for this new experimental result.

RC: "3. The description of the permeation device (Section 3.3) and the diagram (Fig. 3) do not indicate that there is a temperature measurement of the system. Although

it is large, well-insulated, thermal mass, it will drift in temperature and ultimately reach equilibrium with its surroundings. As reported by the authors, the permeation rate of acetone depends strongly on temperature (6.6

AC: The temperature of the calibration source is indeed measured, even at three different points. Figure 3 and the text were corrected.

RC: "4. Please expand on some details in the description of the device in Section 3.3: - What is the thickness of the PTFE membrane? (Given in Fig. 3, but not in the text.) - What is the area of the PTFE membrane? - What is the typical thickness of PTFE for commercially-available (Kin-Tek, Vici) permeation tubes, for comparison? - What is the volume of analyte immersed in the water bath?"

AC: The information has been added into section 3.3.

RC: "Please provide a list of variables and their deïňĄnitions for the equations. Some variables are deïňĄned multiple times in the text and this should be simpliïňĄed (example: gas constant, pressure). Check that the equations and variables are used consistently. Minor comments: - Pp. 2932 line 21 Remove "inter alia". - Pp. 2934 line 5 Change "easiness to meet safety clearance" to "ability to meet safety clearance" - Pp. 2939 line 9 Change "independent on" to "independent of" - Pp. 2943 line 21 Change "loosing" to "losing""

AC: The suggested list has been inserted and spelling/text corrected.

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