

## ***Interactive comment on “Physical state of 2-methylbutane-1,2,3,4-tetraol in pure and internally mixed aerosols” by Jörn Lessmeier et al.***

### **Anonymous Referee #1**

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This manuscript investigated the phase state of tetraol, which is an important secondary organic aerosol component. The authors synthesized tetraol and studied the glass transition temperatures ( $T_g$ ) of tetraol in pure and mixed particles with another important oxidation product, 3-MBTCA. This manuscript derived the phase diagram of water/tetraol mixtures at the atmospheric relevant conditions and determined the water activity of water/tetraol mixtures as a function of temperature and solute mass concentration. This study provides a set of valuable data for the phase state important SOA at different temperature and humidity. Due to the lack of experience on the synthesis, I was not able to provide assessment on this part. Besides that, the experimental methods are valid and the scientific approach and discussion are sound. The paper is well written and organized. I recommend it for publication for a minor revision. Please see

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the following comments which the authors may want to consider in the revision.

Minor comments:

1. P11, L17-22, It is not trivial to understand the  $T_g$  with currently short description. It will be useful to provide details how the  $T_g$  was determined. It could be also useful to provide measured average values instead of  $T_g$  is about 200 K.
2. P13, L2-11, How does the  $T_g$  look like when using  $T_g(\text{dry})$  from the spray-dried samples? It is suggested to derived  $T_g$  using both  $T_g(\text{dry})$  from vacuum-dried and spray-dried samples, or provide uncertainties in Figure 2. Does the uncertainty in  $k_{GT}$  cover this variation? L5-6, the maximum error in the water mass fraction is estimated to be 0.03 (a) and 0.05(b), do you mean in figure 2(a) and 2(b)?
3. P14, L8-13, It will be great to provide the fitting parameters that could be directly used by the readers.
4. P16 section 3.4, is it possible to estimate the diffusion coefficient of water vapor using this water uptake/DSC experiment?

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