

***Interactive comment on “Aerosol analysis using a Proton-Transfer-Reaction Thermo-Desorption Mass Spectrometer (PTR-TD-MS): a new approach to study processing of organic aerosols” by R. Holzinger et al.***

**Anonymous Referee #1**

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Overall, this is a strong manuscript, but several revisions are required. In general, it is written clearly, but edits are needed. It is my opinion that the instrument described within this manuscript is a valuable addition to aerosol thermal desorption techniques. I offer the following comments and suggestions:

1) Title: Thermal-desorption proton transfer reaction mass spectrometer (TD-PTRMS) would be a more desirable instrument name, as thermal-desorption is more commonly used over thermo-desorption, and the desorption happens prior to chemical ionization and mass spectral detection.

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2) Page 25984, Line 25: we're missing a source, not missing OA

3) Page 25985, Lines 17-21: OOA-1 and OOA-2 are now called low volatility LV-OOA and semi-volatile SV-OOA, respectively. Also add reference to Jimenez et al, Science, 2009.

4) Page 25987, Line 12: The CTD cell has been previously titled as collection and thermal desorption cell, not “thermo”

5) Page 25987, Line 23: was the entire system coated in Restek Sulfinert, or did the CTD have an AMCX coating similar to that used by Williams et al.?

6) Would like to see some calibrations using liquid standards.

7) Major comment: Page 25988, Line 11: Ramping to 350C is not necessary if all transfer lines are only at 200C, the most nonvolatile and sticky organics will largely be lost in the transfer lines, and cause the potential for carryover to following runs. This is apparent in your thermograms in Figure 9, where there is a noticeable drop in mass right at 200C.

8) Major comment: related to comment#6, without elevating all temperatures to at least 300C, it will be expected that you observe much less than 80% of the aerosol mass for an ambient aerosol matrix which contains more nonvolatile organics.

9) Page 25989, Lines 1-2: What about Thornberry et al? Didn't they measure in-situ on the Ron Brown?

10) Page 25990, Line 21: Why did you choose reaction rate of  $2E-9$ ? In the previous sentence you stated that oxygenated compounds have higher reaction rates. Do you see it possible to use a variable reaction rate based on compound functionality?

11) Page 25992, Line 4: Neglecting oligomer formation.

12) Page 25992, Lines 10-16: Thermal decomposition products, e.g. Tobias et al, 2000, ES&T

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13) Page 25997, Line 6: It would be beneficial to know some sort of oxidation level that was achieved in your chamber experiments, e.g. O:C ratio. The organic aerosol mass concentrations from your chamber experiments are on the order of 100-times that of ambient air. It has been shown that to best mimic ambient condition, chamber experiments should be run near ambient concentrations. (J. Shilling et al., etc.). Also, your lab experiments create a much simpler aerosol matrix than what is found in ambient OA. Main point, I'm not surprised your lab SOA doesn't look like ambient OA.

14) Major comment: Page 25998, Line 22: I suggest changing sentence to, "The PTR-TD-MS instrument directly quantifies 55–80% of laboratory-generated organic aerosol." Also change in the abstract!

15) Great paper overall. This will be a nice technique to incorporate in future studies of atmospheric organic aerosol.

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 25983, 2009.