Atmos. Chem. Phys. Discuss., 13, C862–C864, 2013
www.atmos-chem-phys-discuss.net/13/C862/2013/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Real refractive indices and volatility of secondary organic aerosol generated from photooxidation and ozonolysis of limonene, α-pinene and toluene" *by* H. Kim and S. E. Paulson

Anonymous Referee #2

Received and published: 1 April 2013

General Comments

In this study the authors conducted smog chamber experiments in which they reacted atmospherically representative anthropogenic and biogenic VOCs with O3 and/or OH radicals under a variety of conditions including different hydrocarbon/NOx ratio, relative humidity, and with and without OH scavengers in the O3 experiments. SOA was passed through a thermal denuder at different temperatures to remove compounds of different volatilities in order to create SOA with a wide range of chemical compositions that one might expect to be formed in the atmosphere. SOA yields were measured,

but the major focus was on measurements of the refractive indices for these different SOA particles. Based on their results the authors propose refractive indices that should be used for atmospheric modeling of anthropogenic and biogenic SOA. The study is quite straightforward, the experiments appear to be well done, and the discussion and interpretation of the results seem quite reasonable. Such data are valuable for modeling visibility and regional and global climate, and yet few such studies have been conducted, so I think this represents a very useful contribution to the field. I think the paper is suitable for publication in ACP after the following few comments/questions have been addressed.

Specific Comments

1. Page 1958, lines 6-10: Since your gravimetric mass measurements are always significantly higher than the SMPS mass it would probably be a good idea to try using a Teflon filter, which does not adsorb organics, to be certain that adsorption is the reason for the difference and not something else.

2. Page 1963, lines 14-17: I do not understand why the observed TD behavior indicates the formation of SOA layers or the decomposition of oligomers. Please elaborate.

3. Page 1965, lines 20-24: Since light scattering is sensitive to particle size, and this is also highly uncertain in atmospheric models, I suggest stating what difference in particle size would change light scattering by an amount comparable to a difference in refractive index between 1.44 and 1.55 (the thermo-denuded SOA), and between 1.35 and 1.61 (the original SOA). This will give readers a better sense for the accuracy with which refractive index needs to be known.

Technical Comments

1. Page 1953, line 17: I think this is supposed to be "both O3 and OH"

2. Page 1961, line 25: I think this should be "generated from"

3. Page 1962, line 20: I think this should be "consistent with"

4. Table 2, bottom sentence: I think cyclohexane suppresses reactions of OH with the alkene but does not suppress OH formation.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 1949, 2013.