

***Interactive comment on* “Common inorganic ions are efficient catalysts for organic reactions in atmospheric aerosols and other natural environments” by B. Nozière et al.**

Anonymous Referee #2

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This paper demonstrates that carbonyl compounds react in the presence of ammonium at the very high concentrations found in atmospheric aerosols. It concludes that ammonium serves as a catalyst in these reactions and that "ammonium catalysis would account quantitatively for the aging of carbonyl compounds into secondary 'fulvic' compounds in tropospheric aerosols."

The experiments appear to have been conducted with care. I have the following questions/issues with the manuscript:

1. How do the authors know that ammonium serves as a catalyst and does not participate as a reactant? Another recent ACPD paper (Galloway et al, 2008) reports on

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glyoxal reactions with ammonium sulfate particles in smog chambers (dark) and finds nitrogen-containing products, possibly imidazoles.

2. Others have been studying the oxidation of dicarbonyls in aqueous aerosols and clouds by hydroxyl radical. Oligomers form in these systems, and many reaction rates have been measured (Ervens, Blando, Lim, Volkamer, Altieri, Perri, Carlton). Are the ammonium reactions fast enough to compete with OH during the day? The smog chamber work of Volkamer suggests not, since SOA formation from glyoxal in the presence of ammonium sulfate seed particles was slow and became very rapid when OH was added.

3. The authors should consider the work of Galloway (ACPD) and of Shapiro (ACPD) in their interpretation.

4. At the very end of the paper the authors note that the Henry's law constants for the precursors studies (with the exception of glyoxal, highlighted in a different paper) appear to be too small to make these compounds effective SOA precursors. This is a major limitation of the study. It is important that this be stated early in the paper.

ALSO:

1. Two sentences in the abstract require attention - "The reactions were found..." and "The ubiquitous presence..."

2. Fig 2 - the authors only show a small portion of the mass spectrum. Perhaps it would be helpful to show the entire spectrum and an insert of this expanded portion.

3. Experimental section should list compounds tested and should summarize the analytical method details for LC-HRMS, including mobile phase, QC checks...

4. The authors should explain in the text why they concluded the mechanism was aldol condensation.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 1, 2009.

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