

Interactive comment on “Qualitative and quantitative determination of water in airborne particulate matter” by S. Canepari et al.

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We thank the Referee for his careful reading of our paper and for his interesting suggestions.

His major issue, regarding the Karl Fisher technique, has been addressed by preparing a completely revised version of experimental section 2.2. We added a couple of paragraphs describing the principles of the coulometric Karl Fisher technique, adding the reference of the original paper. Also we added a more detailed description of the experimental apparatus, explaining the meaning of the less common terms and giving a brief summary of the experimental procedure. We hope these changes will improve the manuscript and make the text more clear also to readers having different backgrounds.

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Specific comments and suggestions are addressed in the following.

1) "Different water contributions" are operatively defined as water amounts that are retained by the sample with different strength and are thus released at different temperatures. This was better explained on page 27371, line 11.

2) It was specified that the thermal ramp was optimized on urban dust Reference Material by "trial and error". It seems that this thermal gradient is able to differentiate the operative behavior of the main water contributions that are present in most atmospheric dust samples (for example water bound to crustal matter behaves differently from water bound to ammonium nitrate and sulfate). It is worth noting, however, that water may be bound to a variety of hydrophilic chemical species and that this method is not able, of course, to perform a thorough differentiation of these water contributes.

3) As reported in the last paragraph of Section 2.2, the quantification limit of this method is of 25 ug of water. The possibility to apply the method to size segregated or PM2.5 and PM1.0 samples depends, of course, on the sampled volume. We successfully applied it to samples collected by cascade impactors operating in peri-urban areas at a flow rate of 30 l/min for a sampling duration of ten days.

4) We slightly changed the phrase in p. 27377 line 16. We are aware that the problem of the possible interferences from semi-volatile compounds must be taken into account when applying the method to environments such as boreal forests, that are very different from the investigated urban and peri-urban areas. In these cases it is necessary to have information about the chemical composition of the collected particles before applying the method. The drift profiles of the chemicals and materials listed in the experimental section has been added as Supplementary Material.

5) "y-axes" has been substituted to "ordinates" at p. 27373, line 18.

6) The sentence at p. 27374 line 15-18 has been modified.

7) TG had already been defined in the Introduction (p. 27371, line 14).

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8) "Secondary ammonium salts" indicates ammonium species that are formed in the atmosphere from the reaction between gaseous precursors (e.g. ammonium nitrate from the reaction between nitric acid and ammonia). Species of secondary formation have a different behavior from primary compounds (e.g. ammonia), which are directly emitted from the sources into the atmosphere. For example, secondary compounds are much more sensitive to the ageing of the atmosphere.

9) The calculations at p. 27378 lines 14-19 have been explained.

10) The typo at p. 27381 line 22 has been corrected.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 27367, 2012.

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