

***Interactive comment on* “The surface properties of SOA generated from limonene and toluene using specific molecular probes: exploration of a new experimental technique” by B. Demirdjian and M. J. Rossi**

Anonymous Referee #2

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This manuscript explores a new experimental technique to investigate the surface properties of organic particles. The manuscript is interesting and focuses on an important topic, but several points need to be addressed adequately before publication in ACP.

Comments:

The goal of the project is to investigate the surface properties of organic particles by interacting them with specific molecular probes. Recent work by Marcolli et al.1 suggest

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that most organic particles in the atmosphere are liquid since they consist of hundreds of different organic species. Does this new experimental technique apply to liquids? I would speculate that this technique will only be surface specific if the organic particles are solid or extremely viscous. Do the authors expect this technique to work for all types of organic particles? It would be beneficial to include a discussion at the beginning of the document on these points. Under what conditions do the authors expect this technique to be surface specific?

Related to the above discussion, on page 628 the authors comment that the value for limonene SOA is a factor of 32 larger than the number of molecules corresponding to a molecular monolayer, and this means that some diffusional exchange between the bulk and the surface of a limonene SOA droplet must occur on the time scale of the titration experiment. Hence, these results confirm that this technique is not specific to the surface, at least not for all types of organic particles. This should be stated clearly in the conclusions of the document, and also stated clearly in the abstract.

The authors are trying to investigate the surface properties of aerosol particles. The experiments that probe the surfaces of the particles are carried out at low pressures in a Knudsen flow reactor. Is it possible that the surfaces evaporate during the experiments? Perhaps the authors are investigating the bulk of the particles and not the “real” surface due to evaporation? The authors should include a section that addresses these points.

On page 618, the authors state, “we would like to point out, however, that most of the ozone has been taken out of the reactive flow by using the KI denuder upstream of the filter.” Do the authors know what fraction of the O₃ is removed by the denuder?

Please define k_{uni} and k_{esc} on page 623. Also, please discuss how these values were measured. Also, what assumptions go into Equation 7. Maybe give a reference for this equation.

Page 613: do the filters selectively remove certain particle sizes. In other words, what

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is the efficiency of the filters for collecting 50 nm, 100 nm and 200 nm particles? Is the efficiency the same for each size bin? If not, will this be a problem in the analysis?

On page 636 the authors discuss results obtained with FTIR optoacoustic spectroscopy. Are the peaks observed in the spectra due to surface species or bulk species? How do the authors (or this technique) separate these two contributions? A short discussion of the technique would be beneficial.

(1) Marcolli, C. et al. J. Phys. Chem. A 2004, 108, 2216.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 607, 2005.

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