Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2016-672-RC1, 2016

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The effect of adding hydroxyl functional groups and increasing molar mass on the viscosity of organics relevant to secondary organic aerosols" *by* James W. Grayson et al.

Anonymous Referee #1

Received and published: 6 September 2016

Review of manuscript, "The effect of adding hydroxyl functional groups and increasing molar mass on the viscosity of organics relevant to secondary organic aerosols" by Grayson et al.

The authors present a new dataset of viscosities of four polyols with different numbers of hydroxyl groups and of aqueous solutions with different water activities for three saccharides with different molar masses. They compare their (and literature) data to two different structure-property models for the polyols.

In the recent past it became evident that secondary organic aerosol is often highly

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Discussion paper

viscous or even glassy under atmospheric conditions with potentially significant consequences for heterogeneous chemistry and hygroscopicity of atmospheric aerosol. Since secondary organic aerosol consists of thousands of different compounds, prediction methods need to be validated for model systems before they may be used within a chemical oxidation scheme to predict viscosity of aged aerosol. However, data on viscosities for highly concentrated organic model systems are still sparse. The study of Grayson et al. will help in progressing towards the development of reliable prediction models for viscosity of atmospheric aerosol and as such well suited for publication in ACP.

The paper is well written, clear and with conclusions appropriately supported by experimental data. The paper should be published as is.

Minor comments:

I understand why the authors focus with the polyols on the change of viscosity with increasing functionalization. However, it would be also beneficial for testing prediction models to measure the effect of water content, i.e. performing measurements as different humidities. If the authors did perform such measurements they should be added to the paper.

In the description of the experimental techniques, I suggest to add the range of viscosities accessible with each technique to the respective sections.

Technical comments:

I do not like too much the notation the authors use to write the values for the viscosities in the text: “approximately 1e1 Pa s”. I suggest to use write those as 10 or whatever power of 10 is needed.

Similarly, at the end of section 3, change “0.1 orders of magnitude”. Just write by a factor of xxx (I do not know what you mean by 0.1 orders of magnitude, 10%?).

I do not see the need for having Fig. 6. Since you show all data in Fig. 7 showing just

it should be sufficient for the reader.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-672, 2016.