Atmospheric
Chemistry
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Discussions

# Interactive comment on "Inorganic salts interact with organic di-acids in sub-micron particles to form material with low hygroscopicity and volatility" *by* G. Drozd et al.

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vfmcneill@columbia.edu

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We thank the reviewer for his or her helpful comments and insight. We respond to the specific points below.

1. The title should be changed. This research focused on oxalic acid and used oxalic acid as representative. Although oxalic acid is the dominant DCA in the atmosphere, it is not proper to extend the results of oxalic acid to all DCAs, especially for reactivity and hygroscopicity. A recent work by Ma et al. (2013) showed that the reaction between NaCl and dicarboxylic acids during humidification and dehumidification depended on

the species of DCAs as well as the hygroscopicity of formed dicarboxylates. So, conclusion for DCA based on oxalic acid's results should be rigorous.

Given the differences in the results of Ma et al. (2013) and the different binding strengths for different DCAs, we agree to change the title to: "Inorganic salts interact with oxalic acid in sub-micron particles to form material with low hygroscopicity and volatility"

2. P30660, L 16: Is a residence time of less than one second in the heating tube enough for aerosol particles to be decomposed?

While the heating time is short and equilibrium may not be achieved, the conclusions we reach about relative volatility will still be upheld. The fact that a reasonable value for dHvap was determined for oxalic acid suggests the residence time is sufficient for material of volatility similar to oxalic acid. To more clearly state this limitation, the text was modified at 30669:L23: "As discussed above, due to short heating residence times, this value should be taken as an estimate."

3. P30669, L1: The authors defined 75C as the onset temperature of evaporation for MOx. However, from figure 4, it seems ambiguous. Can authors show the mass spectra of pure OxA for comparison? Moreover, how to differential the two sources of oxalate signals in CIMS, adsorbed residual OxA or yielded MOx? For Ca-oxalate particles, it would first undergo dehydration and then decomposition to CaCO3 and CaO (Chang and Huang, 1997). Were these components monitored in this study?

A more quantitative definition of "constant" was implemented: signal/signal25C <= 1.1.

Table 1 and Figure 5 were updated and the text was changed to read: "A quantitative estimate of the onset evaporation temperature was defined as: signal/signal25C <= 1.1. The resulting onset temperatures were: Na2Ox 95 C, CaOx: 115 C"

4. Conclusion: The authors referred to high oxidation state. Since conversion of oxalic acid to oxalate does not change the oxidation state for both O and C, how do the

authors get this conclusion?

We do not imply that any change in oxidation state occurs, but rather seek to emphasize that high oxidation-state material cannot always be associated with high hygroscopicity. No change in oxidation is mentioned in the text.

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