**Atmospheric
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Discussions**

Interactive
Comment

Interactive comment on "Cloud droplet activation of mixed organic-sulfate particles produced by the photooxidation of isoprene" *by* S. M. King et al.

Anonymous Referee #1

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General comments The authors present a laboratory study of CCN activation of SOA generated from isoprene. The isoprene SOA was initiated by OH reaction and in the presence of different NOx levels and ammonium sulfate seed particulates. Kohler theory effectively models the cloud activation of the mixed organic/inorganic particles, and no significant change in the CCN activation was observed as the VOC:NOx ratio was changed. Furthermore, a thermodenuder was used to volatilize a portion of the SOA, and the residual organic volume as a function of temperature did not change for the range of VOC:NOx ratios. This implies the chemical composition of SOA is similar at a range a VOC:NOx ratios. Lastly, the authors show that the cloud properties of isoprene/NOx/ammonium SOA is consistent with the cloud properties of aerosol observed during the AMAZE-08 study.

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This manuscript is a valuable contribution to the field, adding insight into the CCN properties of atmospheric particles. The figures and tables are appropriate, and the text is well-written.

Specific Comments The authors were careful to note the relevant references that address the effect of residence time on the measured volatility of SOA, and they found no difference in the volatilization of isoprene/NOx SOA when measured at 0.7 and 1.8 s. An et al. showed that volatilization of alpha-pinene/ozone SOA was nearly complete (98%)when the residence time was increased to 10 s, indicating that volatilization is kinetically limited (at least for alpha-pinene SOA). If this finding applies to isoprene/NOx SOA, the organic fraction that remains on the ammonium sulfate core after the thermodenuder treatment represents the kinetically slower material to evaporate. How is the CCN activity of this material relevant to atmospheric particles, where kinetics are not limited?

Technical Comments Table 1: I recommend that "<MDL" in column 4 is replaced with the value for the instrument's minimum detection limit. This enables the calculation of the lower limit of the VOC/NOx ratio, which may be helpful to future authors for comparison purposes.

Table 1: The last footnote indicates that ozone concentrations are an upper limit due to H2O2 interference. I recommend that an estimate the contribution of H2O2 to the systematic error of the ozone concentration is included (a range, even), by estimating the H2O2 concentration after photolysis, and using the absorption cross sections for H2O2 and ozone (see, for example, "JPL publication 06-2 "Chemical Kinetics and Photochemical Data for Use in Stratospheric Modeling").

Figure caption S2: Please indicate the symbols for 25, 60, and 100 oC. Table 1: The last footnote indicates that ozone concentrations are an upper limit due to H2O2 interference. I recommend that an estimate the contribution of H2O2 to the systematic error of the ozone concentration is included (a range, even), by estimating the H2O2

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