

## ***Interactive comment on “Performance evaluation of a high-resolution parallel-plate differential mobility analyzer” by J. P. Santos et al.***

**J. P. Santos et al.**

Received and published: 27 January 2009

Authors Reply to ACPD 8, S8688-S8689 (Anonymous Referee 2)

Page S8688

C1. In the text following Eq. (23) on page 17642,  $\alpha$  is described as the angle formed between the deterministic trajectory and the "x-axis" which is parallel to the flow. This may be merely a typo but it should be the y-axis. This would then conform to the last factor in Eq. (24).

The comment is correct. The text (line 18 in page 17642) has been modified accordingly:

$\alpha$  is the angle formed between this trajectory and the y-axis

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



C2. Two factors have been omitted from Eq. (25) on page 17643. The first is  $Q_{sh}/(Q_{sh}+Q_a)$  deriving from the  $Q_{sh}$  in the definition of  $k_c$  (Eq. (14) and the fact that  $\bar{u}$  depends on the total flow  $Q_{sh}+Q_a$ . The second omitted factor is  $(\Delta x^2+\Delta y^2)/(2\Delta x^2)$ . This factor is 1 in the current configuration and the first is very near one for a high resolution instrument. Thus, it is justified to omit these factors for the current configuration but that should be noted.

The referee is right. Eq. (25) and the text (at the top of page 17643) have been changed, as follows:

the relative diffusional variance can be also expressed as  $\sigma_{diff}^2=(4k_B T/peV)[Q_{sh}/(Q_{sh}+Q_a)][(\Delta x^2+\Delta y^2)/(2\Delta x^2)]$  (25). Since in the IONER X1 the conditions  $\Delta x=\Delta y$  and  $Q_a \ll Q_{sh}$  are satisfied, the expression above reduces to  $\sigma_{diff}^2=4k_B T/peV$  (26).

Page S8689

C3. In Fig. (1) the ion inlet is downstream of the ion outlet. What are the inner lines along the direction of flow? If they are streamlines then please make them dotted or thinner to distinguish them from the instrument outline.

The positions of the ion injection and the ion extraction in Fig. 1 are wrong. They have been exchanged and the flow streamlines removed.

C4. On page 17633 references should be given for the works of Zeleny and Langevin.

The following references have been added to the list of references:

Langevin, P.: Sur la mobilité des ions dans les gaz, Comptes rendus, 134, 646-649, 1902. Langevin, P.: L'ionization des gaz, Ann. Chim. Phys. 28, 289-384, 1903. Zeleny, J.: On the ratio of the velocities of the two ions produced in gases by Röntgen radiation; and on some related phenomena, Phil. Mag., 46, 120-154, 1898.

C5. On page 17644 in the text following Eq. (29) it should be noted that turbulence in

the flow at the inlet or outlet slit is a very important nonideality affecting DMA resolution. Also, the slit width affects the DMA accuracy, not the resolution.

Nonidealities in the IONER X1 are discussed in section 2.4 of the new manuscript. See the reply of the authors to comments C3 to C6 and comment C9 of Referee 1.

C6. On the same page line 19 the range of the sheath flow rate should be given as 200 to 700 l/min according to Table 1.

The text has been corrected, as follows:

The flow rate of sheath air was varied between about 200 and 700 lmin<sup>-1</sup>. Some representative spectra are shown in Fig. 3. The sheath flow rates that appear in the legend are those calculated for the classification zone from the flow measurements of the Venturi-type flowmeter upstream and assuming isentropic flow conditions.

C7. On page 17645 line 14 should the disk be 0.5 mm in diameter? Otherwise it would not fit in the 4 mm ID tube. The last line of that paragraph appears to be redundant.

The diameter of the disks is 5 mm, while the outer diameter of the tube is 6 mm. The wall of the tube was perforated at diametrically opposite positions where the disks were allocated (parallel to the tube axis) and then stuck to the wall. The last sentence of the mentioned paragraph (lines 17-18 in page 17645) has been removed.

---

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 17631, 2008.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)