

Interactive comment on “Hydrocarbon-like and oxygenated organic aerosols in Pittsburgh: insights into sources and processes of organic aerosols” by Q. Zhang et al.

Anonymous Referee #2

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General Comments:

This manuscript describes an extensive and thorough analysis of AMS and gas phase data that yields detailed and quantitative insights into the nature and sources of organic aerosol particles measured during a short campaign in Pittsburgh. The results are a convincing and self-consistent picture of the organic (and sulfate) aerosol in this area. Quantitative estimates are made for the oxidized (essentially SOA) and hydrocarbon (essentially POA) components using a recently developed approach and mass spectra provide further information on aerosol composition. The paper is one in a continu-

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ing series covering different aspects of methodology and demonstrations of the utility and power of the AMS technique, which may serve as a model for studies of ambient aerosol chemistry. Although the manuscript is long, it is a cohesive presentation and is well written. I think it is an important and well-done study and is certainly suitable for publication in Atmospheric Chemistry and Physics. I suggest the following comments be addressed.

Specific Comments:

1. In reading the introduction to this paper, I, like Reviewer 1, became concerned about the overlap with previous publications by this group. The posted response by the authors to the comment by Reviewer 1 clarify this matter to my satisfaction. The response should somehow be incorporated into the manuscript, however. The itemized response is too long in its current form, so I suggest simplifying it to a few sentences that will better place the current paper in the context of the earlier papers. This is important since there are many references to the earlier work and one should not expect that the reader has read them.

2. Page 8432, bottom paragraph: Do the authors have any comments on why the HOA/CO, POA/CO, HOA/NO_x, and POA/NO_x ratios quoted here differ so much? Is this likely due to fleet differences, analytical methods, or something else?

3. Page 8433, lines 15-20: Since the vacuum aerodynamic diameter is a quantity that readers may not be familiar with, I suggest noting its relationship to the geometric diameter, and if possible, give an estimate of the geometric diameter corresponding to a vacuum aerodynamic diameter for organics and sulfates.

4. Page 8437: Is there any indication that a significant fraction of the m/z 46 signal comes from organic nitrates? What is the source of CO₂⁺? Is it only from acids? Is CO⁺ from carbonyls or is it also a fragment from acids and other compounds?

5. Page 8437: The measured C:H:O ratio of 1:1.6:0.8 could also be presented in a

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way that allows the reader to better grasp what this means in terms of the nature of the oxidized products. For example, this is equivalent to a C:H:O ratio of 5:8:4, which is the molecular formula of glutaric acid. This is the least volatile C5 compound possible for this formula. It is also the molecular formula of a C5 dihydroxy-dialdehyde, which would be expected to be more volatile. However, compounds such as these are formed from the oxidation of aromatics and are thought to become less volatile by forming oligomers through heterogeneous reactions.

6. Page 8438, Lines 1-5: I suggest also quoting the actual values of the OM:OC ratios obtained by Russell (2003), as is done for the Turpin and Lim values.

7. The observation that the mass spectrum of OOA formed during the new particle formation event is similar to that of aged organic aerosol is interesting. Considering that the time scale for this event is a few hours, and that the OOA products are highly oxidized, it would appear that the VOC precursors for OOA must either be freshly emitted aromatics such as trimethyl benzene or oxygenated compounds present in the background air. Only these compounds could form such highly oxidized condensable products (consistent with the C:H:O ratio) on this short time scale. Do the authors have any thoughts on the VOC sources of OOA?

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 8421, 2005.

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